VDPAU

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Contents

Chapter 1

Video Decode and Presentation API for Unix

1.1 Introduction

The Video Decode and Presentation API for Unix (VDPAU) provides a complete solution for decoding, post-processing, compositing, and displaying compressed or uncompressed video streams. These video streams may be combined (composited) with bitmap content, to implement OSDs and other application user interfaces.

1.2 API Partitioning

VDPAU is split into two distinct modules:

- Core API
- Window System Integration Layer

The intent is that most VDPAU functionality exists and operates identically across all possible Windowing Systems. This functionality is the Core API.

However, a small amount of functionality must be included that is tightly coupled to the underlying Windowing System. This functionality is the Window System Integration Layer. Possibly examples include:

- Creation of the initial VDPAU VdpDevice handle, since this act requires intimate knowledge of the underlying Window System, such as specific display handle or driver identification.
- Conversion of VDPAU surfaces to/from underlying Window System surface types, e.g. to allow manipulation of VDPAU-generated surfaces via native Window System APIs.

1.3 Object Types

VDPAU is roughly object oriented; most functionality is exposed by creating an object (handle) of a certain class (type), then executing various functions against that handle. The set of object classes supported, and their purpose, is discussed below.

1.3.1 Device Type

A VdpDevice is the root object in VDPAU's object system. The Window System Integration Layer allows creation of a VdpDevice object handle, from which all other API entry points can be retrieved and invoked.

1.3.2 Surface Types

A surface stores pixel information. Various types of surfaces existing for different purposes:

- VdpVideoSurfaces store decompressed YCbCr video frames in an implementation-defined internal format.
- VdpOutputSurfaces store RGB 4:4:4 data. They are legal render targets for video post-processing and compositing operations.
- VdpBitmapSurfaces store RGB 4:4:4 data. These surfaces are designed to contain read-only bitmap data, to be used for OSD or application UI compositing.

1.3.3 Transfer Types

A data transfer object reads data from a surface (or surfaces), processes it, and writes the result to another surface. Various types of processing are possible:

- VdpDecoder objects process compressed video data, and generate decompressed images.
- VdpOutputSurfaces have their own rendering functionality.
- VdpVideoMixer objects perform video post-processing, de-interlacing, and compositing.
- VdpPresentationQueue is responsible for timestamp-based display of surfaces.

1.4 Data Flow

Compressed video data originates in the application's memory space. This memory is typically obtained using `malloc`, and filled via regular file or network read system calls. Alternatively, the application may `mmap` a file.

The compressed data is then processed using a VdpDecoder, which will decompress the field or frame, and write the result into a VdpVideoSurface. This action may require reading pixel data from some number of other VdpVideoSurface objects, depending on the type of compressed data and field/frame in question.

If the application wishes to display any form of OSD or user-interface, this must be created in a VdpOutputSurface.

This process begins with the creation of VdpBitmapSurface objects to contain the OSD/UI's static data, such as individual glyphs.

VdpOutputSurface rendering functionality may be used to composite together various VdpBitmapSurfaces and VdpOutputSurfaces, into another VdpOutputSurface "VdpOutputSurface".

Once video has been decoded, it must be post-processed. This involves various steps such as color space conversion, de-interlacing, and other video adjustments. This step is performed using an VdpVideoMixer object. This object can not only perform the aforementioned video post-processing, but also composite the video with a number of VdpOutputSurfaces, thus allowing complex user interfaces to be built. The final result is written into another VdpOutputSurface.

Note that at this point, the resultant VdpOutputSurface may be fed back through the above path, either using VdpOutputSurface rendering functionality, or as input to the VdpVideoMixer object.

Finally, the resultant VdpOutputSurface must be displayed on screen. This is the job of the VdpPresentationQueue object.

1.5 Entry Point Retrieval

VDPAU is designed so that multiple implementations can be used without application changes. For example, VDPAU could be hosted on X11, or via direct GPU access.

The key technology behind this is the use of function pointers and a "get proc address" style API for all entry points. Put another way, functions are not called directly via global symbols set up by the linker, but rather through pointers.

In practical terms, the Window System Integration Layer provides factory functions which not only create and return VdpDevice objects, but also a function pointer to a VdpGetProcAddress function, through which all entry point function pointers will be retrieved.

1.5.1 Philosophy

It is entirely possible to envisage a simpler scheme whereby such function pointers are hidden. That is, the application would link against a wrapper library that exposed "real" functions. The application would then call such functions directly, by symbol, like any other function. The wrapper library would handle loading the appropriate back-end, and implementing a similar "get proc address" scheme internally.

However, the above scheme does not work well in the context of separated Core API and Window System Integration Layer. In this scenario, one would require a separate wrapper library per Window System, since each Window System would have a different function name and prototype for the main factory function. If an application then wanted to be Window System agnostic (making final determination at run-time via some form of plugin), it may then need to link against two wrapper libraries, which would cause conflicts for all symbols other than the main factory function.

Another disadvantage of the wrapper library approach is the extra level of function call required; the wrapper library would internally implement the existing "get proc address" and "function pointer" style dispatch anyway. Exposing this directly to the application is slightly more efficient.

1.6 Multi-threading

All VDPAU functionality is fully thread-safe; any number of threads may call into any VDPAU functions at any time. VDPAU may not be called from signal-handlers.

Note, however, that this simply guarantees that internal VDPAU state will not be corrupted by thread usage, and that crashes and deadlocks will not occur. Completely arbitrary thread usage may not generate the results that an application desires. In particular, care must be taken when multiple threads are performing operations on the same VDPAU objects.

VDPAU implementations guarantee correct flow of surface content through the rendering pipeline, but only when function calls that read from or write to a surface return to the caller prior to any thread calling any other function(s) that read from or write to the surface. Invoking multiple reads from a surface in parallel is OK.

Note that this restriction is placed upon VDPAU function invocations, and specifically not upon any back-end hardware's physical rendering operations. VDPAU implementations are expected to internally synchronize such hardware operations.

In a single-threaded application, the above restriction comes naturally; each function call completes before it is possible to begin a new function call.

In a multi-threaded application, threads may need to be synchronized. For example, consider the situation where:

- Thread 1 is parsing compressed video data, passing them through a VdpDecoder object, and filling a ring-buffer of VdpVideoSurfaces
- Thread 2 is consuming those VdpVideoSurfaces, and using a VdpVideoMixer to process them and composite them with UI.

In this case, the threads must synchronize to ensure that thread 1's call to VdpDecoderRender has returned prior to thread 2's call(s) to VdpVideoMixerRender that use that specific surface. This could be achieved using the following pseudo-code:

```
Queue<VdpVideoSurface> q_full_surfaces;
Queue<VdpVideoSurface> q_empty_surfaces;

thread_1() {
    for (;;) {
        VdpVideoSurface s = q_empty_surfaces.get();
        // Parse compressed stream here
        VdpDecoderRender(s, ...);
        q_full_surfaces.put(s);
    }
}

// This would need to be more complex if
// VdpVideoMixerRender were to be provided with more
// than one field/frame at a time.
thread_2() {
    for (;;) {
        // Possibly, other rendering operations to mixer
        // layer surfaces here.
        VdpOutputSurface t = ...;
        VdpPresentationQueueBlockUntilSurfaceIdle(t);
        VdpVideoSurface s = q_full_surfaces.get();
        VdpVideoMixerRender(s, t, ...);
        q_empty_surfaces.put(s);
        // Possibly, other rendering operations to "t" here
        VdpPresentationQueueDisplay(t, ...);
    }
}
```

Finally, note that VDPAU makes no guarantees regarding any level of parallelism in any given implementation. Put another way, use of multi-threading is not guaranteed to yield any performance gain, and in theory could even slightly reduce performance due to threading/synchronization overhead.

However, the intent of the threading requirements is to allow for e.g. video decoding and video mixer operations to proceed in parallel in hardware. Given a (presumably multi-threaded) application that kept each portion of the hardware busy, this would yield a performance increase.

1.7 Surface Endianness

When dealing with surface content, i.e. the input/output of Put/GetBits functions, applications must take care to access memory in the correct fashion, so as to avoid endianness issues.

By established convention in the 3D graphics world, RGBA data is defined to be an array of 32-bit pixels containing packed RGBA components, not as an array of bytes or interleaved RGBA components. VDPAU follows this convention. As such, applications are expected to access such surfaces as arrays of 32-bit components (i.e. using a 32-bit pointer), and not as interleaved arrays of 8-bit components (i.e. using an 8-bit pointer.) Deviation from this convention will lead to endianness issues, unless appropriate care is taken.

The same convention is followed for some packed YCbCr formats such as VDP_YCBCR_FORMAT_Y8U8V8A8; i.e. they are considered arrays of 32-bit pixels, and hence should be accessed as such.

For YCbCr formats with chroma decimation and/or planar formats, however, this convention is awkward. Therefore, formats such as VDP_YCBCR_FORMAT_NV12 are defined as arrays of (potentially interleaved) byte-sized components. Hence, applications should manipulate such data 8-bits at a time, using 8-bit pointers.

Note that one common usage for the input/output of Put/GetBits APIs is file I/O. Typical file I/O APIs treat all memory as a simple array of 8-bit values. This violates the rule requiring surface data to be accessed in its true native format. As such, applications may be required to solve endianness issues. Possible solutions include:

- Authoring static UI data files according to the endianness of the target execution platform.
- Conditionally byte-swapping Put/GetBits data buffers at run-time based on execution platform.

Note: Complete details regarding each surface format's precise pixel layout is included with the documentation of each surface type. For example, see VDP_RGBA_FORMAT_B8G8R8A8.

1.8 Video Decoder Usage

VDPAU is a slice-level API. Put another way, VDPAU implementations accept "slice" data from the bitstream, and perform all required processing of those slices (e.g VLD decoding, IDCT, motion compensation, in-loop deblocking, etc.).

The client application is responsible for:

- Extracting the slices from the bitstream (e.g. parsing/demultiplexing container formats, scanning the data to determine slice start positions and slice sizes).
- Parsing various bitstream headers/structures (e.g. sequence header, sequence parameter set, picture parameter set, entry point structures, etc.) Various fields from the parsed header structures needs to be provided to VDPAU alongside the slice bitstream in a "picture info" structure.
- Surface management (e.g. H.264 DPB processing, display re-ordering)

It is recommended that applications pass solely the slice data to VDPAU; specifically that any header data structures be excluded from the portion of the bitstream passed to VDPAU. VDPAU implementations must operate correctly if non-slice data is included, at least for formats employing start codes to delimit slice data. However, any extra data may need to be uploaded to hardware for parsing thus lowering performance, and/or, in the worst case, may even overflow internal buffers that are sized solely for slice data.

The exact data that should be passed to VDPAU is detailed below for each supported format:

1.8.1 MPEG-1 and MPEG-2

Include all slices beginning with start codes 0x00000101 through 0x000001AF. The slice start code must be included for all slices.

1.8.2 H.264

Include all NALs with nal_unit_type of 1 or 5 (coded slice of non-IDR/IDR picture respectively). The complete slice start code (including 0x000001 prefix) must be included for all slices, even when the prefix is not included in the bitstream.

Note that if desired:

- The slice start code prefix may be included in a separate bitstream buffer array entry to the actual slice data extracted from the bitstream.
- Multiple bitstream buffer array entries (e.g. one per slice) may point at the same physical data storage for the slice start code prefix.

1.8.3 VC-1 Simple and Main Profile

VC-1 simple/main profile bitstreams always consist of a single slice per picture, and do not use start codes to delimit pictures. Instead, the container format must indicate where each picture begins/ends.

As such, no slice start codes should be included in the data passed to VDPAU; simply pass in the exact data from the bitstream.

Header information contained in the bitstream should be parsed by the application and passed to VDPAU using the "picture info" data structure; this header information explicitly must not be included in the bitstream data passed to VDPAU for this encoding format.

1.8.4 VC-1 Advanced Profile

Include all slices beginning with start codes 0x0000010D (frame), 0x0000010C (field) or 0x0000010B (slice). The slice start code should be included in all cases.

Some VC-1 advanced profile streams do not contain slice start codes; again, the container format must indicate where picture data begins and ends. In this case, pictures are assumed to be progressive and to contain a single slice. It is highly recommended that applications detect this condition, and add the missing start codes to the bitstream passed to VDPAU. However, VDPAU implementations must allow bitstreams with missing start codes, and act as if a 0x0000010D (frame) start code had been present.

Note that pictures containing multiple slices, or interlace streams, must contain a complete set of slice start codes in the original bitstream; without them, it is not possible to correctly parse and decode the stream.

The bitstream passed to VDPAU should contain all original emulation prevention bytes present in the original bitstream; do not remove these from the bitstream.

1.8.5 MPEG-4 Part 2 and DivX

Include all slices beginning with start codes 0x000001B6. The slice start code must be included for all slices.

1.8.6 H.265/HEVC - High Efficiency Video Codec

Include all video coding layer (VCL) NAL units, with nal_unit_type values of 0 (TRAIL_N) through 31 (RSV_VC↩ L31) inclusive. In addition to parsing and providing NAL units, an H.265/HEVC decoder application using VDPAU for decoding must parse certain values of the first slice segment header in a VCL NAL unit and provide it through VdpPictureInfoHEVC. Please see the documentation for VdpPictureInfoHEVC below for further details.

The complete slice start code (including the 0x000001 prefix) must be included for all slices, even when the prefix is not included in the bitstream.

Note that if desired:

- The slice start code prefix may be included in a separate bitstream buffer array entry to the actual slice data extracted from the bitstream.
- Multiple bitstream buffer array entries (e.g. one per slice) may point at the same physical data storage for the slice start code prefix.

1.9 Video Mixer Usage

1.9.1 VdpVideoSurface Content

Each VdpVideoSurface is expected to contain an entire frame's-worth of data, irrespective of whether an interlaced of progressive sequence is being decoded.

Depending on the exact encoding structure of the compressed video stream, the application may need to call VdpDecoderRender twice to fill a single VdpVideoSurface. When the stream contains an encoded progressive frame, or a "frame coded" interlaced field-pair, a single VdpDecoderRender call will fill the entire surface. When the stream contains separately encoded interlaced fields, two VdpDecoderRender calls will be required; one for the top field, and one for the bottom field.

Implementation note: When VdpDecoderRender renders an interlaced field, this operation must not disturb the content of the other field in the surface.

1.9.2 VdpVideoMixer Surface List

An video stream is logically composed of a sequence of fields. An example is shown below, in display order, assuming top field first:

```
t0 b0 t1 b1 t2 b2 t3 b3 t4 b4 t5 b5 t6 b6 t7 b7 t8 b8 t9 b9
```

The canonical usage is to call VdpVideoMixerRender once for decoded field, in display order, to yield one post-processed frame for display.

For each call to VdpVideoMixerRender, the field to be processed should be provided as the **video_surface_current** parameter.

To enable operation of advanced de-interlacing algorithms and/or post-processing algorithms, some past and/or future surfaces should be provided as context. These are provided in the **video_surface_past** and **video_surface_future** lists. In general, these lists may contain any number of surfaces. Specific implementations may have specific requirements determining the minimum required number of surfaces for optimal operation, and the maximum number of useful surfaces, beyond which surfaces are not used. It is recommended that in all cases other than plain bob/weave, at least 2 past and 1 future field be provided.

Note that it is entirely possible, in general, for any of the VdpVideoMixer post-processing steps other than de-interlacing to require access to multiple input fields/frames. For example, an motion-sensitive noise-reduction algorithm.

For example, when processing field t4, the VdpVideoMixerRender parameters may contain the following values, if the application chose to provide 3 fields of context for both the past and future:

```
current_picture_structure: VDP_VIDEO_MIXER_PICTURE_STRUCTURE_TOP_FIELD
past:    [b3, t3, b2]
current: t4
future:  [b4, t5, b5]
```

Note that for both the past/future lists, array index 0 represents the field temporally closest to current, in display order.

The VdpVideoMixerRender parameter **current_picture_structure** applies to **video_surface_current**. The picture structure for the other surfaces will be automatically derived from that for the current picture. The derivation algorithm is extremely simple; the concatenated list past/current/future is simply assumed to have an alternating top/bottom pattern throughout.

Continuing the example above, subsequent calls to VdpVideoMixerRender would provide the following sets of parameters:

```
current_picture_structure: VDP_VIDEO_MIXER_PICTURE_STRUCTURE_BOTTOM_FIELD
past:    [t4, b3, t3]
current: b4
future:  [t5, b5, t6]
```

then:

```
current_picture_structure: VDP_VIDEO_MIXER_PICTURE_STRUCTURE_TOP_FIELD
past:    [b4, t4, b3]
current: t5
future:  [b5, t6, b7]
```

In other words, the concatenated list of past/current/future frames simply forms a window that slides through the sequence of decoded fields.

It is syntactically legal for an application to choose not to provide a particular entry in the past or future lists. In this case, the "slot" in the surface list must be filled with the special value VDP_INVALID_HANDLE, to explicitly indicate that the picture is missing; do not simply shuffle other surfaces together to fill in the gap. Note that entries should only be omitted under special circumstances, such as failed decode due to bitstream error during picture header parsing, since missing entries will typically cause advanced de-interlacing algorithms to experience significantly degraded operation.

Specific examples for different de-interlacing types are presented below.

1.9.3 Weave De-interlacing

Weave de-interlacing is the act of interleaving the lines of two temporally adjacent fields to form a frame for display.

To disable de-interlacing for progressive streams, simply specify **current_picture_structure** as VDP_VIDEO_M↩IXER_PICTURE_STRUCTURE_FRAME; no de-interlacing will be applied.

Weave de-interlacing for interlaced streams is identical to disabling de-interlacing, as describe immediately above, because each VdpVideoSurface; Video Surface object already contains an entire frame's worth (i.e. two fields) of picture data.

Inverse telecine is disabled when using weave de-interlacing.

Weave de-interlacing produces one output frame for each input frame. The application should make one Vdp↩VideoMixerRender call per pair of decoded fields, or per decoded frame.

Weave de-interlacing requires no entries in the past/future lists.

All implementations must support weave de-interlacing.

1.9.4 Bob De-interlacing

Bob de-interlacing is the act of vertically scaling a single field to the size of a single frame.

To achieve bob de-interlacing, simply provide a single field as **video_surface_current**, and set **current_picture_structure** appropriately, to indicate whether a top or bottom field was provided.

Inverse telecine is disabled when using bob de-interlacing.

Bob de-interlacing produces one output frame for each input field. The application should make one VdpVideoMixerRender call per decoded field.

Bob de-interlacing requires no entries in the past/future lists.

Bob de-interlacing is the default when no advanced method is requested and enabled. Advanced de-interlacing algorithms may fall back to bob e.g. when required past/future fields are missing.

All implementations must support bob de-interlacing.

1.9.5 Advanced De-interlacing

Operation of both temporal and temporal-spatial de-interlacing is identical; the only difference is the internal processing the algorithm performs in generating the output frame.

These algorithms use various advanced processing on the pixels of both the current and various past/future fields in order to determine how best to de-interlacing individual portions of the image.

Inverse telecine may be enabled when using advanced de-interlacing.

Advanced de-interlacing produces one output frame for each input field. The application should make one VdpVideoMixerRender call per decoded field.

Advanced de-interlacing requires entries in the past/future lists.

Availability of advanced de-interlacing algorithms is implementation dependent.

1.9.6 De-interlacing Rate

For all de-interlacing algorithms except weave, a choice may be made to call VdpVideoMixerRender for either each decoded field, or every second decoded field.

If VdpVideoMixerRender is called for every decoded field, the generated post-processed frame rate is equal to the decoded field rate. Put another way, the generated post-processed nominal field rate is equal to 2x the decoded field rate. This is standard practice.

If VdpVideoMixerRender is called for every second decoded field (say every top field), the generated post-processed frame rate is half to the decoded field rate. This mode of operation is thus referred to as "half-rate".

Implementations may choose whether to support half-rate de-interlacing or not. Regular full-rate de-interlacing should be supported by any supported advanced de-interlacing algorithm.

The descriptions of de-interlacing algorithms above assume that regular (not half-rate) operation is being performed, when detailing the number of VdpVideoMixerRender calls.

Recall that the concatenation of past/current/future surface lists simply forms a window into the stream of decoded fields. To achieve standard de-interlacing, the window is slid through the list of decoded fields one field at a time, and a call is made to VdpVideoMixerRender for each movement of the window. To achieve half-rate de-interlacing, the window is slid through the∗ list of decoded fields two fields at a time, and a call is made to VdpVideoMixerRender for each movement of the window.

1.9.7 Inverse Telecine

Assuming the implementation supports it, inverse telecine may be enabled alongside any advanced de-interlacing algorithm. Inverse telecine is never active for bob or weave.

Operation of VdpVideoMixerRender with inverse telecine active is identical to the basic operation mechanisms describe above in every way; all inverse telecine processing is performed internally to the VdpVideoMixer.

In particular, there is no provision way for VdpVideoMixerRender to indicate when identical input fields have been observed, and consequently identical output frames may have been produced.

De-interlacing (and inverse telecine) may be applied to streams that are marked as being progressive. This will allow detection of, and correct de-interlacing of, mixed interlace/progressive streams, bad edits, etc. To implement de-interlacing/inverse-telecine on progressive material, simply treat the stream of decoded frames as a stream of decoded fields, apply any telecine flags (see the next section), and then apply de-interlacing to those fields as described above.

Implementations are free to determine whether inverse telecine operates in conjunction with half-rate de-interlacing or not. It should always operate with regular de-interlacing, when advertized.

1.9.8 Telecine (Pull-Down) Flags

Some media delivery formats, e.g. DVD-Video, include flags that are intended to modify the decoded field sequence before display. This allows e.g. 24p content to be encoded at 48i, which saves space relative to a 60i encoded stream, but still displayed at 60i, to match target consumer display equipment.

If the inverse telecine option is not activated in the VdpVideoMixer, these flags should be ignored, and the decoded fields passed directly to VdpVideoMixerRender as detailed above.

However, to make full use of the inverse telecine feature, these flags should be applied to the field stream, yielding another field stream with some repeated fields, before passing the field stream to VdpVideoMixerRender. In this scenario, the sliding window mentioned in the descriptions above applies to the field stream after application of flags.

1.10 Extending the API

1.10.1 Enumerations and Other Constants

VDPAU defines a number of enumeration types.

When modifying VDPAU, existing enumeration constants must continue to exist (although they may be deprecated), and do so in the existing order.

The above discussion naturally applies to "manually" defined enumerations, using pre-processor macros, too.

1.10.2 Structures

In most case, VDPAU includes no provision for modifying existing structure definitions, although they may be deprecated.

New structures may be created, together with new API entry points or feature/attribute/parameter values, to expose new functionality.

A few structures are considered plausible candidates for future extension. Such structures include a version number as the first field, indicating the exact layout of the client-provided data. When changing such structures, the old structure must be preserved and a new structure created. This allows applications built against the old version of the structure to continue to interoperate. For example, to extend the VdpProcamp structure, define a new VdpProcamp1 and update VdpGenerateCSCMatrix to take the new structure as an argument. Document in a comment that the caller must fill the struct_version field with the value 1. VDPAU implementations should use the struct_version field to determine which version of the structure the application was built against. Note that you cannot simply increment the value of VDP_PROCAMP_VERSION because applications recompiled against a newer version of vdpau.h but that have not been updated to use the new structure must still report that they're using version 0.

Note that the layouts of VdpPictureInfo structures are defined by their corresponding VdpDecoderProfile numbers, so no struct_version field is needed for them. This layout includes the size of the structure, so new profiles that extend existing functionality may incorporate the old VdpPictureInfo as a substructure, but may not modify existing VdpPictureInfo structures.

1.10.3 Functions

Existing functions may not be modified, although they may be deprecated.

New functions may be added at will. Note the enumeration requirements when modifying the enumeration that defines the list of entry points.

1.11 Display Preemption

Please note that the display may be preempted away from VDPAU at any time. See Display Preemption for more details.

1.11.1 Trademarks

VDPAU is a trademark of NVIDIA Corporation. You may freely use the VDPAU trademark, as long as trademark ownership is attributed to NVIDIA Corporation.

Chapter 2

Module Index

2.1 Modules

Here is a list of all modules:

Chapter 3

Data Structure Index

3.1 Data Structures

Here are the data structures with brief descriptions:

Chapter 4

File Index

4.1 File List

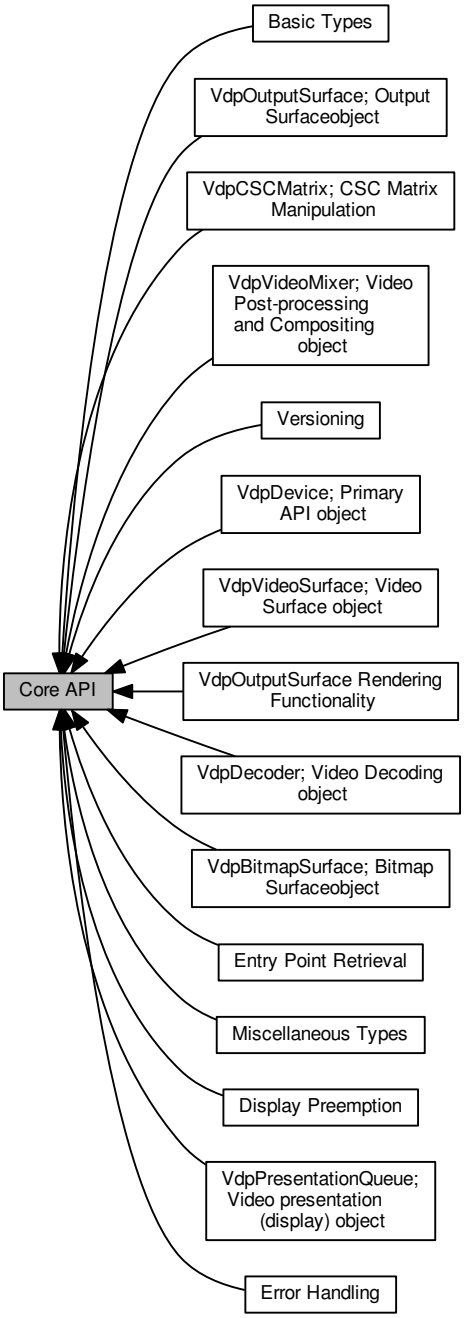
Here is a list of all files with brief descriptions:

Chapter 5

Module Documentation

5.1 Core API

Collaboration diagram for Core API:



Modules

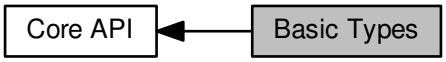
- Basic Types
- Miscellaneous Types

5.1.1 Detailed Description

The core API encompasses all VDPAU functionality that operates in the same fashion across all Window Systems.

5.2 Basic Types

Collaboration diagram for Basic Types:



Macros

- #define VDP_TRUE 1
  A true VdpBool value.
- #define VDP_FALSE 0
  A false VdpBool value.

Typedefs

- typedef int VdpBool
  A boolean value, holding VDP_TRUE or VDP_FALSE.

5.2.1 Detailed Description

VDPAU primarily uses ISO C99 types from `stdint.h`.

5.2.2 Macro Definition Documentation

5.2.2.1 #define VDP_FALSE 0

A false VdpBool value.

5.2.2.2 #define VDP_TRUE 1

A true VdpBool value.

5.2.3 Typedef Documentation

5.2.3.1 typedef int VdpBool

A boolean value, holding VDP_TRUE or VDP_FALSE.

5.3 Miscellaneous Types

Collaboration diagram for Miscellaneous Types:

Data Structures

- struct VdpPoint

  A location within a surface.
- struct VdpRect

  A rectangular region of a surface.
- struct VdpColor

Macros

- #define VDP_INVALID_HANDLE 0xffffffffU

  An invalid object handle value.
- #define VDP_CHROMA_TYPE_420

  4:2:0 chroma format.
- #define VDP_CHROMA_TYPE_422

  4:2:2 chroma format.
- #define VDP_CHROMA_TYPE_444

  4:4:4 chroma format.
- #define VDP_YCBCR_FORMAT_NV12

  The "NV12" YCbCr surface format.
- #define VDP_YCBCR_FORMAT_YV12

  The "YV12" YCbCr surface format.
- #define VDP_YCBCR_FORMAT_UYVY

  The "UYVY" YCbCr surface format.
- #define VDP_YCBCR_FORMAT_YUYV

  The "YUYV" YCbCr surface format.
- #define VDP_YCBCR_FORMAT_Y8U8V8A8

  A packed YCbCr format.
- #define VDP_YCBCR_FORMAT_V8U8Y8A8

  A packed YCbCr format.
- #define VDP_RGBA_FORMAT_B8G8R8A8

  A packed RGB format.
- #define VDP_RGBA_FORMAT_R8G8B8A8

  A packed RGB format.
- #define VDP_RGBA_FORMAT_R10G10B10A2

  A packed RGB format.

- #define VDP_RGBA_FORMAT_B10G10R10A2
  A packed RGB format.
- #define VDP_RGBA_FORMAT_A8
  An alpha-only surface format.
- #define VDP_INDEXED_FORMAT_A4I4
  A 4-bit indexed format, with alpha.
- #define VDP_INDEXED_FORMAT_I4A4
  A 4-bit indexed format, with alpha.
- #define VDP_INDEXED_FORMAT_A8I8
  A 8-bit indexed format, with alpha.
- #define VDP_INDEXED_FORMAT_I8A8
  A 8-bit indexed format, with alpha.

Typedefs

- typedef uint32_t VdpChromaType
  The set of all chroma formats for VdpVideoSurfaces.
- typedef uint32_t VdpYCbCrFormat
  The set of all known YCbCr surface formats.
- typedef uint32_t VdpRGBAFormat
  The set of all known RGB surface formats.
- typedef uint32_t VdpIndexedFormat
  The set of all known indexed surface formats.

5.3.1 Detailed Description

5.3.2 Macro Definition Documentation

5.3.2.1 #define VDP_CHROMA_TYPE_420

4:2:0 chroma format.

5.3.2.2 #define VDP_CHROMA_TYPE_422

4:2:2 chroma format.

5.3.2.3 #define VDP_CHROMA_TYPE_444

4:4:4 chroma format.

5.3.2.4 #define VDP_INDEXED_FORMAT_A4I4

A 4-bit indexed format, with alpha.

This format has a single plane.

This plane is an array of byte-sized components. Within each byte, bits [7:4] contain I (index), and bits [3:0] contain A.

Applications should access this data via a uint8_t pointer.

5.3.2.5 #define VDP_INDEXED_FORMAT_A8I8

A 8-bit indexed format, with alpha.

This format has a single plane.

This plane is an array of interleaved byte-sized A and I (index) components, in the order A, I, A, I.

Applications should access this data via a uint8_t pointer.

5.3.2.6 #define VDP_INDEXED_FORMAT_I4A4

A 4-bit indexed format, with alpha.

This format has a single plane.

This plane is an array of byte-sized components. Within each byte, bits [7:4] contain A, and bits [3:0] contain I (index).

Applications should access this data via a uint8_t pointer.

5.3.2.7 #define VDP_INDEXED_FORMAT_I8A8

A 8-bit indexed format, with alpha.

This format has a single plane.

This plane is an array of interleaved byte-sized A and I (index) components, in the order I, A, I, A.

Applications should access this data via a uint8_t pointer.

5.3.2.8 #define VDP_INVALID_HANDLE 0xffffffffU

An invalid object handle value.

This value may be used to represent an invalid, or non-existent, object (VdpDevice, VdpVideoSurface, etc.)

Note that most APIs require valid object handles in all cases, and will fail when presented with this value.

5.3.2.9 #define VDP_RGBA_FORMAT_A8

An alpha-only surface format.

This format has a single plane.

This plane is an array of byte-sized components.

Applications should access this data via a uint8_t pointer.

5.3.2.10 #define VDP_RGBA_FORMAT_B10G10R10A2

A packed RGB format.

This format has a single plane.

This plane is an array packed 32-bit pixel data. Within each 32-bit pixel, bits [31:30] contain A, bits [29:20] contain R, bits [19:10] contain G, and bits [9:0] contain B.

Applications should access this data via a uint32_t pointer.

5.3.2.11 #define VDP_RGBA_FORMAT_B8G8R8A8

A packed RGB format.

This format has a single plane.

This plane is an array packed 32-bit pixel data. Within each 32-bit pixel, bits [31:24] contain A, bits [23:16] contain R, bits [15:8] contain G, and bits [7:0] contain B.

Applications should access this data via a uint32_t pointer.

5.3.2.12 #define VDP_RGBA_FORMAT_R10G10B10A2

A packed RGB format.

This format has a single plane.

This plane is an array packed 32-bit pixel data. Within each 32-bit pixel, bits [31:30] contain A, bits [29:20] contain B, bits [19:10] contain G, and bits [9:0] contain R.

Applications should access this data via a uint32_t pointer.

5.3.2.13 #define VDP_RGBA_FORMAT_R8G8B8A8

A packed RGB format.

This format has a single plane.

This plane is an array packed 32-bit pixel data. Within each 32-bit pixel, bits [31:24] contain A, bits [23:16] contain B, bits [15:8] contain G, and bits [7:0] contain R.

Applications should access this data via a uint32_t pointer.

5.3.2.14 #define VDP_YCBCR_FORMAT_NV12

The "NV12" YCbCr surface format.

This format has a two planes, a Y plane and a UV plane.

The Y plane is an array of byte-sized Y components. Applications should access this data via a uint8_t pointer.

The UV plane is an array of interleaved byte-sized U and V components, in the order U, V, U, V. Applications should access this data via a uint8_t pointer.

5.3.2.15 #define VDP_YCBCR_FORMAT_UYVY

The "UYVY" YCbCr surface format.

This format may also be known as Y422, UYNV, HDYC.

This format has a single plane.

This plane is an array of interleaved byte-sized Y, U, and V components, in the order U, Y, V, Y, U, Y, V, Y.

Applications should access this data via a uint8_t pointer.

5.3.2.16 #define VDP_YCBCR_FORMAT_V8U8Y8A8

A packed YCbCr format.

This format has a single plane.

This plane is an array packed 32-bit pixel data. Within each 32-bit pixel, bits [31:24] contain A, bits [23:16] contain Y, bits [15:8] contain U, and bits [7:0] contain V.

Applications should access this data via a uint32_t pointer.

5.3.2.17 #define VDP_YCBCR_FORMAT_Y8U8V8A8

A packed YCbCr format.

This format has a single plane.

This plane is an array packed 32-bit pixel data. Within each 32-bit pixel, bits [31:24] contain A, bits [23:16] contain V, bits [15:8] contain U, and bits [7:0] contain Y.

Applications should access this data via a uint32_t pointer.

5.3.2.18 #define VDP_YCBCR_FORMAT_YUYV

The "YUYV" YCbCr surface format.

This format may also be known as YUY2, YUNV, V422.

This format has a single plane.

This plane is an array of interleaved byte-sized Y, U, and V components, in the order Y, U, Y, V, Y, U, Y, V.

Applications should access this data via a uint8_t pointer.

5.3.2.19 #define VDP_YCBCR_FORMAT_YV12

The "YV12" YCbCr surface format.

This format has a three planes, a Y plane, a V plane, and a U plane.

Each of the planes is an array of byte-sized components.

Applications should access this data via a uint8_t pointer.

5.3.3 Typedef Documentation

5.3.3.1 typedef uint32_t VdpChromaType

The set of all chroma formats for VdpVideoSurfaces.

5.3.3.2 typedef uint32_t VdpIndexedFormat

The set of all known indexed surface formats.

5.3.3.3 typedef uint32_t VdpRGBAFormat

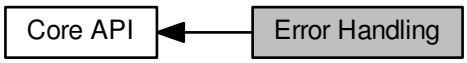
The set of all known RGB surface formats.

5.3.3.4 typedef uint32_t VdpYCbCrFormat

The set of all known YCbCr surface formats.

5.4 Error Handling

Collaboration diagram for Error Handling:



Typedefs

- typedef char const * VdpGetErrorString(VdpStatus status)

  Retrieve a string describing an error code.

Enumerations

- enum VdpStatus {
  VDP_STATUS_OK = 0, VDP_STATUS_NO_IMPLEMENTATION, VDP_STATUS_DISPLAY_PREEMPTED,
  VDP_STATUS_INVALID_HANDLE,
  VDP_STATUS_INVALID_POINTER, VDP_STATUS_INVALID_CHROMA_TYPE, VDP_STATUS_INVALI↩
  D_Y_CB_CR_FORMAT, VDP_STATUS_INVALID_RGBA_FORMAT,
  VDP_STATUS_INVALID_INDEXED_FORMAT, VDP_STATUS_INVALID_COLOR_STANDARD, VDP_ST↩
  ATUS_INVALID_COLOR_TABLE_FORMAT, VDP_STATUS_INVALID_BLEND_FACTOR,
  VDP_STATUS_INVALID_BLEND_EQUATION, VDP_STATUS_INVALID_FLAG, VDP_STATUS_INVALID↩
  _DECODER_PROFILE, VDP_STATUS_INVALID_VIDEO_MIXER_FEATURE,
  VDP_STATUS_INVALID_VIDEO_MIXER_PARAMETER, VDP_STATUS_INVALID_VIDEO_MIXER_ATT↩
  RIBUTE, VDP_STATUS_INVALID_VIDEO_MIXER_PICTURE_STRUCTURE, VDP_STATUS_INVALID_↩
  FUNC_ID,
  VDP_STATUS_INVALID_SIZE, VDP_STATUS_INVALID_VALUE, VDP_STATUS_INVALID_STRUCT_V↩
  ERSION, VDP_STATUS_RESOURCES,
  VDP_STATUS_HANDLE_DEVICE_MISMATCH, VDP_STATUS_ERROR }

  The set of all possible error codes.

5.4.1 Detailed Description

5.4.2 Typedef Documentation

5.4.2.1 typedef char const* VdpGetErrorString(VdpStatus status)

Retrieve a string describing an error code.

Parameters

in	*status*	The error code.

Returns

A pointer to the string. Note that this is a statically allocated read-only string. As such, the application must not free the returned pointer. The pointer is valid as long as the VDPAU implementation is present within the application's address space.

5.4.3 Enumeration Type Documentation

5.4.3.1 enum VdpStatus

The set of all possible error codes.

Enumerator

VDP_STATUS_OK The operation completed successfully; no error.

VDP_STATUS_NO_IMPLEMENTATION No backend implementation could be loaded.

VDP_STATUS_DISPLAY_PREEMPTED The display was preempted, or a fatal error occurred.
The application must re-initialize VDPAU.

VDP_STATUS_INVALID_HANDLE An invalid handle value was provided.
Either the handle does not exist at all, or refers to an object of an incorrect type.

VDP_STATUS_INVALID_POINTER An invalid pointer was provided.
Typically, this means that a NULL pointer was provided for an "output" parameter.

VDP_STATUS_INVALID_CHROMA_TYPE An invalid/unsupported VdpChromaType value was supplied.

VDP_STATUS_INVALID_Y_CB_CR_FORMAT An invalid/unsupported VdpYCbCrFormat value was supplied.

VDP_STATUS_INVALID_RGBA_FORMAT An invalid/unsupported VdpRGBAFormat value was supplied.

VDP_STATUS_INVALID_INDEXED_FORMAT An invalid/unsupported VdpIndexedFormat value was supplied.

VDP_STATUS_INVALID_COLOR_STANDARD An invalid/unsupported VdpColorStandard value was supplied.

VDP_STATUS_INVALID_COLOR_TABLE_FORMAT An invalid/unsupported VdpColorTableFormat value was supplied.

VDP_STATUS_INVALID_BLEND_FACTOR An invalid/unsupported VdpOutputSurfaceRenderBlendFactor value was supplied.

VDP_STATUS_INVALID_BLEND_EQUATION An invalid/unsupported VdpOutputSurfaceRenderBlendEquation value was supplied.

VDP_STATUS_INVALID_FLAG An invalid/unsupported flag value/combination was supplied.

VDP_STATUS_INVALID_DECODER_PROFILE An invalid/unsupported VdpDecoderProfile value was supplied.

VDP_STATUS_INVALID_VIDEO_MIXER_FEATURE An invalid/unsupported VdpVideoMixerFeature value was supplied.

VDP_STATUS_INVALID_VIDEO_MIXER_PARAMETER An invalid/unsupported VdpVideoMixerParameter value was supplied.

VDP_STATUS_INVALID_VIDEO_MIXER_ATTRIBUTE An invalid/unsupported VdpVideoMixerAttribute value was supplied.

VDP_STATUS_INVALID_VIDEO_MIXER_PICTURE_STRUCTURE An invalid/unsupported VdpVideoMixerPictureStructure value was supplied.

VDP_STATUS_INVALID_FUNC_ID An invalid/unsupported VdpFuncId value was supplied.

VDP_STATUS_INVALID_SIZE The size of a supplied object does not match the object it is being used with.

For example, a VdpVideoMixer is configured to process VdpVideoSurface objects of a specific size. If presented with a VdpVideoSurface of a different size, this error will be raised.

VDP_STATUS_INVALID_VALUE An invalid/unsupported value was supplied.

This is a catch-all error code for values of type other than those with a specific error code.

VDP_STATUS_INVALID_STRUCT_VERSION An invalid/unsupported structure version was specified in a versioned structure. This implies that the implementation is older than the header file the application was built against.

VDP_STATUS_RESOURCES The system does not have enough resources to complete the requested operation at this time.

VDP_STATUS_HANDLE_DEVICE_MISMATCH The set of handles supplied are not all related to the same VdpDevice.

When performing operations that operate on multiple surfaces, such as VdpOutputSurfaceRender↩OutputSurface or VdpVideoMixerRender, all supplied surfaces must have been created within the context of the same VdpDevice object. This error is raised if they were not.

VDP_STATUS_ERROR A catch-all error, used when no other error code applies.

5.5 Versioning

Collaboration diagram for Versioning:

Macros

- #define VDPAU_INTERFACE_VERSION 1

  The VDPAU interface version described by this header file.
- #define VDPAU_VERSION 1

  The VDPAU version described by this header file.

Typedefs

- typedef VdpStatus VdpGetApiVersion(uint32_t *api_version)

  Retrieve the VDPAU version implemented by the backend.
- typedef VdpStatus VdpGetInformationString(char const **information_string)

  Retrieve an implementation-specific string description of the implementation. This typically includes detailed version information.

5.5.1 Detailed Description

5.5.2 Macro Definition Documentation

5.5.2.1 #define VDPAU_INTERFACE_VERSION 1

The VDPAU interface version described by this header file.

This version will only increase if a major incompatible change is made. For example, if the parameters passed to an existing function are modified, rather than simply adding new functions/enumerations), or if the mechanism used to load the backend driver is modified incompatibly. Such changes are unlikely.

This value also represents the DSO version of VDPAU-related shared-libraries.

VDPAU version numbers are simple integers that increase monotonically (typically by value 1).

5.5.2.2 #define VDPAU_VERSION 1

The VDPAU version described by this header file.

This version will increase whenever any non-documentation change is made to vdpau.h, or related header files such as vdpau_x11.h. Such changes typically involve the addition of new functions, constants, or features. Such changes are expected to be completely backwards-compatible.

VDPAU version numbers are simple integers that increase monotonically (typically by value 1).

5.5.3 Typedef Documentation

5.5.3.1 typedef VdpStatus VdpGetApiVersion(uint32_t *api_version)

Retrieve the VDPAU version implemented by the backend.

Parameters

out	*api_version*	The API version.

Returns

VdpStatus The completion status of the operation.

5.5.3.2 typedef VdpStatus VdpGetInformationString(char const **information_string)

Retrieve an implementation-specific string description of the implementation. This typically includes detailed version information.

Parameters

out	*information_string*	A pointer to the information string. Note that this is a statically allocated read-only string. As such, the application must not free the returned pointer. The pointer is valid as long as the implementation is present within the application's address space.

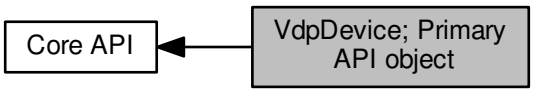
Returns

VdpStatus The completion status of the operation.

Note that the returned string is useful for information reporting. It is not intended that the application should parse this string in order to determine any information about the implementation.

5.6 VdpDevice; Primary API object

Collaboration diagram for VdpDevice; Primary API object:



Typedefs

- typedef uint32_t VdpDevice

  An opaque handle representing a VdpDevice object.
- typedef VdpStatus VdpDeviceDestroy(VdpDevice device)

  Destroy a VdpDevice.

5.6.1 Detailed Description

The VdpDevice is the root of the VDPAU object system. Using a VdpDevice object, all other object types may be created. See the sections describing those other object types for details on object creation.

Note that VdpDevice objects are created using the Window System Integration Layer.

5.6.2 Typedef Documentation

5.6.2.1 typedef uint32_t VdpDevice

An opaque handle representing a VdpDevice object.

5.6.2.2 typedef VdpStatus VdpDeviceDestroy(VdpDevice device)

Destroy a VdpDevice.

Parameters

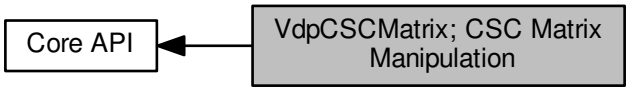
in	*device*	The device to destroy.

Returns

VdpStatus The completion status of the operation.

5.7 VdpCSCMatrix; CSC Matrix Manipulation

Collaboration diagram for VdpCSCMatrix; CSC Matrix Manipulation:



Data Structures

- struct VdpProcamp

  Procamp operation parameterization data.

Macros

- #define VDP_PROCAMP_VERSION 0
- #define VDP_COLOR_STANDARD_ITUR_BT_601

  ITU-R BT.601.
- #define VDP_COLOR_STANDARD_ITUR_BT_709

  ITU-R BT.709.
- #define VDP_COLOR_STANDARD_SMPTE_240M

  SMPTE-240M.

Typedefs

- typedef float VdpCSCMatrix[3][4]

  Storage for a color space conversion matrix.
- typedef uint32_t VdpColorStandard

  YCbCr color space specification.
- typedef VdpStatus VdpGenerateCSCMatrix(VdpProcamp *procamp, VdpColorStandard standard, VdpCSCMatrix *csc_matrix)

  Generate a color space conversion matrix.

5.7.1 Detailed Description

When converting from YCbCr to RGB data formats, a color space conversion operation must be performed. This operation is parameterized using a "color space conversion matrix". The VdpCSCMatrix is a data structure representing this information.

5.7.2 Macro Definition Documentation

5.7.2.1 #define VDP_COLOR_STANDARD_ITUR_BT_601

ITU-R BT.601.

5.7.2.2 #define VDP_COLOR_STANDARD_ITUR_BT_709

ITU-R BT.709.

5.7.2.3 #define VDP_COLOR_STANDARD_SMPTE_240M

SMPTE-240M.

5.7.2.4 #define VDP_PROCAMP_VERSION 0

5.7.3 Typedef Documentation

5.7.3.1 typedef uint32_t VdpColorStandard

YCbCr color space specification.

A number of YCbCr color spaces exist. This enumeration defines the specifications known to VDPAU.

5.7.3.2 typedef float VdpCSCMatrix[3][4]

Storage for a color space conversion matrix.

Note that the application may choose to construct the matrix content by either:

- Directly filling in the fields of the CSC matrix
- Using the VdpGenerateCSCMatrix helper function.

The color space conversion equation is as follows:

$$\begin{pmatrix} R \\ G \\ B \end{pmatrix} = \begin{pmatrix} m_{0,0} & m_{0,1} & m_{0,2} & m_{0,3} \\ m_{1,0} & m_{1,1} & m_{1,2} & m_{1,3} \\ m_{2,0} & m_{2,1} & m_{2,2} & m_{2,3} \end{pmatrix} * \begin{pmatrix} Y \\ Cb \\ Cr \\ 1.0 \end{pmatrix}$$

5.7.3.3 typedef VdpStatus VdpGenerateCSCMatrix(VdpProcamp *procamp, VdpColorStandard standard, VdpCSCMatrix *csc_matrix)

Generate a color space conversion matrix.

Parameters

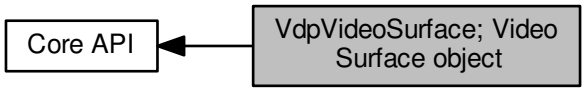
in	*procamp*	The procamp adjustments to make. If NULL, no adjustments will be made.
in	*standard*	The YCbCr color space to convert from.
out	*csc_matrix*	The CSC matrix to initialize.

Returns

VdpStatus The completion status of the operation.

5.8 VdpVideoSurface; Video Surface object

Collaboration diagram for VdpVideoSurface; Video Surface object:



Typedefs

- typedef VdpStatus VdpVideoSurfaceQueryCapabilities(VdpDevice device, VdpChromaType surface_chroma_type, VdpBool *is_supported, uint32_t *max_width, uint32_t *max_height)

  Query the implementation's VdpVideoSurface capabilities.
- typedef VdpStatus VdpVideoSurfaceQueryGetPutBitsYCbCrCapabilities(VdpDevice device, VdpChromaType surface_chroma_type, VdpYCbCrFormat bits_ycbcr_format, VdpBool *is_supported)

  Query the implementation's VdpVideoSurface GetBits/PutBits capabilities.
- typedef uint32_t VdpVideoSurface

  An opaque handle representing a VdpVideoSurface object.
- typedef VdpStatus VdpVideoSurfaceCreate(VdpDevice device, VdpChromaType chroma_type, uint32_t width, uint32_t height, VdpVideoSurface *surface)

  Create a VdpVideoSurface.
- typedef VdpStatus VdpVideoSurfaceDestroy(VdpVideoSurface surface)

  Destroy a VdpVideoSurface.
- typedef VdpStatus VdpVideoSurfaceGetParameters(VdpVideoSurface surface, VdpChromaType *chroma_type, uint32_t *width, uint32_t *height)

  Retrieve the parameters used to create a VdpVideoSurface.
- typedef VdpStatus VdpVideoSurfaceGetBitsYCbCr(VdpVideoSurface surface, VdpYCbCrFormat destination_ycbcr_format, void *const *destination_data, uint32_t const *destination_pitches)

  Copy image data from a VdpVideoSurface to application memory in a specified YCbCr format.
- typedef VdpStatus VdpVideoSurfacePutBitsYCbCr(VdpVideoSurface surface, VdpYCbCrFormat source_ycbcr_format, void const *const *source_data, uint32_t const *source_pitches)

  Copy image data from application memory in a specific YCbCr format to a VdpVideoSurface.

5.8.1 Detailed Description

A VdpVideoSurface stores YCbCr data in an internal format, with a variety of possible chroma sub-sampling options.

A VdpVideoSurface may be filled with:

- Data provided by the CPU via VdpVideoSurfacePutBitsYCbCr (i.e. software decode.)
- The result of applying a VdpDecoder to compressed video data.

VdpVideoSurface content may be accessed by:

- The application via VdpVideoSurfaceGetBitsYCbCr
- The Hardware that implements VdpOutputSurface rendering functionality.
- The Hardware the implements VdpVideoMixer functionality.

VdpVideoSurfaces are not directly displayable. They must be converted into a displayable format using VdpVideoMixer objects.

See Video Mixer Usage for additional information.

5.8.2 Typedef Documentation

5.8.2.1 typedef uint32_t VdpVideoSurface

An opaque handle representing a VdpVideoSurface object.

5.8.2.2 typedef VdpStatus VdpVideoSurfaceCreate(VdpDevice device, VdpChromaType chroma_type, uint32_t width, uint32_t height,VdpVideoSurface *surface)

Create a VdpVideoSurface.

Parameters

in	*device*	The device that will contain the surface.
in	*chroma_type*	The chroma type of the new surface.
in	*width*	The width of the new surface.
in	*height*	The height of the new surface.
out	*surface*	The new surface's handle.

Returns

VdpStatus The completion status of the operation.

The memory backing the surface may not be initialized during creation. Applications are expected to initialize any region that they use, via VdpDecoderRender or VdpVideoSurfacePutBitsYCbCr.

Note that certain widths/heights are impossible for specific values of chroma_type. For example, the definition of VDP_CHROMA_TYPE_420 implies that the width must be even, since each single chroma sample covers two luma samples horizontally. A similar argument applies to surface heights, although doubly so, since interlaced pictures must be supported; each field's height must itself be a multiple of 2. Hence the overall surface's height must be a multiple of 4.

Similar rules apply to other chroma_type values.

Implementations may also impose additional restrictions on the surface sizes they support, potentially requiring additional rounding of actual surface sizes.

In most cases, this is not an issue, since:

- Video streams are encoded as an array of macro-blocks, which typically have larger size alignment requirements than video surfaces do.
- APIs such as VdpVideoMixerRender allow specification of a sub-region of the surface to read, which allows the padding data to be clipped away.

However, other APIs such as VdpVideoSurfaceGetBitsYCbCr and VdpVideoSurfacePutBitsYCbCr do not allow a sub-region to be specified, and always operate on surface size that was actually allocated, rather than the surface size that was requested. In this case, applications need to be aware of the actual surface size, in order to allocate appropriately sized buffers for the get-/put-bits operations.

For this reason, applications may need to call VdpVideoSurfaceGetParameters after creation, in order to retrieve the actual surface size.

5.8.2.3 typedef VdpStatus VdpVideoSurfaceDestroy(VdpVideoSurface surface)

Destroy a VdpVideoSurface.

Parameters

in	*surface*	The surface's handle.

Returns

VdpStatus The completion status of the operation.

5.8.2.4 typedef VdpStatus VdpVideoSurfaceGetBitsYCbCr(VdpVideoSurface surface, VdpYCbCrFormat destination_ycbcr_format, void *const *destination_data, uint32_t const *destination_pitches)

Copy image data from a VdpVideoSurface to application memory in a specified YCbCr format.

Parameters

in	*surface*	The surface's handle.
in	*destination_ycbcr_format*	The format of the application's data buffers.
in	*destination_data*	Pointers to the application data buffers into which the image data will be written. Note that this is an array of pointers, one per plane. The destination_format parameter will define how many planes are required.
in	*destination_pitches*	Pointers to the pitch values for the application data buffers. Note that this is an array of pointers, one per plane. The destination_format parameter will define how many planes are required.

Returns

VdpStatus The completion status of the operation.

5.8.2.5 typedef VdpStatus VdpVideoSurfaceGetParameters(VdpVideoSurface surface,VdpChromaType *chroma_type, uint32_t *width, uint32_t *height)

Retrieve the parameters used to create a VdpVideoSurface.

Parameters

in	*surface*	The surface's handle.
out	*chroma_type*	The chroma type of the surface.
out	*width*	The width of the surface.
out	*height*	The height of the surface.

Returns

VdpStatus The completion status of the operation.

5.8.2.6 typedef VdpStatus VdpVideoSurfacePutBitsYCbCr(VdpVideoSurface surface, VdpYCbCrFormat source_ycbcr_format, void const *const *source_data, uint32_t const *source_pitches)

Copy image data from application memory in a specific YCbCr format to a VdpVideoSurface.

Parameters

in	*surface*	The surface's handle.
in	*source_ycbcr_format*	The format of the application's data buffers.
in	*source_data*	Pointers to the application data buffers from which the image data will be copied. Note that this is an array of pointers, one per plane. The source_format parameter will define how many planes are required.
in	*source_pitches*	Pointers to the pitch values for the application data buffers. Note that this is an array of pointers, one per plane. The source_format parameter will define how many planes are required.

Returns

VdpStatus The completion status of the operation.

5.8.2.7 typedef VdpStatus VdpVideoSurfaceQueryCapabilities(VdpDevice device, VdpChromaType surface_chroma_type,VdpBool *is_supported, uint32_t *max_width, uint32_t *max_height)

Query the implementation's VdpVideoSurface capabilities.

Parameters

in	*device*	The device to query.
in	*surface_chroma_type*	The type of chroma type for which information is requested.
out	*is_supported*	Is this chroma type supported?
out	*max_width*	The maximum supported surface width for this chroma type.
out	*max_height*	The maximum supported surface height for this chroma type.

Returns

VdpStatus The completion status of the operation.

5.8.2.8 typedef VdpStatus VdpVideoSurfaceQueryGetPutBitsYCbCrCapabilities(VdpDevice device, VdpChromaType surface_chroma_type, VdpYCbCrFormat bits_ycbcr_format, VdpBool *is_supported)

Query the implementation's VdpVideoSurface GetBits/PutBits capabilities.

Parameters

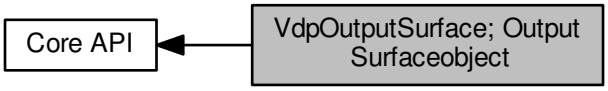
in	*device*	The device to query.
in	*surface_chroma_type*	The type of chroma type for which information is requested.
in	*bits_ycbcr_format*	The format of application "bits" buffer for which information is requested.
out	*is_supported*	Is this chroma type supported?

Returns

VdpStatus The completion status of the operation.

5.9 VdpOutputSurface; Output Surfaceobject

Collaboration diagram for VdpOutputSurface; Output Surfaceobject:



Macros

- #define VDP_COLOR_TABLE_FORMAT_B8G8R8X8

  8-bit per component packed into 32-bits

Typedefs

- typedef uint32_t VdpColorTableFormat

  The set of all known color table formats, for use with VdpOutputSurfacePutBitsIndexed.
- typedef VdpStatus VdpOutputSurfaceQueryCapabilities(VdpDevice device, VdpRGBAFormat surface_rgba_format, VdpBool *is_supported, uint32_t *max_width, uint32_t *max_height)

  Query the implementation's VdpOutputSurface capabilities.
- typedef VdpStatus VdpOutputSurfaceQueryGetPutBitsNativeCapabilities(VdpDevice device, VdpRGBAFormat surface_rgba_format, VdpBool *is_supported)

  Query the implementation's capability to perform a PutBits operation using application data matching the surface's format.
- typedef VdpStatus VdpOutputSurfaceQueryPutBitsIndexedCapabilities(VdpDevice device, VdpRGBAFormat surface_rgba_format, VdpIndexedFormat bits_indexed_format, VdpColorTableFormat color_table_format, VdpBool *is_supported)

  Query the implementation's capability to perform a PutBits operation using application data in a specific indexed format.
- typedef VdpStatus VdpOutputSurfaceQueryPutBitsYCbCrCapabilities(VdpDevice device, VdpRGBAFormat surface_rgba_format, VdpYCbCrFormat bits_ycbcr_format, VdpBool *is_supported)

  Query the implementation's capability to perform a PutBits operation using application data in a specific YCbCr/YUB format.
- typedef uint32_t VdpOutputSurface

  An opaque handle representing a VdpOutputSurface object.
- typedef VdpStatus VdpOutputSurfaceCreate(VdpDevice device, VdpRGBAFormat rgba_format, uint32_t width, uint32_t height, VdpOutputSurface *surface)

  Create a VdpOutputSurface.
- typedef VdpStatus VdpOutputSurfaceDestroy(VdpOutputSurface surface)

  Destroy a VdpOutputSurface.
- typedef VdpStatus VdpOutputSurfaceGetParameters(VdpOutputSurface surface, VdpRGBAFormat *rgba_format, uint32_t *width, uint32_t *height)

  Retrieve the parameters used to create a VdpOutputSurface.
- typedef VdpStatus VdpOutputSurfaceGetBitsNative(VdpOutputSurface surface, VdpRect const *source_rect, void *const *destination_data, uint32_t const *destination_pitches)

Copy image data from a VdpOutputSurface to application memory in the surface's native format.

- typedef VdpStatus VdpOutputSurfacePutBitsNative(VdpOutputSurface surface, void const *const *source_data, uint32_t const *source_pitches, VdpRect const *destination_rect)

  Copy image data from application memory in the surface's native format to a VdpOutputSurface.
- typedef VdpStatus VdpOutputSurfacePutBitsIndexed(VdpOutputSurface surface, VdpIndexedFormat source_indexed_format, void const *const *source_data, uint32_t const *source_pitch, VdpRect const *destination_rect, VdpColorTableFormat color_table_format, void const *color_table)

  Copy image data from application memory in a specific indexed format to a VdpOutputSurface.
- typedef VdpStatus VdpOutputSurfacePutBitsYCbCr(VdpOutputSurface surface, VdpYCbCrFormat source_ycbcr_format, void const *const *source_data, uint32_t const *source_pitches, VdpRect const *destination_rect, VdpCSCMatrix const *csc_matrix)

  Copy image data from application memory in a specific YCbCr format to a VdpOutputSurface.

5.9.1 Detailed Description

A VdpOutputSurface stores RGBA data in a defined format.

A VdpOutputSurface may be filled with:

- Data provided by the CPU via the various VdpOutputSurfacePutBits functions.
- Using the VdpOutputSurface rendering functionality.
- Using a VdpVideoMixer object.

VdpOutputSurface content may be accessed by:

- The application via the various VdpOutputSurfaceGetBits functions.
- The Hardware that implements VdpOutputSurface rendering functionality.
- The Hardware the implements VdpVideoMixer functionality.
- The Hardware that implements VdpPresentationQueue functionality,

VdpVideoSurfaces are directly displayable using a VdpPresentationQueue object.

5.9.2 Macro Definition Documentation

5.9.2.1 #define VDP_COLOR_TABLE_FORMAT_B8G8R8X8

8-bit per component packed into 32-bits

This format is an array of packed 32-bit RGB color values. Bits [31:24] are unused, bits [23:16] contain R, bits [15:8] contain G, and bits [7:0] contain B. Note: The format is physically an array of uint32_t values, and should be accessed as such by the application in order to avoid endianness issues.

5.9.3 Typedef Documentation

5.9.3.1 typedef uint32_t VdpColorTableFormat

The set of all known color table formats, for use with VdpOutputSurfacePutBitsIndexed.

5.9.3.2 typedef uint32_t VdpOutputSurface

An opaque handle representing a VdpOutputSurface object.

5.9.3.3 typedef VdpStatus VdpOutputSurfaceCreate(VdpDevice device, VdpRGBAFormat rgba_format, uint32_t width, uint32_t height,VdpOutputSurface *surface)

Create a VdpOutputSurface.

Parameters

in	*device*	The device that will contain the surface.
in	*rgba_format*	The format of the new surface.
in	*width*	The width of the new surface.
in	*height*	The height of the new surface.
out	*surface*	The new surface's handle.

Returns

VdpStatus The completion status of the operation.

The memory backing the surface will be initialized to 0 color and 0 alpha (i.e. black.)

5.9.3.4 typedef VdpStatus VdpOutputSurfaceDestroy(VdpOutputSurface surface)

Destroy a VdpOutputSurface.

Parameters

in	*surface*	The surface's handle.

Returns

VdpStatus The completion status of the operation.

5.9.3.5 typedef VdpStatus VdpOutputSurfaceGetBitsNative(VdpOutputSurface surface, VdpRect const *source_rect, void *const *destination_data, uint32_t const *destination_pitches)

Copy image data from a VdpOutputSurface to application memory in the surface's native format.

Parameters

in	*surface*	The surface's handle.
in	*source_rect*	The sub-rectangle of the source surface to copy. If NULL, the entire surface will be retrieved.
in	*destination_data*	Pointers to the application data buffers into which the image data will be written. Note that this is an array of pointers, one per plane. The destination_format parameter will define how many planes are required.

Parameters

in	*destination_pitches*	Pointers to the pitch values for the application data buffers. Note that this is an array of pointers, one per plane. The destination_format parameter will define how many planes are required.

Returns

VdpStatus The completion status of the operation.

5.9.3.6 typedef VdpStatus VdpOutputSurfaceGetParameters(VdpOutputSurface surface,VdpRGBAFormat *rgba_format, uint32_t *width, uint32_t *height)

Retrieve the parameters used to create a VdpOutputSurface.

Parameters

in	*surface*	The surface's handle.
out	*rgba_format*	The format of the surface.
out	*width*	The width of the surface.
out	*height*	The height of the surface.

Returns

VdpStatus The completion status of the operation.

5.9.3.7 typedef VdpStatus VdpOutputSurfacePutBitsIndexed(VdpOutputSurface surface, VdpIndexedFormat source_indexed_format, void const *const *source_data, uint32_t const *source_pitch, VdpRect const *destination_rect, VdpColorTableFormat color_table_format, void const *color_table)

Copy image data from application memory in a specific indexed format to a VdpOutputSurface.

Parameters

in	*surface*	The surface's handle.
in	*source_indexed_format*	The format of the application's data buffers.
in	*source_data*	Pointers to the application data buffers from which the image data will be copied. Note that this is an array of pointers, one per plane. The source_indexed_format parameter will define how many planes are required.
in	*source_pitches*	Pointers to the pitch values for the application data buffers. Note that this is an array of pointers, one per plane. The source_indexed_format parameter will define how many planes are required.
in	*destination_rect*	The sub-rectangle of the surface to fill with application data. If NULL, the entire surface will be updated.
in	*color_table_format*	The format of the color_table.
in	*color_table*	A table that maps between source index and target color data. See VdpColorTableFormat for details regarding the memory layout.

Returns

VdpStatus The completion status of the operation.

5.9.3.8 typedef VdpStatus VdpOutputSurfacePutBitsNative(VdpOutputSurface surface, void const *const *source_data, uint32_t const *source_pitches, VdpRect const *destination_rect)

Copy image data from application memory in the surface's native format to a VdpOutputSurface.

Parameters

in	*surface*	The surface's handle.
in	*source_data*	Pointers to the application data buffers from which the image data will be copied. Note that this is an array of pointers, one per plane. The source_format parameter will define how many planes are required.
in	*source_pitches*	Pointers to the pitch values for the application data buffers. Note that this is an array of pointers, one per plane. The source_format parameter will define how many planes are required.
in	*destination_rect*	The sub-rectangle of the surface to fill with application data. If NULL, the entire surface will be updated.

Returns

VdpStatus The completion status of the operation.

5.9.3.9 typedef VdpStatus VdpOutputSurfacePutBitsYCbCr(VdpOutputSurface surface, VdpYCbCrFormat source_ycbcr_format, void const *const *source_data, uint32_t const *source_pitches, VdpRect const *destination_rect, VdpCSCMatrix const *csc_matrix)

Copy image data from application memory in a specific YCbCr format to a VdpOutputSurface.

Parameters

in	*surface*	The surface's handle.
in	*source_ycbcr_format*	The format of the application's data buffers.
in	*source_data*	Pointers to the application data buffers from which the image data will be copied. Note that this is an array of pointers, one per plane. The source_ycbcr_format parameter will define how many planes are required.
in	*source_pitches*	Pointers to the pitch values for the application data buffers. Note that this is an array of pointers, one per plane. The source_ycbcr_format parameter will define how many planes are required.
in	*destination_rect*	The sub-rectangle of the surface to fill with application data. If NULL, the entire surface will be updated.
in	*csc_matrix*	The color space conversion matrix used by the copy operation. If NULL, a default matrix will be used internally. Th default matrix is equivalent to ITU-R BT.601 with no procamp changes.

Returns

VdpStatus The completion status of the operation.

5.9.3.10 typedef VdpStatus VdpOutputSurfaceQueryCapabilities(VdpDevice device, VdpRGBAFormat surface_rgba_format,VdpBool *is_supported, uint32_t *max_width, uint32_t *max_height)

Query the implementation's VdpOutputSurface capabilities.

Parameters

in	*device*	The device to query.
in	*surface_rgba_format*	The surface format for which information is requested.
out	*is_supported*	Is this surface format supported?
out	*max_width*	The maximum supported surface width for this chroma type.
out	*max_height*	The maximum supported surface height for this chroma type.

Returns

VdpStatus The completion status of the operation.

5.9.3.11 typedef VdpStatus VdpOutputSurfaceQueryGetPutBitsNativeCapabilities(VdpDevice device, VdpRGBAFormat surface_rgba_format,VdpBool *is_supported)

Query the implementation's capability to perform a PutBits operation using application data matching the surface's format.

Parameters

in	*device*	The device to query.
in	*surface_rgba_format*	The surface format for which information is requested.
out	*is_supported*	Is this surface format supported?

Returns

VdpStatus The completion status of the operation.

5.9.3.12 typedef VdpStatus VdpOutputSurfaceQueryPutBitsIndexedCapabilities(VdpDevice device, VdpRGBAFormat surface_rgba_format, VdpIndexedFormat bits_indexed_format, VdpColorTableFormat color_table_format,VdpBool *is_supported)

Query the implementation's capability to perform a PutBits operation using application data in a specific indexed format.

Parameters

in	*device*	The device to query.

Parameters

in	*surface_rgba_format*	The surface format for which information is requested.
in	*bits_indexed_format*	The format of the application data buffer.
in	*color_table_format*	The format of the color lookup table.
out	*is_supported*	Is this surface format supported?

Returns

VdpStatus The completion status of the operation.

5.9.3.13 typedef VdpStatus VdpOutputSurfaceQueryPutBitsYCbCrCapabilities(VdpDevice device, VdpRGBAFormat surface_rgba_format, VdpYCbCrFormat bits_ycbcr_format,VdpBool *is_supported)

Query the implementation's capability to perform a PutBits operation using application data in a specific YCbCr/YUB format.

Parameters

in	*device*	The device to query.
in	*surface_rgba_format*	The surface format for which information is requested.
in	*bits_ycbcr_format*	The format of the application data buffer.
out	*is_supported*	Is this surface format supported?

Returns

VdpStatus The completion status of the operation.

5.10 VdpBitmapSurface; Bitmap Surfaceobject

Collaboration diagram for VdpBitmapSurface; Bitmap Surfaceobject:

Typedefs

- typedef VdpStatus VdpBitmapSurfaceQueryCapabilities(VdpDevice device, VdpRGBAFormat surface_↩ rgba_format, VdpBool *is_supported, uint32_t *max_width, uint32_t *max_height)

  Query the implementation's VdpBitmapSurface capabilities.
- typedef uint32_t VdpBitmapSurface

  An opaque handle representing a VdpBitmapSurface object.
- typedef VdpStatus VdpBitmapSurfaceCreate(VdpDevice device, VdpRGBAFormat rgba_format, uint32_↩ t width, uint32_t height, VdpBool frequently_accessed, VdpBitmapSurface *surface)

  Create a VdpBitmapSurface.
- typedef VdpStatus VdpBitmapSurfaceDestroy(VdpBitmapSurface surface)

  Destroy a VdpBitmapSurface.
- typedef VdpStatus VdpBitmapSurfaceGetParameters(VdpBitmapSurface surface, VdpRGBAFormat *rgba↩ _format, uint32_t *width, uint32_t *height, VdpBool *frequently_accessed)

  Retrieve the parameters used to create a VdpBitmapSurface.
- typedef VdpStatus VdpBitmapSurfacePutBitsNative(VdpBitmapSurface surface, void const *const *source↩ _data, uint32_t const *source_pitches, VdpRect const *destination_rect)

  Copy image data from application memory in the surface's native format to a VdpBitmapSurface.

5.10.1 Detailed Description

A VdpBitmapSurface stores RGBA data in a defined format.

A VdpBitmapSurface may be filled with:

- Data provided by the CPU via the VdpBitmapSurfacePutBitsNative function.

VdpBitmapSurface content may be accessed by:

- The Hardware that implements VdpOutputSurface rendering functionality

VdpBitmapSurface objects are intended to store static read-only data, such as font glyphs, and the bitmaps used to compose an applications' user-interface.

The primary differences between VdpBitmapSurfaces and VdpOutputSurfaces are:

- You cannot render to a VdpBitmapSurface, just upload native data via the PutBits API.
- The read-only nature of a VdpBitmapSurface gives the implementation more flexibility in its choice of data storage location for the bitmap data. For example, some implementations may choose to store some/all VdpBitmapSurface objects in system memory to relieve GPU memory pressure.
- VdpBitmapSurface and VdpOutputSurface may support different subsets of all known RGBA formats.

5.10.2 Typedef Documentation

5.10.2.1 typedef uint32_t VdpBitmapSurface

An opaque handle representing a VdpBitmapSurface object.

5.10.2.2 typedef VdpStatus VdpBitmapSurfaceCreate(VdpDevice device, VdpRGBAFormat rgba_format, uint32_t width, uint32_t height, VdpBool frequently_accessed,VdpBitmapSurface *surface)

Create a VdpBitmapSurface.

Parameters

in	*device*	The device that will contain the surface.
in	*rgba_format*	The format of the new surface.
in	*width*	The width of the new surface.
in	*height*	The height of the new surface.
in	*frequently_accessed*	Is this bitmap used frequently, or infrequently, by compositing options? Implementations may use this as a hint to determine how to allocate the underlying storage for the surface.
out	*surface*	The new surface's handle.

Returns

VdpStatus The completion status of the operation.

The memory backing the surface may not be initialized during creation. Applications are expected initialize any region that they use, via VdpBitmapSurfacePutBitsNative.

5.10.2.3 typedef VdpStatus VdpBitmapSurfaceDestroy(VdpBitmapSurface surface)

Destroy a VdpBitmapSurface.

Parameters

in	*surface*	The surface's handle.

Returns

VdpStatus The completion status of the operation.

5.10.2.4 typedef VdpStatus VdpBitmapSurfaceGetParameters(VdpBitmapSurface surface,VdpRGBAFormat *rgba_format, uint32_t *width, uint32_t *height, VdpBool *frequently_accessed)

Retrieve the parameters used to create a VdpBitmapSurface.

Parameters

in	*surface*	The surface's handle.
out	*rgba_format*	The format of the surface.
out	*width*	The width of the surface.
out	*height*	The height of the surface.
out	*frequently_accessed*	The frequently_accessed state of the surface.

Returns

VdpStatus The completion status of the operation.

5.10.2.5 typedef VdpStatus VdpBitmapSurfacePutBitsNative(VdpBitmapSurface surface, void const *const *source_data, uint32_t const *source_pitches, VdpRect const *destination_rect)

Copy image data from application memory in the surface's native format to a VdpBitmapSurface.

Parameters

in	*surface*	The surface's handle.
in	*source_data*	Pointers to the application data buffers from which the image data will be copied. Note that this is an array of pointers, one per plane. The source_format parameter will define how many planes are required.
in	*source_pitches*	Pointers to the pitch values for the application data buffers. Note that this is an array of pointers, one per plane. The source_format parameter will define how many planes are required.
in	*destination_rect*	The sub-rectangle of the surface to fill with application data. If NULL, the entire surface will be updated.

Returns

VdpStatus The completion status of the operation.

5.10.2.6 typedef VdpStatus VdpBitmapSurfaceQueryCapabilities(VdpDevice device, VdpRGBAFormat surface_rgba_format,VdpBool *is_supported, uint32_t *max_width, uint32_t *max_height)

Query the implementation's VdpBitmapSurface capabilities.

Parameters

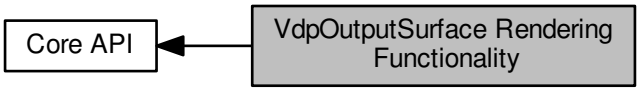
in	*device*	The device to query.
in	*surface_rgba_format*	The surface format for which information is requested.
out	*is_supported*	Is this surface format supported?
out	*max_width*	The maximum supported surface width for this chroma type.
out	*max_height*	The maximum supported surface height for this chroma type.

Returns

VdpStatus The completion status of the operation.

5.11 VdpOutputSurface Rendering Functionality

Collaboration diagram for VdpOutputSurface Rendering Functionality:



Data Structures

- struct VdpOutputSurfaceRenderBlendState

  Complete blending operation definition.

Macros

- #define VDP_OUTPUT_SURFACE_RENDER_BLEND_STATE_VERSION 0
- #define VDP_OUTPUT_SURFACE_RENDER_ROTATE_0

  Do not rotate source_surface prior to compositing.
- #define VDP_OUTPUT_SURFACE_RENDER_ROTATE_90

  Rotate source_surface 90 degrees clockwise prior to compositing.
- #define VDP_OUTPUT_SURFACE_RENDER_ROTATE_180

  Rotate source_surface 180 degrees prior to compositing.
- #define VDP_OUTPUT_SURFACE_RENDER_ROTATE_270

  Rotate source_surface 270 degrees clockwise prior to compositing.
- #define VDP_OUTPUT_SURFACE_RENDER_COLOR_PER_VERTEX

  A separate color is used for each vertex of the smooth-shaded quad. Hence, colors array contains 4 elements rather than 1. See description of colors array.

Typedefs

- typedef VdpStatus VdpOutputSurfaceRenderOutputSurface(VdpOutputSurface destination_surface, VdpRect const *destination_rect, VdpOutputSurface source_surface, VdpRect const *source_rect, VdpColor const *colors, VdpOutputSurfaceRenderBlendState const *blend_state, uint32_t flags)

  Composite a sub-rectangle of a VdpOutputSurface into a sub-rectangle of another VdpOutputSurface; Output Surfaceobject VdpOutputSurface.
- typedef VdpStatus VdpOutputSurfaceRenderBitmapSurface(VdpOutputSurface destination_surface, VdpRect const *destination_rect, VdpBitmapSurface source_surface, VdpRect const *source_rect, VdpColor const *colors, VdpOutputSurfaceRenderBlendState const *blend_state, uint32_t flags)

  Composite a sub-rectangle of a VdpBitmapSurface into a sub-rectangle of a VdpOutputSurface; Output Surfaceobject VdpOutputSurface.

Enumerations

- enum VdpOutputSurfaceRenderBlendFactor {
  VDP_OUTPUT_SURFACE_RENDER_BLEND_FACTOR_ZERO = 0, VDP_OUTPUT_SURFACE_REND↩
  ER_BLEND_FACTOR_ONE = 1, VDP_OUTPUT_SURFACE_RENDER_BLEND_FACTOR_SRC_COLOR =
  2, VDP_OUTPUT_SURFACE_RENDER_BLEND_FACTOR_ONE_MINUS_SRC_COLOR = 3,
  VDP_OUTPUT_SURFACE_RENDER_BLEND_FACTOR_SRC_ALPHA = 4, VDP_OUTPUT_SURFACE_↩
  RENDER_BLEND_FACTOR_ONE_MINUS_SRC_ALPHA = 5, VDP_OUTPUT_SURFACE_RENDER_BL↩
  END_FACTOR_DST_ALPHA = 6, VDP_OUTPUT_SURFACE_RENDER_BLEND_FACTOR_ONE_MINU↩
  S_DST_ALPHA = 7,
  VDP_OUTPUT_SURFACE_RENDER_BLEND_FACTOR_DST_COLOR = 8, VDP_OUTPUT_SURFACE_↩
  RENDER_BLEND_FACTOR_ONE_MINUS_DST_COLOR = 9, VDP_OUTPUT_SURFACE_RENDER_BL↩
  END_FACTOR_SRC_ALPHA_SATURATE = 10, VDP_OUTPUT_SURFACE_RENDER_BLEND_FACTO↩
  R_CONSTANT_COLOR = 11,
  VDP_OUTPUT_SURFACE_RENDER_BLEND_FACTOR_ONE_MINUS_CONSTANT_COLOR = 12, VDP↩
  _OUTPUT_SURFACE_RENDER_BLEND_FACTOR_CONSTANT_ALPHA = 13, VDP_OUTPUT_SURFA↩
  CE_RENDER_BLEND_FACTOR_ONE_MINUS_CONSTANT_ALPHA = 14 }

  The blending equation factors.
- enum VdpOutputSurfaceRenderBlendEquation {
  VDP_OUTPUT_SURFACE_RENDER_BLEND_EQUATION_SUBTRACT = 0, VDP_OUTPUT_SURFACE↩
  _RENDER_BLEND_EQUATION_REVERSE_SUBTRACT = 1, VDP_OUTPUT_SURFACE_RENDER_BL↩
  END_EQUATION_ADD = 2, VDP_OUTPUT_SURFACE_RENDER_BLEND_EQUATION_MIN = 3,
  VDP_OUTPUT_SURFACE_RENDER_BLEND_EQUATION_MAX = 4 }

  The blending equations.

5.11.1 Detailed Description

VdpOutputSurface objects directly provide some rendering/compositing operations. These are described below.

5.11.2 Macro Definition Documentation

5.11.2.1 #define VDP_OUTPUT_SURFACE_RENDER_BLEND_STATE_VERSION 0

5.11.2.2 #define VDP_OUTPUT_SURFACE_RENDER_COLOR_PER_VERTEX

A separate color is used for each vertex of the smooth-shaded quad. Hence, colors array contains 4 elements rather than 1. See description of colors array.

5.11.2.3 #define VDP_OUTPUT_SURFACE_RENDER_ROTATE_0

Do not rotate source_surface prior to compositing.

5.11.2.4 #define VDP_OUTPUT_SURFACE_RENDER_ROTATE_180

Rotate source_surface 180 degrees prior to compositing.

5.11.2.5 #define VDP_OUTPUT_SURFACE_RENDER_ROTATE_270

Rotate source_surface 270 degrees clockwise prior to compositing.

5.11.2.6 #define VDP_OUTPUT_SURFACE_RENDER_ROTATE_90

Rotate source_surface 90 degrees clockwise prior to compositing.

5.11.3 Typedef Documentation

5.11.3.1 typedef VdpStatus VdpOutputSurfaceRenderBitmapSurface(VdpOutputSurface destination_surface, VdpRect const *destination_rect, VdpBitmapSurface source_surface, VdpRect const *source_rect, VdpColor const *colors, VdpOutputSurfaceRenderBlendState const *blend_state, uint32_t flags)

Composite a sub-rectangle of a VdpBitmapSurface into a sub-rectangle of a VdpOutputSurface; Output Surfaceobject VdpOutputSurface.

Parameters

in	*destination_surface*	The destination surface of the compositing operation.
in	*destination_rect*	The sub-rectangle of the destination surface to update. If NULL, the entire destination surface will be updated.
in	*source_surface*	The source surface for the compositing operation. The surface is treated as having four components: red, green, blue and alpha. Any missing components are treated as 1.0. For example, for an A8 VdpBitmapSurface, alpha will come from the surface but red, green and blue will be treated as 1.0. If source_surface is VDP_INVALID_HANDLE, all components will be treated as 1.0. Note that destination_surface and source_surface must have been allocated via the same VdpDevice.
in	*source_rect*	The sub-rectangle of the source surface to read from. If NULL, the entire source_surface will be read. Left/right ot top/bottom co-ordinates may be swapped to flip the source. Any flip occurs prior to any requested rotation. Values from outside the source surface are valid and samples at those locations will be taken from the nearest edge.
in	*colors*	A pointer to an array of VdpColor objects. If the flag VDP_OUTPUT_SURFACE_RENDER_COLOR_PER_VERTEX is set, VDPAU will four entries from the array, and treat them as the colors corresponding to the upper-left, upper-right, lower-right and lower-left corners of the post-rotation source (i.e. indices 0, 1, 2 and 3 run clockwise from the upper left corner). If the flag VDP_OUTPUT_SURFACE_RENDER_COLOR_PER_VERTEX is not set, VDPAU will use the single VdpColor for all four corners. If colors is NULL then red, green, blue and alpha values of 1.0 will be used.
in	*blend_state*	If a blend state is provided, the blend state will be used for the composite operation. If NULL, blending is effectively disabled, which is equivalent to a blend equation of ADD, source blend factors of ONE and destination blend factors of ZERO. See VdpOutputSurfaceRenderBlendState for details regarding the mathematics of the blending operation.
in	*flags*	A set of flags influencing how the compositing operation works. • VDP_OUTPUT_SURFACE_RENDER_ROTATE_0 • VDP_OUTPUT_SURFACE_RENDER_ROTATE_90 • VDP_OUTPUT_SURFACE_RENDER_ROTATE_180 • VDP_OUTPUT_SURFACE_RENDER_ROTATE_270 • VDP_OUTPUT_SURFACE_RENDER_COLOR_PER_VERTEX

Returns

VdpStatus The completion status of the operation.

The general compositing pipeline is as follows.

1. Extract source_rect from source_surface.
2. The extracted source is rotated 0, 90, 180 or 270 degrees according to the flags.
3. The rotated source is component-wise multiplied by a smooth-shaded quad with a (potentially) different color at each vertex.
4. The resulting rotated, smooth-shaded quad is scaled to the size of destination_rect and composited with destination_surface using the provided blend state.

5.11.3.2 typedef VdpStatus VdpOutputSurfaceRenderOutputSurface(VdpOutputSurface destination_surface, VdpRect const *destination_rect, VdpOutputSurface source_surface, VdpRect const *source_rect, VdpColor const *colors, VdpOutputSurfaceRenderBlendState const *blend_state, uint32_t flags)

Composite a sub-rectangle of a VdpOutputSurface into a sub-rectangle of another VdpOutputSurface; Output Surfaceobject VdpOutputSurface.

Parameters

in	*destination_surface*	The destination surface of the compositing operation.
in	*destination_rect*	The sub-rectangle of the destination surface to update. If NULL, the entire destination surface will be updated.
in	*source_surface*	The source surface for the compositing operation. The surface is treated as having four components: red, green, blue and alpha. Any missing components are treated as 1.0. For example, for an A8 VdpOutputSurface, alpha will come from the surface but red, green and blue will be treated as 1.0. If source_surface is VDP_INVALID_HANDLE, all components will be treated as 1.0. Note that destination_surface and source_surface must have been allocated via the same VdpDevice.
in	*source_rect*	The sub-rectangle of the source surface to read from. If NULL, the entire source_surface will be read. Left/right and/or top/bottom co-ordinates may be swapped to flip the source. Any flip occurs prior to any requested rotation. Values from outside the source surface are valid and samples at those locations will be taken from the nearest edge.
in	*colors*	A pointer to an array of VdpColor objects. If the flag VDP_OUTPUT_SURFACE_RENDER_COLOR_PER_VERTEX is set, VDPAU will four entries from the array, and treat them as the colors corresponding to the upper-left, upper-right, lower-right and lower-left corners of the post-rotation source (i.e. indices 0, 1, 2 and 3 run clockwise from the upper left corner). If the flag VDP_OUTPUT_SURFACE_RENDER_COLOR_PER_VERTEX is not set, VDPAU will use the single VdpColor for all four corners. If colors is NULL then red, green, blue and alpha values of 1.0 will be used.
in	*blend_state*	If a blend state is provided, the blend state will be used for the composite operation. If NULL, blending is effectively disabled, which is equivalent to a blend equation of ADD, source blend factors of ONE and destination blend factors of ZERO. See VdpOutputSurfaceRenderBlendState for details regarding the mathematics of the blending operation.

Parameters

in	*flags*	A set of flags influencing how the compositing operation works. • VDP_OUTPUT_SURFACE_RENDER_ROTATE_0 • VDP_OUTPUT_SURFACE_RENDER_ROTATE_90 • VDP_OUTPUT_SURFACE_RENDER_ROTATE_180 • VDP_OUTPUT_SURFACE_RENDER_ROTATE_270 • VDP_OUTPUT_SURFACE_RENDER_COLOR_PER_VERTEX

Returns

VdpStatus The completion status of the operation.

The general compositing pipeline is as follows.

1. Extract source_rect from source_surface.
2. The extracted source is rotated 0, 90, 180 or 270 degrees according to the flags.
3. The rotated source is component-wise multiplied by a smooth-shaded quad with a (potentially) different color at each vertex.
4. The resulting rotated, smooth-shaded quad is scaled to the size of destination_rect and composited with destination_surface using the provided blend state.

5.11.4 Enumeration Type Documentation

5.11.4.1 enum VdpOutputSurfaceRenderBlendEquation

The blending equations.

Enumerator

VDP_OUTPUT_SURFACE_RENDER_BLEND_EQUATION_SUBTRACT

VDP_OUTPUT_SURFACE_RENDER_BLEND_EQUATION_REVERSE_SUBTRACT

VDP_OUTPUT_SURFACE_RENDER_BLEND_EQUATION_ADD

VDP_OUTPUT_SURFACE_RENDER_BLEND_EQUATION_MIN

VDP_OUTPUT_SURFACE_RENDER_BLEND_EQUATION_MAX

5.11.4.2 enum VdpOutputSurfaceRenderBlendFactor

The blending equation factors.

Enumerator

VDP_OUTPUT_SURFACE_RENDER_BLEND_FACTOR_ZERO

VDP_OUTPUT_SURFACE_RENDER_BLEND_FACTOR_ONE

VDP_OUTPUT_SURFACE_RENDER_BLEND_FACTOR_SRC_COLOR

VDP_OUTPUT_SURFACE_RENDER_BLEND_FACTOR_ONE_MINUS_SRC_COLOR

VDP_OUTPUT_SURFACE_RENDER_BLEND_FACTOR_SRC_ALPHA

VDP_OUTPUT_SURFACE_RENDER_BLEND_FACTOR_ONE_MINUS_SRC_ALPHA

VDP_OUTPUT_SURFACE_RENDER_BLEND_FACTOR_DST_ALPHA

VDP_OUTPUT_SURFACE_RENDER_BLEND_FACTOR_ONE_MINUS_DST_ALPHA

VDP_OUTPUT_SURFACE_RENDER_BLEND_FACTOR_DST_COLOR

VDP_OUTPUT_SURFACE_RENDER_BLEND_FACTOR_ONE_MINUS_DST_COLOR

VDP_OUTPUT_SURFACE_RENDER_BLEND_FACTOR_SRC_ALPHA_SATURATE

VDP_OUTPUT_SURFACE_RENDER_BLEND_FACTOR_CONSTANT_COLOR

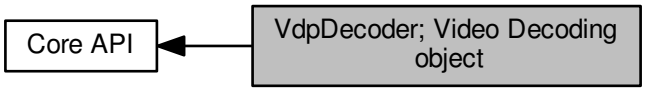
VDP_OUTPUT_SURFACE_RENDER_BLEND_FACTOR_ONE_MINUS_CONSTANT_COLOR

VDP_OUTPUT_SURFACE_RENDER_BLEND_FACTOR_CONSTANT_ALPHA

VDP_OUTPUT_SURFACE_RENDER_BLEND_FACTOR_ONE_MINUS_CONSTANT_ALPHA

5.12 VdpDecoder; Video Decoding object

Collaboration diagram for VdpDecoder; Video Decoding object:



Data Structures

- struct VdpBitstreamBuffer

  Application data buffer containing compressed video data.
- struct VdpPictureInfoMPEG1Or2

  Picture parameter information for an MPEG 1 or MPEG 2 picture.
- struct VdpReferenceFrameH264

  Information about an H.264 reference frame.
- struct VdpPictureInfoH264

  Picture parameter information for an H.264 picture.
- struct VdpPictureInfoH264Predictive

  Picture parameter information for an H.264 Hi444PP picture.
- struct VdpPictureInfoVC1

  Picture parameter information for a VC1 picture.
- struct VdpPictureInfoMPEG4Part2

  Picture parameter information for an MPEG-4 Part 2 picture.
- struct VdpPictureInfoHEVC

  Picture parameter information for an H.265/HEVC picture.

Macros

- #define VDP_DECODER_PROFILE_MPEG1
- #define VDP_DECODER_PROFILE_MPEG2_SIMPLE
- #define VDP_DECODER_PROFILE_MPEG2_MAIN
- #define VDP_DECODER_PROFILE_H264_BASELINE

  MPEG 4 part 10 == H.264 == AVC.
- #define VDP_DECODER_PROFILE_H264_MAIN
- #define VDP_DECODER_PROFILE_H264_HIGH
- #define VDP_DECODER_PROFILE_VC1_SIMPLE
- #define VDP_DECODER_PROFILE_VC1_MAIN
- #define VDP_DECODER_PROFILE_VC1_ADVANCED
- #define VDP_DECODER_PROFILE_MPEG4_PART2_SP
- #define VDP_DECODER_PROFILE_MPEG4_PART2_ASP
- #define VDP_DECODER_PROFILE_DIVX4_QMOBILE
- #define VDP_DECODER_PROFILE_DIVX4_MOBILE
- #define VDP_DECODER_PROFILE_DIVX4_HOME_THEATER

- #define VDP_DECODER_PROFILE_DIVX4_HD_1080P
- #define VDP_DECODER_PROFILE_DIVX5_QMOBILE
- #define VDP_DECODER_PROFILE_DIVX5_MOBILE
- #define VDP_DECODER_PROFILE_DIVX5_HOME_THEATER
- #define VDP_DECODER_PROFILE_DIVX5_HD_1080P
- #define VDP_DECODER_PROFILE_H264_CONSTRAINED_BASELINE
- #define VDP_DECODER_PROFILE_H264_EXTENDED
- #define VDP_DECODER_PROFILE_H264_PROGRESSIVE_HIGH
- #define VDP_DECODER_PROFILE_H264_CONSTRAINED_HIGH
- #define VDP_DECODER_PROFILE_H264_HIGH_444_PREDICTIVE

  Support for 8 bit depth only.
- #define VDP_DECODER_PROFILE_HEVC_MAIN

  MPEG-H Part 2 == H.265 == HEVC.
- #define VDP_DECODER_PROFILE_HEVC_MAIN_10
- #define VDP_DECODER_PROFILE_HEVC_MAIN_STILL
- #define VDP_DECODER_PROFILE_HEVC_MAIN_12
- #define VDP_DECODER_PROFILE_HEVC_MAIN_444
- #define VDP_DECODER_LEVEL_MPEG1_NA
- #define VDP_DECODER_LEVEL_MPEG2_LL
- #define VDP_DECODER_LEVEL_MPEG2_ML
- #define VDP_DECODER_LEVEL_MPEG2_HL14
- #define VDP_DECODER_LEVEL_MPEG2_HL
- #define VDP_DECODER_LEVEL_H264_1
- #define VDP_DECODER_LEVEL_H264_1b
- #define VDP_DECODER_LEVEL_H264_1_1
- #define VDP_DECODER_LEVEL_H264_1_2
- #define VDP_DECODER_LEVEL_H264_1_3
- #define VDP_DECODER_LEVEL_H264_2
- #define VDP_DECODER_LEVEL_H264_2_1
- #define VDP_DECODER_LEVEL_H264_2_2
- #define VDP_DECODER_LEVEL_H264_3
- #define VDP_DECODER_LEVEL_H264_3_1
- #define VDP_DECODER_LEVEL_H264_3_2
- #define VDP_DECODER_LEVEL_H264_4
- #define VDP_DECODER_LEVEL_H264_4_1
- #define VDP_DECODER_LEVEL_H264_4_2
- #define VDP_DECODER_LEVEL_H264_5
- #define VDP_DECODER_LEVEL_H264_5_1
- #define VDP_DECODER_LEVEL_VC1_SIMPLE_LOW
- #define VDP_DECODER_LEVEL_VC1_SIMPLE_MEDIUM
- #define VDP_DECODER_LEVEL_VC1_MAIN_LOW
- #define VDP_DECODER_LEVEL_VC1_MAIN_MEDIUM
- #define VDP_DECODER_LEVEL_VC1_MAIN_HIGH
- #define VDP_DECODER_LEVEL_VC1_ADVANCED_L0
- #define VDP_DECODER_LEVEL_VC1_ADVANCED_L1
- #define VDP_DECODER_LEVEL_VC1_ADVANCED_L2
- #define VDP_DECODER_LEVEL_VC1_ADVANCED_L3
- #define VDP_DECODER_LEVEL_VC1_ADVANCED_L4
- #define VDP_DECODER_LEVEL_MPEG4_PART2_SP_L0
- #define VDP_DECODER_LEVEL_MPEG4_PART2_SP_L1
- #define VDP_DECODER_LEVEL_MPEG4_PART2_SP_L2
- #define VDP_DECODER_LEVEL_MPEG4_PART2_SP_L3
- #define VDP_DECODER_LEVEL_MPEG4_PART2_ASP_L0
- #define VDP_DECODER_LEVEL_MPEG4_PART2_ASP_L1

- #define VDP_DECODER_LEVEL_MPEG4_PART2_ASP_L2
- #define VDP_DECODER_LEVEL_MPEG4_PART2_ASP_L3
- #define VDP_DECODER_LEVEL_MPEG4_PART2_ASP_L4
- #define VDP_DECODER_LEVEL_MPEG4_PART2_ASP_L5
- #define VDP_DECODER_LEVEL_DIVX_NA
- #define VDP_DECODER_LEVEL_HEVC_1 30
- #define VDP_DECODER_LEVEL_HEVC_2
- #define VDP_DECODER_LEVEL_HEVC_2_1
- #define VDP_DECODER_LEVEL_HEVC_3
- #define VDP_DECODER_LEVEL_HEVC_3_1
- #define VDP_DECODER_LEVEL_HEVC_4
- #define VDP_DECODER_LEVEL_HEVC_4_1
- #define VDP_DECODER_LEVEL_HEVC_5
- #define VDP_DECODER_LEVEL_HEVC_5_1
- #define VDP_DECODER_LEVEL_HEVC_5_2
- #define VDP_DECODER_LEVEL_HEVC_6
- #define VDP_DECODER_LEVEL_HEVC_6_1
- #define VDP_DECODER_LEVEL_HEVC_6_2
- #define VDP_BITSTREAM_BUFFER_VERSION 0

Typedefs

- typedef uint32_t VdpDecoderProfile

  The set of all known compressed video formats, and associated profiles, that may be decoded.

- typedef VdpStatus VdpDecoderQueryCapabilities(VdpDevice device, VdpDecoderProfile profile, VdpBool *is_supported, uint32_t *max_level, uint32_t *max_macroblocks, uint32_t *max_width, uint32_t *max_height)

  Query the implementation's VdpDecoder capabilities.

- typedef uint32_t VdpDecoder

  An opaque handle representing a VdpDecoder object.

- typedef VdpStatus VdpDecoderCreate(VdpDevice device, VdpDecoderProfile profile, uint32_t width, uint32_t height, uint32_t max_references, VdpDecoder *decoder)

  Create a VdpDecoder.

- typedef VdpStatus VdpDecoderDestroy(VdpDecoder decoder)

  Destroy a VdpDecoder.

- typedef VdpStatus VdpDecoderGetParameters(VdpDecoder decoder, VdpDecoderProfile *profile, uint32_t *width, uint32_t *height)

  Retrieve the parameters used to create a VdpDecoder.

- typedef void VdpPictureInfo

  A generic "picture information" type.

- typedef VdpPictureInfoMPEG4Part2 VdpPictureInfoDivX4

  Picture parameter information for a DivX 4 picture.

- typedef VdpPictureInfoMPEG4Part2 VdpPictureInfoDivX5

  Picture parameter information for a DivX 5 picture.

- typedef VdpStatus VdpDecoderRender(VdpDecoder decoder, VdpVideoSurface target, VdpPictureInfo const *picture_info, uint32_t bitstream_buffer_count, VdpBitstreamBuffer const *bitstream_buffers)

  Decode a compressed field/frame and render the result into a VdpVideoSurface.

5.12.1 Detailed Description

The VdpDecoder object decodes compressed video data, writing the results to a VdpVideoSurface.

A specific VDPAU implementation may support decoding multiple types of compressed video data. However, VdpDecoder objects are able to decode a specific type of compressed video data. This type must be specified during creation.

5.12.2 Macro Definition Documentation

5.12.2.1 #define VDP_BITSTREAM_BUFFER_VERSION 0

5.12.2.2 #define VDP_DECODER_LEVEL_DIVX_NA

5.12.2.3 #define VDP_DECODER_LEVEL_H264_1

5.12.2.4 #define VDP_DECODER_LEVEL_H264_1_1

5.12.2.5 #define VDP_DECODER_LEVEL_H264_1_2

5.12.2.6 #define VDP_DECODER_LEVEL_H264_1_3

5.12.2.7 #define VDP_DECODER_LEVEL_H264_1b

5.12.2.8 #define VDP_DECODER_LEVEL_H264_2

5.12.2.9 #define VDP_DECODER_LEVEL_H264_2_1

5.12.2.10 #define VDP_DECODER_LEVEL_H264_2_2

5.12.2.11 #define VDP_DECODER_LEVEL_H264_3

5.12.2.12 #define VDP_DECODER_LEVEL_H264_3_1

5.12.2.13 #define VDP_DECODER_LEVEL_H264_3_2

5.12.2.14 #define VDP_DECODER_LEVEL_H264_4

5.12.2.15 #define VDP_DECODER_LEVEL_H264_4_1

5.12.2.16 #define VDP_DECODER_LEVEL_H264_4_2

5.12.2.17 #define VDP_DECODER_LEVEL_H264_5

5.12.2.18 #define VDP_DECODER_LEVEL_H264_5_1

5.12.2.19 #define VDP_DECODER_LEVEL_HEVC_1 30

The VDPAU H.265/HEVC decoder levels correspond to the values of general_level_idc as described in the H.265 Specification, Annex A, Table A.1. The enumeration values are equal to thirty times the level number.

5.12.2.20 #define VDP_DECODER_LEVEL_HEVC_2

5.12.2.21 #define VDP_DECODER_LEVEL_HEVC_2_1

5.12.2.22 #define VDP_DECODER_LEVEL_HEVC_3

5.12.2.23 #define VDP_DECODER_LEVEL_HEVC_3_1

5.12.2.24 #define VDP_DECODER_LEVEL_HEVC_4

5.12.2.25 #define VDP_DECODER_LEVEL_HEVC_4_1

5.12.2.26 #define VDP_DECODER_LEVEL_HEVC_5

5.12.2.27 #define VDP_DECODER_LEVEL_HEVC_5_1

5.12.2.28 #define VDP_DECODER_LEVEL_HEVC_5_2

5.12.2.29 #define VDP_DECODER_LEVEL_HEVC_6

5.12.2.30 #define VDP_DECODER_LEVEL_HEVC_6_1

5.12.2.31 #define VDP_DECODER_LEVEL_HEVC_6_2

5.12.2.32 #define VDP_DECODER_LEVEL_MPEG1_NA

5.12.2.33 #define VDP_DECODER_LEVEL_MPEG2_HL

5.12.2.34 #define VDP_DECODER_LEVEL_MPEG2_HL14

5.12.2.35 #define VDP_DECODER_LEVEL_MPEG2_LL

5.12.2.36 #define VDP_DECODER_LEVEL_MPEG2_ML

5.12.2.37 #define VDP_DECODER_LEVEL_MPEG4_PART2_ASP_L0

5.12.2.38 #define VDP_DECODER_LEVEL_MPEG4_PART2_ASP_L1

5.12.2.39 #define VDP_DECODER_LEVEL_MPEG4_PART2_ASP_L2

5.12.2.40 #define VDP_DECODER_LEVEL_MPEG4_PART2_ASP_L3

5.12.2.41 #define VDP_DECODER_LEVEL_MPEG4_PART2_ASP_L4

5.12.2.42 #define VDP_DECODER_LEVEL_MPEG4_PART2_ASP_L5

5.12.2.43 #define VDP_DECODER_LEVEL_MPEG4_PART2_SP_L0

5.12.2.44 #define VDP_DECODER_LEVEL_MPEG4_PART2_SP_L1

5.12.2.45 #define VDP_DECODER_LEVEL_MPEG4_PART2_SP_L2

5.12.2.46 #define VDP_DECODER_LEVEL_MPEG4_PART2_SP_L3

5.12.2.47 #define VDP_DECODER_LEVEL_VC1_ADVANCED_L0

5.12.2.48 #define VDP_DECODER_LEVEL_VC1_ADVANCED_L1

5.12.2.49 #define VDP_DECODER_LEVEL_VC1_ADVANCED_L2

5.12.2.50 #define VDP_DECODER_LEVEL_VC1_ADVANCED_L3

5.12.2.51 #define VDP_DECODER_LEVEL_VC1_ADVANCED_L4

5.12.2.52 #define VDP_DECODER_LEVEL_VC1_MAIN_HIGH

5.12.2.53 #define VDP_DECODER_LEVEL_VC1_MAIN_LOW

5.12.2.54 #define VDP_DECODER_LEVEL_VC1_MAIN_MEDIUM

5.12.2.55 #define VDP_DECODER_LEVEL_VC1_SIMPLE_LOW

5.12.2.56 #define VDP_DECODER_LEVEL_VC1_SIMPLE_MEDIUM

5.12.2.57 #define VDP_DECODER_PROFILE_DIVX4_HD_1080P

5.12.2.58 #define VDP_DECODER_PROFILE_DIVX4_HOME_THEATER

5.12.2.59 #define VDP_DECODER_PROFILE_DIVX4_MOBILE

5.12.2.60 #define VDP_DECODER_PROFILE_DIVX4_QMOBILE

5.12.2.61 #define VDP_DECODER_PROFILE_DIVX5_HD_1080P

5.12.2.62 #define VDP_DECODER_PROFILE_DIVX5_HOME_THEATER

5.12.2.63 #define VDP_DECODER_PROFILE_DIVX5_MOBILE

5.12.2.64 #define VDP_DECODER_PROFILE_DIVX5_QMOBILE

5.12.2.65 #define VDP_DECODER_PROFILE_H264_BASELINE

MPEG 4 part 10 == H.264 == AVC.

5.12.2.66 #define VDP_DECODER_PROFILE_H264_CONSTRAINED_BASELINE

5.12.2.67 #define VDP_DECODER_PROFILE_H264_CONSTRAINED_HIGH

5.12.2.68 #define VDP_DECODER_PROFILE_H264_EXTENDED

5.12.2.69 #define VDP_DECODER_PROFILE_H264_HIGH

5.12.2.70 #define VDP_DECODER_PROFILE_H264_HIGH_444_PREDICTIVE

Support for 8 bit depth only.

5.12.2.71 #define VDP_DECODER_PROFILE_H264_MAIN

5.12.2.72 #define VDP_DECODER_PROFILE_H264_PROGRESSIVE_HIGH

5.12.2.73 #define VDP_DECODER_PROFILE_HEVC_MAIN

MPEG-H Part 2 == H.265 == HEVC.

5.12.2.74 #define VDP_DECODER_PROFILE_HEVC_MAIN_10

5.12.2.75 #define VDP_DECODER_PROFILE_HEVC_MAIN_12

5.12.2.76 #define VDP_DECODER_PROFILE_HEVC_MAIN_444

5.12.2.77 #define VDP_DECODER_PROFILE_HEVC_MAIN_STILL

5.12.2.78 #define VDP_DECODER_PROFILE_MPEG1

5.12.2.79 #define VDP_DECODER_PROFILE_MPEG2_MAIN

5.12.2.80 #define VDP_DECODER_PROFILE_MPEG2_SIMPLE

5.12.2.81 #define VDP_DECODER_PROFILE_MPEG4_PART2_ASP

5.12.2.82 #define VDP_DECODER_PROFILE_MPEG4_PART2_SP

5.12.2.83 #define VDP_DECODER_PROFILE_VC1_ADVANCED

5.12.2.84 #define VDP_DECODER_PROFILE_VC1_MAIN

5.12.2.85 #define VDP_DECODER_PROFILE_VC1_SIMPLE

5.12.3 Typedef Documentation

5.12.3.1 typedef uint32_t VdpDecoder

An opaque handle representing a VdpDecoder object.

5.12.3.2 typedef VdpStatus VdpDecoderCreate(VdpDevice device, VdpDecoderProfile profile, uint32_t width, uint32_t height, uint32_t max_references, VdpDecoder *decoder)

Create a VdpDecoder.

Parameters

in	*device*	The device that will contain the surface.
in	*profile*	The video format the decoder will decode.
in	*width*	The width of the new surface.
in	*height*	The height of the new surface.
in	*max_references*	The maximum number of references that may be used by a single frame in the stream to be decoded. This parameter exists mainly for formats such as H.264, where different streams may use a different number of references. Requesting too many references may waste memory, but decoding should still operate correctly. Requesting too few references will cause decoding to fail.
out	*decoder*	The new decoder's handle.

Returns

VdpStatus The completion status of the operation.

5.12.3.3 typedef VdpStatus VdpDecoderDestroy(VdpDecoder decoder)

Destroy a VdpDecoder.

Parameters

in	*surface*	The decoder's handle.

Returns

VdpStatus The completion status of the operation.

5.12.3.4 typedef VdpStatus VdpDecoderGetParameters(VdpDecoder decoder,VdpDecoderProfile *profile, uint32_t *width, uint32_t *height)

Retrieve the parameters used to create a VdpDecoder.

Parameters

in	*surface*	The surface's handle.
out	*profile*	The video format used to create the decoder.
out	*width*	The width of surfaces decode by the decoder.
out	*height*	The height of surfaces decode by the decoder

Returns

VdpStatus The completion status of the operation.

5.12.3.5 typedef uint32_t VdpDecoderProfile

The set of all known compressed video formats, and associated profiles, that may be decoded.

5.12.3.6 typedef VdpStatus VdpDecoderQueryCapabilities(VdpDevice device, VdpDecoderProfile profile,VdpBool *is_supported, uint32_t *max_level, uint32_t *max_macroblocks, uint32_t *max_width, uint32_t *max_height)

Query the implementation's VdpDecoder capabilities.

Parameters

in	*device*	The device to query.
in	*profile*	The decoder profile for which information is requested.
out	*is_supported*	Is this profile supported?
out	*max_level*	The maximum specification level supported for this profile.
out	*max_macroblocks*	The maximum supported surface size in macroblocks. Note that this could be greater than that dictated by the maximum level.
out	*max_width*	The maximum supported surface width for this profile. Note that this could be greater than that dictated by the maximum level.
out	*max_height*	The maximum supported surface height for this profile. Note that this could be greater than that dictated by the maximum level.

Returns

VdpStatus The completion status of the operation.

5.12.3.7 typedef VdpStatus VdpDecoderRender(VdpDecoder decoder, VdpVideoSurface target, VdpPictureInfo const *picture_info, uint32_t bitstream_buffer_count, VdpBitstreamBuffer const *bitstream_buffers)

Decode a compressed field/frame and render the result into a VdpVideoSurface.

Parameters

in	*decoder*	The decoder object that will perform the decode operation.
in	*target*	The video surface to render to.
in	*picture_info*	A (pointer to a) structure containing information about the picture to be decoded. Note that the appropriate type of VdpPictureInfo* structure must be provided to match to profile that the decoder was created for.
in	*bitstream_buffer_count*	The number of bitstream buffers containing compressed data for this picture.
in	*bitstream_buffers*	An array of bitstream buffers.

Returns

VdpStatus The completion status of the operation.

See Video Mixer Usage for additional information.

5.12.3.8 typedef void VdpPictureInfo

A generic "picture information" type.

This type serves solely to document the expected usage of a generic (void *) function parameter. In actual usage, the application is expected to physically provide a pointer to an instance of one of the "real" VdpPictureInfo* structures, picking the type appropriate for the decoder object in question.

5.12.3.9 typedef VdpPictureInfoMPEG4Part2 VdpPictureInfoDivX4

Picture parameter information for a DivX 4 picture.

Due to similarites between MPEG-4 Part 2 and DivX 4, the picture parameter structure is re-used.

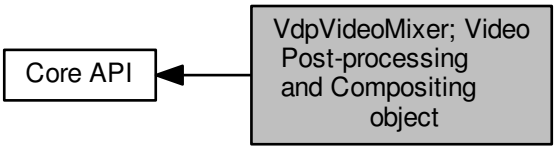
5.12.3.10 typedef VdpPictureInfoMPEG4Part2 VdpPictureInfoDivX5

Picture parameter information for a DivX 5 picture.

Due to similarites between MPEG-4 Part 2 and DivX 5, the picture parameter structure is re-used.

5.13 VdpVideoMixer; Video Post-processing and Compositing object

Collaboration diagram for VdpVideoMixer; Video Post-processing and Compositing object:



Data Structures

- struct VdpLayer

  Definition of an additional VdpOutputSurface layer in the composting model.

Macros

- #define VDP_VIDEO_MIXER_FEATURE_DEINTERLACE_TEMPORAL

  A VdpVideoMixerFeature.
- #define VDP_VIDEO_MIXER_FEATURE_DEINTERLACE_TEMPORAL_SPATIAL

  A VdpVideoMixerFeature.
- #define VDP_VIDEO_MIXER_FEATURE_INVERSE_TELECINE

  A VdpVideoMixerFeature.
- #define VDP_VIDEO_MIXER_FEATURE_NOISE_REDUCTION

  A VdpVideoMixerFeature.
- #define VDP_VIDEO_MIXER_FEATURE_SHARPNESS

  A VdpVideoMixerFeature.
- #define VDP_VIDEO_MIXER_FEATURE_LUMA_KEY

  A VdpVideoMixerFeature.
- #define VDP_VIDEO_MIXER_FEATURE_HIGH_QUALITY_SCALING_L1

  A VdpVideoMixerFeature.
- #define VDP_VIDEO_MIXER_FEATURE_HIGH_QUALITY_SCALING_L2

  A VdpVideoMixerFeature.
- #define VDP_VIDEO_MIXER_FEATURE_HIGH_QUALITY_SCALING_L3

  A VdpVideoMixerFeature.
- #define VDP_VIDEO_MIXER_FEATURE_HIGH_QUALITY_SCALING_L4

  A VdpVideoMixerFeature.
- #define VDP_VIDEO_MIXER_FEATURE_HIGH_QUALITY_SCALING_L5

  A VdpVideoMixerFeature.
- #define VDP_VIDEO_MIXER_FEATURE_HIGH_QUALITY_SCALING_L6

  A VdpVideoMixerFeature.
- #define VDP_VIDEO_MIXER_FEATURE_HIGH_QUALITY_SCALING_L7

  A VdpVideoMixerFeature.

- #define VDP_VIDEO_MIXER_FEATURE_HIGH_QUALITY_SCALING_L8

  A VdpVideoMixerFeature.
- #define VDP_VIDEO_MIXER_FEATURE_HIGH_QUALITY_SCALING_L9

  A VdpVideoMixerFeature.
- #define VDP_VIDEO_MIXER_PARAMETER_VIDEO_SURFACE_WIDTH

  The exact width of input video surfaces.
- #define VDP_VIDEO_MIXER_PARAMETER_VIDEO_SURFACE_HEIGHT

  The exact height of input video surfaces.
- #define VDP_VIDEO_MIXER_PARAMETER_CHROMA_TYPE

  The chroma type of the input video surfaces the will process.
- #define VDP_VIDEO_MIXER_PARAMETER_LAYERS

  The number of auxiliary layers in the mixer's compositing model.
- #define VDP_VIDEO_MIXER_ATTRIBUTE_BACKGROUND_COLOR

  The background color in the VdpVideoMixer's compositing model.
- #define VDP_VIDEO_MIXER_ATTRIBUTE_CSC_MATRIX

  The color-space conversion matrix used by the VdpVideoMixer.
- #define VDP_VIDEO_MIXER_ATTRIBUTE_NOISE_REDUCTION_LEVEL

  The amount of noise reduction algorithm to apply.
- #define VDP_VIDEO_MIXER_ATTRIBUTE_SHARPNESS_LEVEL

  The amount of sharpening, or blurring, to apply.
- #define VDP_VIDEO_MIXER_ATTRIBUTE_LUMA_KEY_MIN_LUMA

  The minimum luma value for the luma key algorithm.
- #define VDP_VIDEO_MIXER_ATTRIBUTE_LUMA_KEY_MAX_LUMA

  The maximum luma value for the luma key algorithm.
- #define VDP_VIDEO_MIXER_ATTRIBUTE_SKIP_CHROMA_DEINTERLACE

  Whether de-interlacers should operate solely on luma, and bob chroma.
- #define VDP_LAYER_VERSION 0

Typedefs

- typedef uint32_t VdpVideoMixerFeature

  A VdpVideoMixer feature that must be requested at creation time to be used.
- typedef uint32_t VdpVideoMixerParameter

  A VdpVideoMixer creation parameter.
- typedef uint32_t VdpVideoMixerAttribute

  An adjustable attribute of VdpVideoMixer operation.
- typedef VdpStatus VdpVideoMixerQueryFeatureSupport(VdpDevice device, VdpVideoMixerFeature feature, VdpBool *is_supported)

  Query the implementation's support for a specific feature.
- typedef VdpStatus VdpVideoMixerQueryParameterSupport(VdpDevice device, VdpVideoMixerParameter parameter, VdpBool *is_supported)

  Query the implementation's support for a specific parameter.
- typedef VdpStatus VdpVideoMixerQueryAttributeSupport(VdpDevice device, VdpVideoMixerAttribute attribute, VdpBool *is_supported)

  Query the implementation's support for a specific attribute.
- typedef VdpStatus VdpVideoMixerQueryParameterValueRange(VdpDevice device, VdpVideoMixerParameter parameter, void *min_value, void *max_value)

  Query the implementation's supported for a specific parameter.
- typedef VdpStatus VdpVideoMixerQueryAttributeValueRange(VdpDevice device, VdpVideoMixerAttribute attribute, void *min_value, void *max_value)

  Query the implementation's supported for a specific attribute.

- typedef uint32_t VdpVideoMixer

  An opaque handle representing a VdpVideoMixer object.
- typedef VdpStatus VdpVideoMixerCreate(VdpDevice device, uint32_t feature_count, VdpVideoMixerFeature const *features, uint32_t parameter_count, VdpVideoMixerParameter const *parameters, void const *const *parameter_values, VdpVideoMixer *mixer)

  Create a VdpVideoMixer.
- typedef VdpStatus VdpVideoMixerSetFeatureEnables(VdpVideoMixer mixer, uint32_t feature_count, VdpVideoMixerFeature const *features, VdpBool const *feature_enables)

  Enable or disable features.
- typedef VdpStatus VdpVideoMixerSetAttributeValues(VdpVideoMixer mixer, uint32_t attribute_count, VdpVideoMixerAttribute const *attributes, void const *const *attribute_values)

  Set attribute values.
- typedef VdpStatus VdpVideoMixerGetFeatureSupport(VdpVideoMixer mixer, uint32_t feature_count, VdpVideoMixerFeature const *features, VdpBool *feature_supports)

  Retrieve whether features were requested at creation time.
- typedef VdpStatus VdpVideoMixerGetFeatureEnables(VdpVideoMixer mixer, uint32_t feature_count, VdpVideoMixerFeature const *features, VdpBool *feature_enables)

  Retrieve whether features are enabled.
- typedef VdpStatus VdpVideoMixerGetParameterValues(VdpVideoMixer mixer, uint32_t parameter_count, VdpVideoMixerParameter const *parameters, void *const *parameter_values)

  Retrieve parameter values given at creation time.
- typedef VdpStatus VdpVideoMixerGetAttributeValues(VdpVideoMixer mixer, uint32_t attribute_count, VdpVideoMixerAttribute const *attributes, void *const *attribute_values)

  Retrieve current attribute values.
- typedef VdpStatus VdpVideoMixerDestroy(VdpVideoMixer mixer)

  Destroy a VdpVideoMixer.
- typedef VdpStatus VdpVideoMixerRender(VdpVideoMixer mixer, VdpOutputSurface background_surface, VdpRect const *background_source_rect, VdpVideoMixerPictureStructure current_picture_structure, uint32_t video_surface_past_count, VdpVideoSurface const *video_surface_past, VdpVideoSurface video_surface_current, uint32_t video_surface_future_count, VdpVideoSurface const *video_surface_future, VdpRect const *video_source_rect, VdpOutputSurface destination_surface, VdpRect const *destination_rect, VdpRect const *destination_video_rect, uint32_t layer_count, VdpLayer const *layers)

  Perform a video post-processing and compositing operation.

Enumerations

- enum VdpVideoMixerPictureStructure { VDP_VIDEO_MIXER_PICTURE_STRUCTURE_TOP_FIELD, VDP_VIDEO_MIXER_PICTURE_STRUCTURE_BOTTOM_FIELD, VDP_VIDEO_MIXER_PICTURE_STRUCTURE_FRAME }

  The structure of the picture present in a VdpVideoSurface.

5.13.1 Detailed Description

VdpVideoMixer can perform some subset of the following post-processing steps on video:

- De-interlacing
  - Various types, with or without inverse telecine
- Noise-reduction
- Sharpness adjustment

- Color space conversion to RGB
- Chroma format upscaling to 4:4:4

A VdpVideoMixer takes a source VdpVideoSurface VdpVideoSurface and performs various video processing steps on it (potentially using information from past or future video surfaces). It scales the video and converts it to RGB, then optionally composites it with multiple auxiliary VdpOutputSurfaces before writing the result to the destination VdpOutputSurface.

The video mixer compositing model is as follows:

- A rectangle will be rendered on an output surface. No pixels will be rendered outside of this output rectangle. The contents of this rectangle will be a composite of many layers.
- The first layer is the background color. The background color will fill the entire rectangle.
- The second layer is the processed video which has been converted to RGB. These pixels will overwrite the background color of the first layer except where the second layer's rectangle does not completely cover the output rectangle. In those regions the background color will continue to show. If any portion of the second layer's output rectangle is outside of the output rectangle, those portions will be clipped.
- The third layer contains some number of auxiliary layers (in the form of VdpOutputSurfaces) which will be composited using the alpha value from the those surfaces. The compositing operations are equivalent to rendering with VdpOutputSurfaceRenderOutputSurface using a source blend factor of SOURCE_ALPHA, a destination blend factor of ONE_MINUS_SOURCE_ALPHA and an equation of ADD.

5.13.2 Macro Definition Documentation

5.13.2.1 #define VDP_LAYER_VERSION 0

5.13.2.2 #define VDP_VIDEO_MIXER_ATTRIBUTE_BACKGROUND_COLOR

The background color in the VdpVideoMixer's compositing model.

This attribute's type is VdpColor.

This parameter defaults to black (all color components 0.0 and alpha 1.0).

The application may not query this parameter's supported range, since the type is not scalar.

5.13.2.3 #define VDP_VIDEO_MIXER_ATTRIBUTE_CSC_MATRIX

The color-space conversion matrix used by the VdpVideoMixer.

This attribute's type is VdpCSCMatrix; CSC Matrix Manipulation.

Note: When using VdpVideoMixerGetAttributeValues to retrieve the current CSC matrix, the attribute_values array must contain a pointer to a pointer a VdpCSCMatrix (VdpCSCMatrix$**$ as a void $*$). The get function will either initialize the referenced CSC matrix to the current value, *or* clear the supplied pointer to NULL, if the previous set call supplied a value of NULL in parameter_values, to request the default matrix.

```
1 VdpCSCMatrix   matrix;
2 VdpCSCMatrix * matrix_ptr;
3 void * attribute_values[] = {&matrix_ptr};
4 VdpStatus st = vdp_video_mixer_get_attribute_values(..., attribute_values, ...);
```

This parameter defaults to a matrix suitable for ITU-R BT.601 input surfaces, with no procamp adjustments.

The application may not query this parameter's supported range, since the type is not scalar.

5.13.2.4 #define VDP_VIDEO_MIXER_ATTRIBUTE_LUMA_KEY_MAX_LUMA

The maximum luma value for the luma key algorithm.

This attribute's type is float.

This parameter defaults to 1.0.

The application may query this parameter's supported range. However, the range is fixed as 0.0...1.0.

5.13.2.5 #define VDP_VIDEO_MIXER_ATTRIBUTE_LUMA_KEY_MIN_LUMA

The minimum luma value for the luma key algorithm.

This attribute's type is float.

This parameter defaults to 0.0.

The application may query this parameter's supported range. However, the range is fixed as 0.0...1.0.

5.13.2.6 #define VDP_VIDEO_MIXER_ATTRIBUTE_NOISE_REDUCTION_LEVEL

The amount of noise reduction algorithm to apply.

This attribute's type is float.

This parameter defaults to 0.0, which equates to no noise reduction.

The application may query this parameter's supported range. However, the range is fixed as 0.0...1.0.

5.13.2.7 #define VDP_VIDEO_MIXER_ATTRIBUTE_SHARPNESS_LEVEL

The amount of sharpening, or blurring, to apply.

This attribute's type is float.

This parameter defaults to 0.0, which equates to no sharpening.

Positive values request sharpening. Negative values request blurring.

The application may query this parameter's supported range. However, the range is fixed as -1.0...1.0.

5.13.2.8 #define VDP_VIDEO_MIXER_ATTRIBUTE_SKIP_CHROMA_DEINTERLACE

Whether de-interlacers should operate solely on luma, and bob chroma.

Note: This attribute only affects advanced de-interlacing algorithms, not bob or weave.

This attribute's type is uint8_t.

This parameter defaults to 0.

The application may query this parameter's supported range. However, the range is fixed as 0 (no/off) ... 1 (yes/on).

5.13.2.9 #define VDP_VIDEO_MIXER_FEATURE_DEINTERLACE_TEMPORAL

A VdpVideoMixerFeature.

When requested and enabled, motion adaptive temporal deinterlacing will be used on interlaced content.

When multiple de-interlacing options are requested and enabled, the back-end implementation chooses the best algorithm to apply.

5.13.2.10 #define VDP_VIDEO_MIXER_FEATURE_DEINTERLACE_TEMPORAL_SPATIAL

A VdpVideoMixerFeature.

When requested and enabled, this enables a more advanced version of temporal de-interlacing, that additionally uses edge-guided spatial interpolation.

When multiple de-interlacing options are requested and enabled, the back-end implementation chooses the best algorithm to apply.

5.13.2.11 #define VDP_VIDEO_MIXER_FEATURE_HIGH_QUALITY_SCALING_L1

A VdpVideoMixerFeature.

A VDPAU implementation may support multiple scaling algorithms of differing quality, and may potentially support a different subset of algorithms on different hardware.

In some cases, higher quality algorithms may require more resources (memory size, memory bandwidth, etc.) to operate. Hence, these high quality algorithms must be explicitly requested and enabled by the client application. This allows applications operating in a resource-constrained environment to have some level of control over resource usage.

Basic scaling is always built into any video mixer, and is known as level 0. Scaling quality increases beginning with optional level 1, through optional level 9.

If an application requests and enables multiple high quality scaling algorithms, the highest level enabled scaling algorithm will be used.

5.13.2.12 #define VDP_VIDEO_MIXER_FEATURE_HIGH_QUALITY_SCALING_L2

A VdpVideoMixerFeature.

See VDP_VIDEO_MIXER_FEATURE_HIGH_QUALITY_SCALING_L1 for details.

5.13.2.13 #define VDP_VIDEO_MIXER_FEATURE_HIGH_QUALITY_SCALING_L3

A VdpVideoMixerFeature.

See VDP_VIDEO_MIXER_FEATURE_HIGH_QUALITY_SCALING_L1 for details.

5.13.2.14 #define VDP_VIDEO_MIXER_FEATURE_HIGH_QUALITY_SCALING_L4

A VdpVideoMixerFeature.

See VDP_VIDEO_MIXER_FEATURE_HIGH_QUALITY_SCALING_L1 for details.

5.13.2.15 #define VDP_VIDEO_MIXER_FEATURE_HIGH_QUALITY_SCALING_L5

A VdpVideoMixerFeature.

See VDP_VIDEO_MIXER_FEATURE_HIGH_QUALITY_SCALING_L1 for details.

5.13.2.16 #define VDP_VIDEO_MIXER_FEATURE_HIGH_QUALITY_SCALING_L6

A VdpVideoMixerFeature.

See VDP_VIDEO_MIXER_FEATURE_HIGH_QUALITY_SCALING_L1 for details.

5.13.2.17 #define VDP_VIDEO_MIXER_FEATURE_HIGH_QUALITY_SCALING_L7

A VdpVideoMixerFeature.

See VDP_VIDEO_MIXER_FEATURE_HIGH_QUALITY_SCALING_L1 for details.

5.13.2.18 #define VDP_VIDEO_MIXER_FEATURE_HIGH_QUALITY_SCALING_L8

A VdpVideoMixerFeature.

See VDP_VIDEO_MIXER_FEATURE_HIGH_QUALITY_SCALING_L1 for details.

5.13.2.19 #define VDP_VIDEO_MIXER_FEATURE_HIGH_QUALITY_SCALING_L9

A VdpVideoMixerFeature.

See VDP_VIDEO_MIXER_FEATURE_HIGH_QUALITY_SCALING_L1 for details.

5.13.2.20 #define VDP_VIDEO_MIXER_FEATURE_INVERSE_TELECINE

A VdpVideoMixerFeature.

When requested and enabled, cadence detection will be enabled on interlaced content and the video mixer will try to extract progressive frames from pull-down material.

5.13.2.21 #define VDP_VIDEO_MIXER_FEATURE_LUMA_KEY

A VdpVideoMixerFeature.

When requested and enabled, the alpha of the rendered surface, which is normally set to the alpha of the background color, will be forced to 0.0 on pixels corresponding to source video surface luminance values in the range specified by attributes VDP_VIDEO_MIXER_ATTRIBUTE_LUMA_KEY_MIN_LUMA to VDP_VIDEO_MIXER_ATTRIBUTE_LUMA_KEY_MAX_LUMA. This keying is performed after scaling and de-interlacing.

5.13.2.22 #define VDP_VIDEO_MIXER_FEATURE_NOISE_REDUCTION

A VdpVideoMixerFeature.

When requested and enabled, a noise reduction algorithm will be applied to the video.

5.13.2.23 #define VDP_VIDEO_MIXER_FEATURE_SHARPNESS

A VdpVideoMixerFeature.

When requested and enabled, a sharpening algorithm will be applied to the video.

5.13.2.24 #define VDP_VIDEO_MIXER_PARAMETER_CHROMA_TYPE

The chroma type of the input video surfaces the will process.

This parameter's type is VdpChromaType.

If not specified, this parameter defaults to VDP_CHROMA_TYPE_420.

The application may not query this application's supported range, since it is a potentially disjoint enumeration.

5.13.2.25 #define VDP_VIDEO_MIXER_PARAMETER_LAYERS

The number of auxiliary layers in the mixer's compositing model.

Note that this indicates the maximum number of layers that may be processed by a given VdpVideoMixer object. Each individual VdpVideoMixerRender invocation may choose to use a different number of actual layers, from 0 up to this limit.

This attribute's type is uint32_t.

If not specified, this parameter defaults to 0.

The application may query this parameter's supported range.

5.13.2.26 #define VDP_VIDEO_MIXER_PARAMETER_VIDEO_SURFACE_HEIGHT

The exact height of input video surfaces.

This parameter's type is uint32_t.

This parameter defaults to 0 if not specified, which entails that it must be specified.

The application may query this parameter's supported range.

5.13.2.27 #define VDP_VIDEO_MIXER_PARAMETER_VIDEO_SURFACE_WIDTH

The exact width of input video surfaces.

This parameter's type is uint32_t.

This parameter defaults to 0 if not specified, which entails that it must be specified.

The application may query this parameter's supported range.

5.13.3 Typedef Documentation

5.13.3.1 typedef uint32_t VdpVideoMixer

An opaque handle representing a VdpVideoMixer object.

5.13.3.2 typedef uint32_t VdpVideoMixerAttribute

An adjustable attribute of VdpVideoMixer operation.

Various attributes of VdpVideoMixer operation may be adjusted at any time. Each attribute is named via a specific VdpVideoMixerAttribute value.

Each attribute has a specific type, and specific default value if not specified at VdpVideoMixer creation time. The application may query the legal supported range for some attributes.

5.13.3.3 typedef VdpStatus VdpVideoMixerCreate(VdpDevice device,uint32_t feature_count, VdpVideoMixerFeature const *features,uint32_t parameter_count, VdpVideoMixerParameter const *parameters, void const *const *parameter_values,VdpVideoMixer *mixer)

Create a VdpVideoMixer.

Parameters

in	*device*	The device that will contain the mixer.
in	*feature_count*	The number of features to request.
in	*features*	The list of features to request.
in	*parameter_count*	The number of parameters to set.
in	*parameters*	The list of parameters to set.
in	*parameter_values*	The values for the parameters. Note that each entry in the value array is a pointer to the actual value. In other words, the values themselves are not cast to "void *" and passed "inside" the array.
out	*mixer*	The new mixer's handle.

Returns

VdpStatus The completion status of the operation.

Initially, all requested features will be disabled. They can be enabled using VdpVideoMixerSetFeatureEnables.

Initially, all attributes will have default values. Values can be changed using VdpVideoMixerSetAttributeValues.

5.13.3.4 typedef VdpStatus VdpVideoMixerDestroy(VdpVideoMixer mixer)

Destroy a VdpVideoMixer.

Parameters

in	*device*	The device to destroy.

Returns

VdpStatus The completion status of the operation.

5.13.3.5 typedef uint32_t VdpVideoMixerFeature

A VdpVideoMixer feature that must be requested at creation time to be used.

Certain advanced VdpVideoMixer features are optional, and the ability to use those features at all must be requested when the VdpVideoMixer object is created. Each feature is named via a specific VdpVideoMixerFeature value.

Once requested, these features are permanently available within that specific VdpVideoMixer object. All features that are not explicitly requested at creation time default to being permanently unavailable.

Even when requested, all features default to being initially disabled. However, applications can subsequently enable and disable features at any time. See VdpVideoMixerSetFeatureEnables.

Some features allow configuration of their operation. Each configurable item is an VdpVideoMixerAttribute. These attributes may be manipulated at any time using VdpVideoMixerSetAttributeValues.

5.13.3.6 typedef VdpStatus VdpVideoMixerGetAttributeValues(VdpVideoMixer mixer, uint32_t attribute_count, VdpVideoMixerAttribute const *attributes,void *const *attribute_values)

Retrieve current attribute values.

Parameters

in	*mixer*	The mixer to manipulate.
in	*attribute_count*	The number of attributes to query.
in	*attributes*	The list of attributes to query.
out	*attribute_values*	The list of current values for the attributes. Note that each entry in the value array is a pointer to storage that will receive the actual value. If the attribute's type is a pointer itself, please closely read the documentation for that attribute type for any other data passing requirements.

Returns

VdpStatus The completion status of the operation.

5.13.3.7 typedef VdpStatus VdpVideoMixerGetFeatureEnables(VdpVideoMixer mixer, uint32_t feature_count, VdpVideoMixerFeature const *features,VdpBool *feature_enables)

Retrieve whether features are enabled.

Parameters

in	*mixer*	The mixer to manipulate.
in	*feature_count*	The number of features to query.
in	*features*	The list of features to query.
out	*feature_enabled*	A list of values indicating whether the feature is enabled.

Returns

VdpStatus The completion status of the operation.

5.13.3.8 typedef VdpStatus VdpVideoMixerGetFeatureSupport(VdpVideoMixer mixer, uint32_t feature_count, VdpVideoMixerFeature const *features,VdpBool *feature_supports)

Retrieve whether features were requested at creation time.

Parameters

in	*mixer*	The mixer to query.
in	*feature_count*	The number of features to query.
in	*features*	The list of features to query.
out	*feature_supported*	A list of values indicating whether the feature was requested, and hence is available.

Returns

VdpStatus The completion status of the operation.

5.13.3.9 typedef VdpStatus VdpVideoMixerGetParameterValues(VdpVideoMixer mixer, uint32_t parameter_count, VdpVideoMixerParameter const *parameters,void *const *parameter_values)

Retrieve parameter values given at creation time.

Parameters

in	*mixer*	The mixer to manipulate.
in	*parameter_count*	The number of parameters to query.
in	*parameters*	The list of parameters to query.
out	*parameter_values*	The list of current values for the parameters. Note that each entry in the value array is a pointer to storage that will receive the actual value. If the attribute's type is a pointer itself, please closely read the documentation for that attribute type for any other data passing requirements.

Returns

VdpStatus The completion status of the operation.

5.13.3.10 typedef uint32_t VdpVideoMixerParameter

A VdpVideoMixer creation parameter.

When a VdpVideoMixer is created, certain parameters may be supplied. Each parameter is named via a specific VdpVideoMixerParameter value.

Each parameter has a specific type, and specific default value if not specified at VdpVideoMixer creation time. The application may query the legal supported range for some parameters.

5.13.3.11 typedef VdpStatus VdpVideoMixerQueryAttributeSupport(VdpDevice device, VdpVideoMixerAttribute attribute, VdpBool *is_supported)

Query the implementation's support for a specific attribute.

Parameters

in	*device*	The device to query.
in	*feature*	The feature for which support is to be queried.
out	*is_supported*	Is the specified feature supported?

Returns

VdpStatus The completion status of the operation.

5.13.3.12 typedef VdpStatus VdpVideoMixerQueryAttributeValueRange(VdpDevice device, VdpVideoMixerAttribute attribute, void *min_value, void *max_value)

Query the implementation's supported for a specific attribute.

Parameters

in	*device*	The device to query.
in	*attribute*	The attribute for which support is to be queried.
out	*min_value*	The minimum supported value.
out	*max_value*	The maximum supported value.

Returns

VdpStatus The completion status of the operation.

5.13.3.13 typedef VdpStatus VdpVideoMixerQueryFeatureSupport(VdpDevice device, VdpVideoMixerFeature feature,VdpBool *is_supported)

Query the implementation's support for a specific feature.

Parameters

in	*device*	The device to query.
in	*feature*	The feature for which support is to be queried.
out	*is_supported*	Is the specified feature supported?

Returns

VdpStatus The completion status of the operation.

5.13.3.14 typedef VdpStatus VdpVideoMixerQueryParameterSupport(VdpDevice device, VdpVideoMixerParameter parameter,VdpBool *is_supported)

Query the implementation's support for a specific parameter.

Parameters

in	*device*	The device to query.
in	*parameter*	The parameter for which support is to be queried.
out	*is_supported*	Is the specified parameter supported?

Returns

VdpStatus The completion status of the operation.

5.13.3.15 typedef VdpStatus VdpVideoMixerQueryParameterValueRange(VdpDevice device, VdpVideoMixerParameter parameter,void *min_value, void *max_value)

Query the implementation's supported for a specific parameter.

Parameters

in	*device*	The device to query.
in	*parameter*	The parameter for which support is to be queried.
out	*min_value*	The minimum supported value.
out	*max_value*	The maximum supported value.

Returns

VdpStatus The completion status of the operation.

5.13.3.16 typedef **VdpStatus** VdpVideoMixerRender(**VdpVideoMixer** mixer, **VdpOutputSurface** background_surface, **VdpRect** const *background_source_rect, **VdpVideoMixerPictureStructure** current_picture_structure, uint32_t video_surface_past_count, **VdpVideoSurface** const *video_surface_past, **VdpVideoSurface** video_surface_current, uint32_t video_surface_future_count, **VdpVideoSurface** const *video_surface_future, **VdpRect** const *video_source_rect, **VdpOutputSurface** destination_surface, **VdpRect** const *destination_rect, **VdpRect** const *destination_video_rect, uint32_t layer_count, **VdpLayer** const *layers)

Perform a video post-processing and compositing operation.

Parameters

in	*mixer*	The mixer object that will perform the mixing/rendering operation.
in	*background_surface*	A background image. If set to any value other than VDP_INVALID_HANDLE, the specific surface will be used instead of the background color as the first layer in the mixer's compositing process.
in	*background_source_rect*	When background_surface is specified, this parameter indicates the portion of background_surface that will be used as the background layer. The specified region will be extracted and scaled to match the size of destination_rect. If NULL, the entire background_surface will be used.
in	*current_picture_structure*	The picture structure of the field/frame to be processed. This field/frame is presented in the **video_surface_current** parameter. If frame, then all **video_surface_**∗ parameters are assumed to be frames. If field, then all video_surface_∗ parameters are assumed to be fields, with alternating top/bottom-ness derived from video_surface_current.
in	*video_surfaces_past_count*	The number of provided fields/frames prior to the current picture.
in	*video_surfaces_past*	The fields/frames prior to the current field/frame. Note that array index 0 is the field/frame temporally nearest to the current field/frame, with increasing array indices used for older frames. Unavailable entries may be set to VDP_INVALID_HANDLE.
in	*video_surface_current*	The field/frame to be processed.
in	*video_surfaces_future_count*	The number of provided fields/frames following the current picture.
in	*video_surfaces_future*	The fields/frames that follow the current field/frame. Note that array index 0 is the field/frame temporally nearest to the current field/frame, with increasing array indices used for newer frames. Unavailable entries may be set to VDP_INVALID_HANDLE.
in	*video_source_rect*	The sub-rectangle of the source video surface to extract and process. If NULL, the entire surface will be used. Left/right and/or top/bottom co-ordinates may be swapped to flip the source. Values from outside the video surface are valid and samples at those locations will be taken from the nearest edge.
in	*destination_surface*	
in	*destination_rect*	The sub-rectangle of the destination surface to modify. Note that rectangle clips all other actions.
in	*destination_video_rect*	The sub-rectangle of the destination surface that will contain the processed video. This rectangle is relative to the entire destination surface. This rectangle is clipped by **destination_rect**. If NULL, the destination rectangle will be sized to match the source rectangle, and will be located at the origin.
in	*layer_count*	The number of additional layers to composite above the video.
in	*layers*	The array of additional layers to composite above the video.

Returns

VdpStatus The completion status of the operation.

For a complete discussion of how to use this API, please see Video Mixer Usage.

5.13.3.17 typedef VdpStatus VdpVideoMixerSetAttributeValues(VdpVideoMixer mixer, uint32_t attribute_count, VdpVideoMixerAttribute const *attributes, void const *const *attribute_values)

Set attribute values.

Parameters

in	*mixer*	The mixer to manipulate.
in	*attribute_count*	The number of attributes to set.
in	*attributes*	The list of attributes to set.
in	*attribute_values*	The values for the attributes. Note that each entry in the value array is a pointer to the actual value. In other words, the values themselves are not cast to "void *" and passed "inside" the array. A NULL pointer requests that the default value be set for that attribute.

Returns

VdpStatus The completion status of the operation.

5.13.3.18 typedef VdpStatus VdpVideoMixerSetFeatureEnables(VdpVideoMixer mixer, uint32_t feature_count, VdpVideoMixerFeature const *features, VdpBool const *feature_enables)

Enable or disable features.

Parameters

in	*mixer*	The mixer to manipulate.
in	*feature_count*	The number of features to enable/disable.
in	*features*	The list of features to enable/disable.
in	*feature_enables*	The list of new feature enable values.

Returns

VdpStatus The completion status of the operation.

5.13.4 Enumeration Type Documentation

5.13.4.1 enum VdpVideoMixerPictureStructure

The structure of the picture present in a VdpVideoSurface.

Enumerator

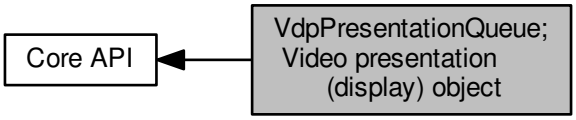
VDP_VIDEO_MIXER_PICTURE_STRUCTURE_TOP_FIELD The picture is a field, and is the top field of the surface.

VDP_VIDEO_MIXER_PICTURE_STRUCTURE_BOTTOM_FIELD The picture is a field, and is the bottom field of the surface.

VDP_VIDEO_MIXER_PICTURE_STRUCTURE_FRAME The picture is a frame, and hence is the entire surface.

5.14 VdpPresentationQueue; Video presentation (display) object

Collaboration diagram for VdpPresentationQueue; Video presentation (display) object:



Typedefs

- typedef uint64_t VdpTime

  The representation of a point in time.
- typedef uint32_t VdpPresentationQueueTarget

  An opaque handle representing the location where video will be presented.
- typedef VdpStatus VdpPresentationQueueTargetDestroy(VdpPresentationQueueTarget presentation_queue_target)

  Destroy a VdpPresentationQueueTarget.
- typedef uint32_t VdpPresentationQueue

  An opaque handle representing a presentation queue object.
- typedef VdpStatus VdpPresentationQueueCreate(VdpDevice device, VdpPresentationQueueTarget presentation_queue_target, VdpPresentationQueue *presentation_queue)

  Create a VdpPresentationQueue.
- typedef VdpStatus VdpPresentationQueueDestroy(VdpPresentationQueue presentation_queue)

  Destroy a VdpPresentationQueue.
- typedef VdpStatus VdpPresentationQueueSetBackgroundColor(VdpPresentationQueue presentation_queue, VdpColor *const background_color)

  Configure the background color setting.
- typedef VdpStatus VdpPresentationQueueGetBackgroundColor(VdpPresentationQueue presentation_queue, VdpColor *background_color)

  Retrieve the current background color setting.
- typedef VdpStatus VdpPresentationQueueGetTime(VdpPresentationQueue presentation_queue, VdpTime *current_time)

  Retrieve the presentation queue's "current" time.
- typedef VdpStatus VdpPresentationQueueDisplay(VdpPresentationQueue presentation_queue, VdpOutputSurface surface, uint32_t clip_width, uint32_t clip_height, VdpTime earliest_presentation_time)

  Enter a surface into the presentation queue.
- typedef VdpStatus VdpPresentationQueueBlockUntilSurfaceIdle(VdpPresentationQueue presentation_queue, VdpOutputSurface surface, VdpTime *first_presentation_time)

  Wait for a surface to finish being displayed.
- typedef VdpStatus VdpPresentationQueueQuerySurfaceStatus(VdpPresentationQueue presentation_queue, VdpOutputSurface surface, VdpPresentationQueueStatus *status, VdpTime *first_presentation_time)

  Poll the current queue status of a surface.

Enumerations

- enum VdpPresentationQueueStatus { VDP_PRESENTATION_QUEUE_STATUS_IDLE, VDP_PRESENTATION_QUEUE_STATUS_QUEUED, VDP_PRESENTATION_QUEUE_STATUS_VISIBLE }

  The status of a surface within a presentation queue.

5.14.1 Detailed Description

The VdpPresentationQueue manages a queue of surfaces and associated timestamps. For each surface in the queue, once the associated timestamp is reached, the surface is displayed to the user. This timestamp-based approach yields high quality video delivery.

The exact location of the displayed content is Window System specific. For this reason, the Window System Integration Layer provides an API to create a VdpPresentationQueueTarget object (e.g. via VdpPresentationQueueTargetCreateX11) which encapsulates this information.

Note that the presentation queue performs no scaling of surfaces to match the display target's size, aspect ratio, etc.

Surfaces that are too large to fit into the display target will be clipped. Surfaces that are too small to fill the display target will be aligned to the top-left corner of the display target, with the balance of the display target being filled with a constant configurable "background" color.

Note that the presentation queue operates in a manner that is semantically equivalent to an overlay surface, with any required color key painting hidden internally. However, implementations are free to use whatever semantically equivalent technique they wish. Note that implementations that actually use color-keyed overlays will typically use the "background" color as the overlay color key value, so this color should be chosen with care.

5.14.2 Typedef Documentation

5.14.2.1 typedef uint32_t VdpPresentationQueue

An opaque handle representing a presentation queue object.

5.14.2.2 typedef VdpStatus VdpPresentationQueueBlockUntilSurfaceIdle(VdpPresentationQueue presentation_queue, VdpOutputSurface surface, VdpTime *first_presentation_time)

Wait for a surface to finish being displayed.

Parameters

in	*presentation_queue*	The queue to query.
in	*surface*	The surface to wait for.
out	*first_presentation_time*	The timestamp of the VSYNC at which this surface was first displayed. Note that 0 means the surface was never displayed.

Returns

VdpStatus The completion status of the operation.

Note that this API would block forever if queried about the surface most recently added to a presentation queue. That is because there would be no other surface that could possibly replace that surface as the currently displayed surface, and hence that surface would never become idle. For that reason, this function will return an error in that case.

5.14.2.3 typedef VdpStatus VdpPresentationQueueCreate(VdpDevice device, VdpPresentationQueueTarget presentation_queue_target,VdpPresentationQueue *presentation_queue)

Create a VdpPresentationQueue.

Parameters

in	*device*	The device that will contain the queue.
in	*presentation_queue_target*	The location to display the content.
out	*presentation_queue*	The new queue's handle.

Returns

VdpStatus The completion status of the operation.

Note: The initial value for the background color will be set to an implementation-defined value.

5.14.2.4 typedef VdpStatus VdpPresentationQueueDestroy(VdpPresentationQueue presentation_queue)

Destroy a VdpPresentationQueue.

Parameters

in	*presentation_queue*	The queue to destroy.

Returns

VdpStatus The completion status of the operation.

5.14.2.5 typedef VdpStatus VdpPresentationQueueDisplay(VdpPresentationQueue presentation_queue, VdpOutputSurface surface, uint32_t clip_width, uint32_t clip_height, VdpTime earliest_presentation_time)

Enter a surface into the presentation queue.

Parameters

in	*presentation_queue*	The queue to query.
in	*surface*	The surface to enter into the queue.
in	*clip_width*	If set to a non-zero value, the presentation queue will display only clip_width pixels of the surface (anchored to the top-left corner of the surface.
in	*clip_height*	If set to a non-zero value, the presentation queue will display only clip_height lines of the surface (anchored to the top-left corner of the surface.
in	*earliest_presentation_time*	The timestamp associated with the surface. The presentation queue will not display the surface until the presentation queue's current time is at least this value.

Returns

VdpStatus The completion status of the operation.

Applications may choose to allow resizing of the presentation queue target (which may be e.g. a regular Window when using an X11-based implementation).

clip_width and **clip_height** may be used to limit the size of the displayed region of a surface, in order to match the specific region that was rendered to.

In turn, this allows the application to allocate over-sized (e.g. screen-sized) surfaces, but render to a region that matches the current size of the video window.

Using this technique, an application's response to window resizing may simply be to render to, and display, a different region of the surface, rather than de-/re-allocation of surfaces to match the updated window size.

Implementations may impose an upper bound on the number of entries contained by the presentation queue at a given time. This limit is likely different to the number of VdpOutputSurfaces that may be allocated at a given time. This limit applies to entries in the QUEUED or VISIBLE state only. In other words, entries that have transitioned from a QUEUED or VISIBLE state to an IDLE state do not count toward this limit.

5.14.2.6 typedef VdpStatus VdpPresentationQueueGetBackgroundColor(VdpPresentationQueue presentation_queue, VdpColor *background_color)

Retrieve the current background color setting.

Parameters

in	*presentation_queue*	The queue to query.
out	*background_color*	The current background color.

5.14.2.7 typedef VdpStatus VdpPresentationQueueGetTime(VdpPresentationQueue presentation_queue,VdpTime *current_time)

Retrieve the presentation queue's "current" time.

Parameters

in	*presentation_queue*	The queue to query.
out	*current_time*	The current time, which may represent a point between display VSYNC events.

Returns

VdpStatus The completion status of the operation.

5.14.2.8 typedef VdpStatus VdpPresentationQueueQuerySurfaceStatus(VdpPresentationQueue presentation_queue, VdpOutputSurface surface,VdpPresentationQueueStatus *status, VdpTime *first_presentation_time)

Poll the current queue status of a surface.

Parameters

in	*presentation_queue*	The queue to query.
in	*surface*	The surface to query.
out	*status*	The current status of the surface within the queue.
out	*first_presentation_time*	The timestamp of the VSYNC at which this surface was first displayed. Note that 0 means the surface was never displayed.

Returns

VdpStatus The completion status of the operation.

5.14.2.9 typedef VdpStatus VdpPresentationQueueSetBackgroundColor(VdpPresentationQueue presentation_queue, VdpColor *const background_color)

Configure the background color setting.

Parameters

in	*presentation_queue*	The queue to manipulate.
in	*background_color*	The new background color.

Note: Implementations may choose whether to apply the new background color value immediately, or defer it until the next surface is presented.

5.14.2.10 typedef uint32_t VdpPresentationQueueTarget

An opaque handle representing the location where video will be presented.

VdpPresentationQueueTarget are created using a Window System Integration Layer specific API, such as VdpPresentationQueueTargetCreateX11.

5.14.2.11 typedef VdpStatus VdpPresentationQueueTargetDestroy(VdpPresentationQueueTarget presentation_queue_target)

Destroy a VdpPresentationQueueTarget.

Parameters

in	*presentation_queue_target*	The target to destroy.

Returns

VdpStatus The completion status of the operation.

5.14.2.12 typedef uint64_t VdpTime

The representation of a point in time.

VdpTime timestamps are intended to be a high-precision timing system, potentially independent from any other time domain in the system.

Time is represented in units of nanoseconds. The origin (i.e. the time represented by a value of 0) is implementation dependent.

5.14.3 Enumeration Type Documentation

5.14.3.1 enum VdpPresentationQueueStatus

The status of a surface within a presentation queue.

Enumerator

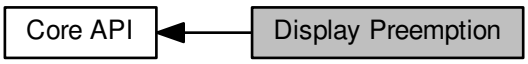
VDP_PRESENTATION_QUEUE_STATUS_IDLE The surface is not queued or currently visible.

VDP_PRESENTATION_QUEUE_STATUS_QUEUED The surface is in the queue, and not currently visible.

VDP_PRESENTATION_QUEUE_STATUS_VISIBLE The surface is the currently visible surface.

5.15 Display Preemption

Collaboration diagram for Display Preemption:



Typedefs

- typedef void VdpPreemptionCallback(VdpDevice device, void *context)

  A callback to notify the client application that a device's display has been preempted.
- typedef VdpStatus VdpPreemptionCallbackRegister(VdpDevice device, VdpPreemptionCallback callback, void *context)

  Configure the display preemption callback.

5.15.1 Detailed Description

The Window System may operate within a frame-work (such as Linux's VT switching) where the display is shared between the Window System (e.g. X) and some other output mechanism (e.g. the VT.) Given this scenario, the Window System's control of the display could be preempted, and restored, at any time.

VDPAU does not mandate that implementations hide such preemptions from VDPAU client applications; doing so may impose extreme burdens upon VDPAU implementations. Equally, however, implementations are free to hide such preemptions from client applications.

VDPAU allows implementations to inform the client application when such a preemption has occurred, and then refuse to continue further operation.

Similarly, some form of fatal hardware error could prevent further operation of the VDPAU implementation, without a complete re-initialization.

The following discusses the behavior of implementations that choose not to hide preemption from client applications.

When preemption occurs, VDPAU internally destroys all objects; the client application need not do this. However, if the client application wishes to continue operation, it must recreate all objects that it uses. It is probable that this recreation will not succeed until the display ownership is restored to the Window System.

Once preemption has occurred, all VDPAU entry points will return the specific error code VDP_STATUS_DISPL↩AY_PREEMPTED.

VDPAU client applications may also be notified of such preemptions and fatal errors via a callback. See Vdp↩PreemptionCallbackRegister for more details.

5.15.2 Typedef Documentation

5.15.2.1 typedef void VdpPreemptionCallback(VdpDevice device, void *context)

A callback to notify the client application that a device's display has been preempted.

Parameters

in	*device*	The device that had its display preempted.
in	*context*	The client-supplied callback context information.

Returns

void No return value

5.15.2.2 typedef VdpStatus VdpPreemptionCallbackRegister(VdpDevice device, VdpPreemptionCallback callback, void ∗context)

Configure the display preemption callback.

Parameters

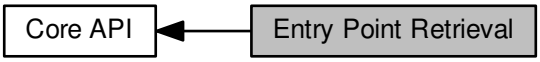
in	*device*	The device to be monitored for preemption.
in	*callback*	The client application's callback function. If NULL, the callback is unregistered.
in	*context*	The client-supplied callback context information. This information will be passed to the callback function if/when invoked.

Returns

VdpStatus The completion status of the operation.

5.16 Entry Point Retrieval

Collaboration diagram for Entry Point Retrieval:



Macros

- #define VDP_FUNC_ID_GET_ERROR_STRING
- #define VDP_FUNC_ID_GET_PROC_ADDRESS
- #define VDP_FUNC_ID_GET_API_VERSION
- #define VDP_FUNC_ID_GET_INFORMATION_STRING
- #define VDP_FUNC_ID_DEVICE_DESTROY
- #define VDP_FUNC_ID_GENERATE_CSC_MATRIX
- #define VDP_FUNC_ID_VIDEO_SURFACE_QUERY_CAPABILITIES
- #define VDP_FUNC_ID_VIDEO_SURFACE_QUERY_GET_PUT_BITS_Y_CB_CR_CAPABILITIES
- #define VDP_FUNC_ID_VIDEO_SURFACE_CREATE
- #define VDP_FUNC_ID_VIDEO_SURFACE_DESTROY
- #define VDP_FUNC_ID_VIDEO_SURFACE_GET_PARAMETERS
- #define VDP_FUNC_ID_VIDEO_SURFACE_GET_BITS_Y_CB_CR
- #define VDP_FUNC_ID_VIDEO_SURFACE_PUT_BITS_Y_CB_CR
- #define VDP_FUNC_ID_OUTPUT_SURFACE_QUERY_CAPABILITIES
- #define VDP_FUNC_ID_OUTPUT_SURFACE_QUERY_GET_PUT_BITS_NATIVE_CAPABILITIES
- #define VDP_FUNC_ID_OUTPUT_SURFACE_QUERY_PUT_BITS_INDEXED_CAPABILITIES
- #define VDP_FUNC_ID_OUTPUT_SURFACE_QUERY_PUT_BITS_Y_CB_CR_CAPABILITIES
- #define VDP_FUNC_ID_OUTPUT_SURFACE_CREATE
- #define VDP_FUNC_ID_OUTPUT_SURFACE_DESTROY
- #define VDP_FUNC_ID_OUTPUT_SURFACE_GET_PARAMETERS
- #define VDP_FUNC_ID_OUTPUT_SURFACE_GET_BITS_NATIVE
- #define VDP_FUNC_ID_OUTPUT_SURFACE_PUT_BITS_NATIVE
- #define VDP_FUNC_ID_OUTPUT_SURFACE_PUT_BITS_INDEXED
- #define VDP_FUNC_ID_OUTPUT_SURFACE_PUT_BITS_Y_CB_CR
- #define VDP_FUNC_ID_BITMAP_SURFACE_QUERY_CAPABILITIES
- #define VDP_FUNC_ID_BITMAP_SURFACE_CREATE
- #define VDP_FUNC_ID_BITMAP_SURFACE_DESTROY
- #define VDP_FUNC_ID_BITMAP_SURFACE_GET_PARAMETERS
- #define VDP_FUNC_ID_BITMAP_SURFACE_PUT_BITS_NATIVE
- #define VDP_FUNC_ID_OUTPUT_SURFACE_RENDER_OUTPUT_SURFACE
- #define VDP_FUNC_ID_OUTPUT_SURFACE_RENDER_BITMAP_SURFACE
- #define VDP_FUNC_ID_OUTPUT_SURFACE_RENDER_VIDEO_SURFACE_LUMA
- #define VDP_FUNC_ID_DECODER_QUERY_CAPABILITIES
- #define VDP_FUNC_ID_DECODER_CREATE
- #define VDP_FUNC_ID_DECODER_DESTROY
- #define VDP_FUNC_ID_DECODER_GET_PARAMETERS
- #define VDP_FUNC_ID_DECODER_RENDER

- #define VDP_FUNC_ID_VIDEO_MIXER_QUERY_FEATURE_SUPPORT
- #define VDP_FUNC_ID_VIDEO_MIXER_QUERY_PARAMETER_SUPPORT
- #define VDP_FUNC_ID_VIDEO_MIXER_QUERY_ATTRIBUTE_SUPPORT
- #define VDP_FUNC_ID_VIDEO_MIXER_QUERY_PARAMETER_VALUE_RANGE
- #define VDP_FUNC_ID_VIDEO_MIXER_QUERY_ATTRIBUTE_VALUE_RANGE
- #define VDP_FUNC_ID_VIDEO_MIXER_CREATE
- #define VDP_FUNC_ID_VIDEO_MIXER_SET_FEATURE_ENABLES
- #define VDP_FUNC_ID_VIDEO_MIXER_SET_ATTRIBUTE_VALUES
- #define VDP_FUNC_ID_VIDEO_MIXER_GET_FEATURE_SUPPORT
- #define VDP_FUNC_ID_VIDEO_MIXER_GET_FEATURE_ENABLES
- #define VDP_FUNC_ID_VIDEO_MIXER_GET_PARAMETER_VALUES
- #define VDP_FUNC_ID_VIDEO_MIXER_GET_ATTRIBUTE_VALUES
- #define VDP_FUNC_ID_VIDEO_MIXER_DESTROY
- #define VDP_FUNC_ID_VIDEO_MIXER_RENDER
- #define VDP_FUNC_ID_PRESENTATION_QUEUE_TARGET_DESTROY
- #define VDP_FUNC_ID_PRESENTATION_QUEUE_CREATE
- #define VDP_FUNC_ID_PRESENTATION_QUEUE_DESTROY
- #define VDP_FUNC_ID_PRESENTATION_QUEUE_SET_BACKGROUND_COLOR
- #define VDP_FUNC_ID_PRESENTATION_QUEUE_GET_BACKGROUND_COLOR
- #define VDP_FUNC_ID_PRESENTATION_QUEUE_GET_TIME
- #define VDP_FUNC_ID_PRESENTATION_QUEUE_DISPLAY
- #define VDP_FUNC_ID_PRESENTATION_QUEUE_BLOCK_UNTIL_SURFACE_IDLE
- #define VDP_FUNC_ID_PRESENTATION_QUEUE_QUERY_SURFACE_STATUS
- #define VDP_FUNC_ID_PREEMPTION_CALLBACK_REGISTER
- #define VDP_FUNC_ID_BASE_WINSYS 0x1000

Typedefs

- typedef uint32_t VdpFuncId

  *A type suitable for VdpGetProcAddress's **function_id** parameter.*
- typedef VdpStatus VdpGetProcAddress(VdpDevice device, VdpFuncId function_id, void **function_pointer)

  Retrieve a VDPAU function pointer.

5.16.1 Detailed Description

In order to facilitate multiple implementations of VDPAU co-existing within a single process, all functionality is available via function pointers. The mechanism to retrieve those function pointers is described below.

5.16.2 Macro Definition Documentation

5.16.2.1 #define VDP_FUNC_ID_BASE_WINSYS 0x1000

5.16.2.2 #define VDP_FUNC_ID_BITMAP_SURFACE_CREATE

5.16.2.3 #define VDP_FUNC_ID_BITMAP_SURFACE_DESTROY

5.16.2.4 #define VDP_FUNC_ID_BITMAP_SURFACE_GET_PARAMETERS

5.16.2.5 #define VDP_FUNC_ID_BITMAP_SURFACE_PUT_BITS_NATIVE

5.16.2.6 #define VDP_FUNC_ID_BITMAP_SURFACE_QUERY_CAPABILITIES

5.16.2.7 #define VDP_FUNC_ID_DECODER_CREATE

5.16.2.8 #define VDP_FUNC_ID_DECODER_DESTROY

5.16.2.9 #define VDP_FUNC_ID_DECODER_GET_PARAMETERS

5.16.2.10 #define VDP_FUNC_ID_DECODER_QUERY_CAPABILITIES

5.16.2.11 #define VDP_FUNC_ID_DECODER_RENDER

5.16.2.12 #define VDP_FUNC_ID_DEVICE_DESTROY

5.16.2.13 #define VDP_FUNC_ID_GENERATE_CSC_MATRIX

5.16.2.14 #define VDP_FUNC_ID_GET_API_VERSION

5.16.2.15 #define VDP_FUNC_ID_GET_ERROR_STRING

5.16.2.16 #define VDP_FUNC_ID_GET_INFORMATION_STRING

5.16.2.17 #define VDP_FUNC_ID_GET_PROC_ADDRESS

5.16.2.18 #define VDP_FUNC_ID_OUTPUT_SURFACE_CREATE

5.16.2.19 #define VDP_FUNC_ID_OUTPUT_SURFACE_DESTROY

5.16.2.20 #define VDP_FUNC_ID_OUTPUT_SURFACE_GET_BITS_NATIVE

5.16.2.21 #define VDP_FUNC_ID_OUTPUT_SURFACE_GET_PARAMETERS

5.16.2.22 #define VDP_FUNC_ID_OUTPUT_SURFACE_PUT_BITS_INDEXED

5.16.2.23 #define VDP_FUNC_ID_OUTPUT_SURFACE_PUT_BITS_NATIVE

5.16.2.24 #define VDP_FUNC_ID_OUTPUT_SURFACE_PUT_BITS_Y_CB_CR

5.16.2.25 #define VDP_FUNC_ID_OUTPUT_SURFACE_QUERY_CAPABILITIES

5.16.2.26 #define VDP_FUNC_ID_OUTPUT_SURFACE_QUERY_GET_PUT_BITS_NATIVE_CAPABILITIES

5.16.2.27 #define VDP_FUNC_ID_OUTPUT_SURFACE_QUERY_PUT_BITS_INDEXED_CAPABILITIES

5.16.2.28 #define VDP_FUNC_ID_OUTPUT_SURFACE_QUERY_PUT_BITS_Y_CB_CR_CAPABILITIES

5.16.2.29 #define VDP_FUNC_ID_OUTPUT_SURFACE_RENDER_BITMAP_SURFACE

5.16.2.30 #define VDP_FUNC_ID_OUTPUT_SURFACE_RENDER_OUTPUT_SURFACE

5.16.2.31 #define VDP_FUNC_ID_OUTPUT_SURFACE_RENDER_VIDEO_SURFACE_LUMA

5.16.2.32 #define VDP_FUNC_ID_PREEMPTION_CALLBACK_REGISTER

5.16.2.33 #define VDP_FUNC_ID_PRESENTATION_QUEUE_BLOCK_UNTIL_SURFACE_IDLE

5.16.2.34 #define VDP_FUNC_ID_PRESENTATION_QUEUE_CREATE

5.16.2.35 #define VDP_FUNC_ID_PRESENTATION_QUEUE_DESTROY

5.16.2.36 #define VDP_FUNC_ID_PRESENTATION_QUEUE_DISPLAY

5.16.2.37 #define VDP_FUNC_ID_PRESENTATION_QUEUE_GET_BACKGROUND_COLOR

5.16.2.38 #define VDP_FUNC_ID_PRESENTATION_QUEUE_GET_TIME

5.16.2.39 #define VDP_FUNC_ID_PRESENTATION_QUEUE_QUERY_SURFACE_STATUS

5.16.2.40 #define VDP_FUNC_ID_PRESENTATION_QUEUE_SET_BACKGROUND_COLOR

5.16.2.41 #define VDP_FUNC_ID_PRESENTATION_QUEUE_TARGET_DESTROY

5.16.2.42 #define VDP_FUNC_ID_VIDEO_MIXER_CREATE

5.16.2.43 #define VDP_FUNC_ID_VIDEO_MIXER_DESTROY

5.16.2.44 #define VDP_FUNC_ID_VIDEO_MIXER_GET_ATTRIBUTE_VALUES

5.16.2.45 #define VDP_FUNC_ID_VIDEO_MIXER_GET_FEATURE_ENABLES

5.16.2.46 #define VDP_FUNC_ID_VIDEO_MIXER_GET_FEATURE_SUPPORT

5.16.2.47 #define VDP_FUNC_ID_VIDEO_MIXER_GET_PARAMETER_VALUES

5.16.2.48 #define VDP_FUNC_ID_VIDEO_MIXER_QUERY_ATTRIBUTE_SUPPORT

5.16.2.49 #define VDP_FUNC_ID_VIDEO_MIXER_QUERY_ATTRIBUTE_VALUE_RANGE

5.16.2.50 #define VDP_FUNC_ID_VIDEO_MIXER_QUERY_FEATURE_SUPPORT

5.16.2.51 #define VDP_FUNC_ID_VIDEO_MIXER_QUERY_PARAMETER_SUPPORT

5.16.2.52 #define VDP_FUNC_ID_VIDEO_MIXER_QUERY_PARAMETER_VALUE_RANGE

5.16.2.53 #define VDP_FUNC_ID_VIDEO_MIXER_RENDER

5.16.2.54 #define VDP_FUNC_ID_VIDEO_MIXER_SET_ATTRIBUTE_VALUES

5.16.2.55 #define VDP_FUNC_ID_VIDEO_MIXER_SET_FEATURE_ENABLES

5.16.2.56 #define VDP_FUNC_ID_VIDEO_SURFACE_CREATE

5.16.2.57 #define VDP_FUNC_ID_VIDEO_SURFACE_DESTROY

5.16.2.58 #define VDP_FUNC_ID_VIDEO_SURFACE_GET_BITS_Y_CB_CR

5.16.2.59 #define VDP_FUNC_ID_VIDEO_SURFACE_GET_PARAMETERS

5.16.2.60 #define VDP_FUNC_ID_VIDEO_SURFACE_PUT_BITS_Y_CB_CR

5.16.2.61 #define VDP_FUNC_ID_VIDEO_SURFACE_QUERY_CAPABILITIES

5.16.2.62 #define VDP_FUNC_ID_VIDEO_SURFACE_QUERY_GET_PUT_BITS_Y_CB_CR_CAPABILITIES

5.16.3 Typedef Documentation

5.16.3.1 typedef uint32_t VdpFuncId

A type suitable for VdpGetProcAddress's **function_id** parameter.

5.16.3.2 typedef VdpStatus VdpGetProcAddress(VdpDevice device, VdpFuncId function_id,void **function_pointer)

Retrieve a VDPAU function pointer.

Parameters

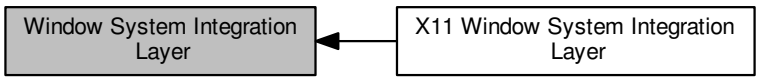
in	*device*	The device that the function will operate against.
in	*function_id*	The specific function to retrieve.
out	*function_pointer*	The actual pointer for the application to call.

Returns

VdpStatus The completion status of the operation.

5.17 Window System Integration Layer

Collaboration diagram for Window System Integration Layer:



Modules

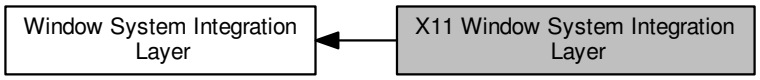
- X11 Window System Integration Layer

5.17.1 Detailed Description

The set of VDPAU functionality specific to an individual Windowing System.

5.18 X11 Window System Integration Layer

Collaboration diagram for X11 Window System Integration Layer:



- typedef VdpStatus VdpDeviceCreateX11(Display *display, int screen, VdpDevice *device, VdpGetProcAddress **get_proc_address)

  Create a VdpDevice object for use with X11.
- typedef VdpStatus VdpPresentationQueueTargetCreateX11(VdpDevice device, Drawable drawable, VdpPresentationQueueTarget *target)

  Create a VdpPresentationQueueTarget for use with X11.
- VdpDeviceCreateX11 vdp_device_create_x11

  Create a VdpDevice object for use with X11. This is an actual symbol of type VdpDeviceCreateX11.
- #define VDP_FUNC_ID_PRESENTATION_QUEUE_TARGET_CREATE_X11

5.18.1 Detailed Description

The set of VDPAU functionality specific to usage with the X Window System.

5.18.2 Library Layout

An X11-oriented VDPAU installation consists of the following components:

- Header files. These files are located in the standard system header file path.
  - `vdpau/vdpau.h`
  - `vdpau/vdpau_x11.h`
- The VDPAU wrapper library. These files are located in the standard system (possibly X11-specific) library path.
  - `libvdpau.so.1` (runtime)
  - `libvdpau.so` (development)
- Back-end driver files. These files are located in a system-defined library path, which is configurable at compile time but is typically /usr/lib/vdpau. Use `pkg-config --variable=moduledir vdpau` to locate the driver install path.
  - `$moduledir/libvdpau_%s.so.1` For example:
  - `/usr/lib/vdpau/libvdpau_nvidia`.so.1
  - `/usr/lib/vdpau/libvdpau_intel`.so.1
  - `/usr/lib/vdpau/libvdpau_ati`.so.1 The library path can be overridden by the VDPAU_DRIVER_PATH environment variable.

The VDPAU wrapper library implements just one function; vdp_device_create_x11. The wrapper implements this function by dynamically loading the appropriate back-end driver file mentioned above. When available, the wrapper uses the DRI2 extension's DRI2Connect request with the driver type 'DRI2DriverVDPAU' to determine which back-end driver to load. If that fails, the wrapper library hard-codes the driver name as "nvidia", although this can be overridden using the environment variable VDPAU_DRIVER.

The back-end driver is expected to implement a function named **vdp_imp_device_create_x11**. The wrapper will call this function to actually implement the vdp_device_create_x11 application call.

Note that it is theoretically possible for an application to create multiple VdpDevice objects. In this case, the wrapper library may load multiple back-end drivers into the same application, and/or invoke a specific back-end driver's **VdpImpDeviceCreateX11** multiple times. The wrapper library imposes no policy regarding whether the application may instantiate multiple VdpDevice objects for the same display and/or screen. However, back-end drivers are free to limit the number of VdpDevice objects as required by their implementation.

5.18.3 Macro Definition Documentation

5.18.3.1 #define VDP_FUNC_ID_PRESENTATION_QUEUE_TARGET_CREATE_X11

5.18.4 Typedef Documentation

5.18.4.1 typedef VdpStatus VdpDeviceCreateX11(Display *display, int screen, VdpDevice *device, VdpGetProcAddress **get_proc_address)

Create a VdpDevice object for use with X11.

Parameters

in	*display*	The X Display that the VdpDevice VdpDevice will operate against.
in	*screen*	The X screen that the VdpDevice will operate against.
out	*device*	The new device's handle.
out	*get_proc_address*	The get_proc_address entry point to use with this device.

Returns

VdpStatus The completion status of the operation.

5.18.4.2 typedef VdpStatus VdpPresentationQueueTargetCreateX11(VdpDevice device, Drawable drawable, VdpPresentationQueueTarget *target)

Create a VdpPresentationQueueTarget for use with X11.

Parameters

in	*device*	The device that will contain the queue target.
in	*drawable*	The X11 Drawable that the presentation queue will present into.
out	*target*	The new queue target's handle.

Returns

VdpStatus The completion status of the operation.

Note: VDPAU expects to own the entire drawable for the duration of time that the presentation queue target exists. In particular, implementations may choose to manipulate client-visible X11 window state as required. As such, it is recommended that applications create a dedicated window for the presentation queue target, as a child (grand-child, ...) of their top-level application window.

Applications may also create child-windows of the presentation queue target, which will cover any presented video in the normal fashion. VDPAU implementations will not manipulate such child windows in any fashion.

5.18.5 Variable Documentation

5.18.5.1 VdpDeviceCreateX11 vdp_device_create_x11

Create a VdpDevice object for use with X11. This is an actual symbol of type VdpDeviceCreateX11.

Chapter 6

Data Structure Documentation

6.1 VdpBitstreamBuffer Struct Reference

Application data buffer containing compressed video data.

`#include <vdpau.h>`

Data Fields

- uint32_t struct_version
- void const * bitstream
- uint32_t bitstream_bytes

6.1.1 Detailed Description

Application data buffer containing compressed video data.

6.1.2 Field Documentation

6.1.2.1 void const* VdpBitstreamBuffer::bitstream

A pointer to the bitstream data bytes

6.1.2.2 uint32_t VdpBitstreamBuffer::bitstream_bytes

The number of data bytes

6.1.2.3 uint32_t VdpBitstreamBuffer::struct_version

This field must be filled with VDP_BITSTREAM_BUFFER_VERSION

The documentation for this struct was generated from the following file:

- vdpau/vdpau.h

6.2 VdpColor Struct Reference

`#include <vdpau.h>`

Data Fields

- float red
- float green
- float blue
- float alpha

6.2.1 Detailed Description

A constant RGBA color.

Note that the components are stored as float values in the range 0.0...1.0 rather than format-specific integer values. This allows VdpColor values to be independent from the exact surface format(s) in use.

6.2.2 Field Documentation

6.2.2.1 float VdpColor::alpha

6.2.2.2 float VdpColor::blue

6.2.2.3 float VdpColor::green

6.2.2.4 float VdpColor::red

The documentation for this struct was generated from the following file:

- vdpau/vdpau.h

6.3 VdpLayer Struct Reference

Definition of an additional VdpOutputSurface layer in the composting model.

`#include <vdpau.h>`

Data Fields

- uint32_t struct_version
- VdpOutputSurface source_surface
- VdpRect const * source_rect
- VdpRect const * destination_rect

6.3.1 Detailed Description

Definition of an additional VdpOutputSurface layer in the composting model.

6.3.2 Field Documentation

6.3.2.1 VdpRect const* VdpLayer::destination_rect

The sub-rectangle of the destination surface to map this layer into. This rectangle is relative to the entire destination surface. This rectangle will be clipped by VdpVideoMixerRender's **destination_rect**. If NULL, the destination rectangle will be sized to match the source rectangle, and will be located at the origin.

6.3.2.2 VdpRect const* VdpLayer::source_rect

The sub-rectangle of the source surface to use. If NULL, the entire source surface will be used.

6.3.2.3 VdpOutputSurface VdpLayer::source_surface

The surface to composite from.

6.3.2.4 uint32_t VdpLayer::struct_version

This field must be filled with VDP_LAYER_VERSION

The documentation for this struct was generated from the following file:

- vdpau/vdpau.h

6.4 VdpOutputSurfaceRenderBlendState Struct Reference

Complete blending operation definition.

```
#include <vdpau.h>
```

Data Fields

- uint32_t struct_version
- VdpOutputSurfaceRenderBlendFactor blend_factor_source_color
- VdpOutputSurfaceRenderBlendFactor blend_factor_destination_color
- VdpOutputSurfaceRenderBlendFactor blend_factor_source_alpha
- VdpOutputSurfaceRenderBlendFactor blend_factor_destination_alpha
- VdpOutputSurfaceRenderBlendEquation blend_equation_color
- VdpOutputSurfaceRenderBlendEquation blend_equation_alpha
- VdpColor blend_constant

6.4.1 Detailed Description

Complete blending operation definition.

A "blend state" operation controls the math behind certain rendering operations.

The blend math is the familiar OpenGL blend math:

$$dst.a = equation(blendFactorDstAlpha * dst.a, blendFactorSrcAlpha * src.a);$$

$$dst.rgb = equation(blendFactorDstColor * dst.rgb, blendFactorSrcColor * src.rgb);$$

Note that when equation is MIN or MAX, the blend factors and constants are ignored, and are treated as if they were 1.0.

6.4.2 Field Documentation

6.4.2.1 VdpColor VdpOutputSurfaceRenderBlendState::blend_constant

6.4.2.2 VdpOutputSurfaceRenderBlendEquation VdpOutputSurfaceRenderBlendState::blend_equation_alpha

6.4.2.3 VdpOutputSurfaceRenderBlendEquation VdpOutputSurfaceRenderBlendState::blend_equation_color

6.4.2.4 VdpOutputSurfaceRenderBlendFactor VdpOutputSurfaceRenderBlendState::blend_factor_destination_alpha

6.4.2.5 VdpOutputSurfaceRenderBlendFactor VdpOutputSurfaceRenderBlendState::blend_factor_destination_color

6.4.2.6 VdpOutputSurfaceRenderBlendFactor VdpOutputSurfaceRenderBlendState::blend_factor_source_alpha

6.4.2.7 VdpOutputSurfaceRenderBlendFactor VdpOutputSurfaceRenderBlendState::blend_factor_source_color

6.4.2.8 uint32_t VdpOutputSurfaceRenderBlendState::struct_version

This field must be filled with VDP_OUTPUT_SURFACE_RENDER_BLEND_STATE_VERSIION

The documentation for this struct was generated from the following file:

- vdpau/vdpau.h

6.5 VdpPictureInfoH264 Struct Reference

Picture parameter information for an H.264 picture.

```
#include <vdpau.h>
```

Data Fields

- uint32_t slice_count
- int32_t field_order_cnt [2]
- VdpBool is_reference
- VdpReferenceFrameH264 referenceFrames [16]

H.264 bitstream

Copies of the H.264 bitstream fields.

- uint16_t frame_num
- uint8_t field_pic_flag
- uint8_t bottom_field_flag
- uint8_t num_ref_frames
- uint8_t mb_adaptive_frame_field_flag
- uint8_t constrained_intra_pred_flag
- uint8_t weighted_pred_flag
- uint8_t weighted_bipred_idc
- uint8_t frame_mbs_only_flag
- uint8_t transform_8x8_mode_flag
- int8_t chroma_qp_index_offset
- int8_t second_chroma_qp_index_offset
- int8_t pic_init_qp_minus26
- uint8_t num_ref_idx_l0_active_minus1
- uint8_t num_ref_idx_l1_active_minus1
- uint8_t log2_max_frame_num_minus4
- uint8_t pic_order_cnt_type
- uint8_t log2_max_pic_order_cnt_lsb_minus4
- uint8_t delta_pic_order_always_zero_flag
- uint8_t direct_8x8_inference_flag
- uint8_t entropy_coding_mode_flag
- uint8_t pic_order_present_flag
- uint8_t deblocking_filter_control_present_flag
- uint8_t redundant_pic_cnt_present_flag
- uint8_t scaling_lists_4x4 [6][16]
- uint8_t scaling_lists_8x8 [2][64]

6.5.1 Detailed Description

Picture parameter information for an H.264 picture.

Note: The referenceFrames array must contain the "DPB" as defined by the H.264 specification. In particular, once a reference frame has been decoded to a surface, that surface must continue to appear in the DPB until no longer required to predict any future frame. Once a surface is removed from the DPB, it can no longer be used as a reference, unless decoded again.

Also note that only surfaces previously generated using VdpDecoderRender may be used as reference frames. In particular, surfaces filled using any "put bits" API will not work.

Note: References to bitstream fields below may refer to data literally parsed from the bitstream, or derived from the bitstream using a mechanism described in the specification.

Note: VDPAU clients must use VdpPictureInfoH264Predictive to describe the attributes of a frame being decoded with VDP_DECODER_PROFILE_H264_HIGH_444_PREDICTIVE.

6.5.2 Field Documentation

6.5.2.1 uint8_t VdpPictureInfoH264::bottom_field_flag

6.5.2.2 int8_t VdpPictureInfoH264::chroma_qp_index_offset

6.5.2.3 uint8_t VdpPictureInfoH264::constrained_intra_pred_flag

6.5.2.4 uint8_t VdpPictureInfoH264::deblocking_filter_control_present_flag

6.5.2.5 uint8_t VdpPictureInfoH264::delta_pic_order_always_zero_flag

6.5.2.6 uint8_t VdpPictureInfoH264::direct_8x8_inference_flag

6.5.2.7 uint8_t VdpPictureInfoH264::entropy_coding_mode_flag

6.5.2.8 int32_t VdpPictureInfoH264::field_order_cnt[2]

[0]: top, [1]: bottom

6.5.2.9 uint8_t VdpPictureInfoH264::field_pic_flag

6.5.2.10 uint8_t VdpPictureInfoH264::frame_mbs_only_flag

6.5.2.11 uint16_t VdpPictureInfoH264::frame_num

6.5.2.12 VdpBool VdpPictureInfoH264::is_reference

Will the decoded frame be used as a reference later.

6.5.2.13 uint8_t VdpPictureInfoH264::log2_max_frame_num_minus4

6.5.2.14 uint8_t VdpPictureInfoH264::log2_max_pic_order_cnt_lsb_minus4

6.5.2.15 uint8_t VdpPictureInfoH264::mb_adaptive_frame_field_flag

6.5.2.16 uint8_t VdpPictureInfoH264::num_ref_frames

6.5.2.17 uint8_t VdpPictureInfoH264::num_ref_idx_l0_active_minus1

6.5.2.18 uint8_t VdpPictureInfoH264::num_ref_idx_l1_active_minus1

6.5.2.19 int8_t VdpPictureInfoH264::pic_init_qp_minus26

6.5.2.20 uint8_t VdpPictureInfoH264::pic_order_cnt_type

6.5.2.21 uint8_t VdpPictureInfoH264::pic_order_present_flag

6.5.2.22 uint8_t VdpPictureInfoH264::redundant_pic_cnt_present_flag

6.5.2.23 VdpReferenceFrameH264 VdpPictureInfoH264::referenceFrames[16]

See VdpPictureInfoH264 for instructions regarding this field.

6.5.2.24 uint8_t VdpPictureInfoH264::scaling_lists_4x4[6][16]

Convert to raster order.

6.5.2.25 uint8_t VdpPictureInfoH264::scaling_lists_8x8[2][64]

Convert to raster order.

6.5.2.26 int8_t VdpPictureInfoH264::second_chroma_qp_index_offset

6.5.2.27 uint32_t VdpPictureInfoH264::slice_count

Number of slices in the bitstream provided.

6.5.2.28 uint8_t VdpPictureInfoH264::transform_8x8_mode_flag

6.5.2.29 uint8_t VdpPictureInfoH264::weighted_bipred_idc

6.5.2.30 uint8_t VdpPictureInfoH264::weighted_pred_flag

The documentation for this struct was generated from the following file:

- vdpau/vdpau.h

6.6 VdpPictureInfoH264Predictive Struct Reference

Picture parameter information for an H.264 Hi444PP picture.

```
#include <vdpau.h>
```

Data Fields

- VdpPictureInfoH264 pictureInfo

H.264 bitstream

Copies of the H.264 bitstream fields.

- uint8_t qpprime_y_zero_transform_bypass_flag
- uint8_t separate_colour_plane_flag

6.6.1 Detailed Description

Picture parameter information for an H.264 Hi444PP picture.

Note: VDPAU clients must use VdpPictureInfoH264Predictive to describe the attributes of a frame being decoded with VDP_DECODER_PROFILE_H264_HIGH_444_PREDICTIVE.

Note: software drivers may choose to honor values of qpprime_y_zero_transform_bypass_flag greater than 1 for internal use.

6.6.2 Field Documentation

6.6.2.1 VdpPictureInfoH264 VdpPictureInfoH264Predictive::pictureInfo

VdpPictureInfoH264 struct.

6.6.2.2 uint8_t VdpPictureInfoH264Predictive::qpprime_y_zero_transform_bypass_flag

0 - lossless disabled 1 - lossless enabled

6.6.2.3 uint8_t VdpPictureInfoH264Predictive::separate_colour_plane_flag

0 - disabled 1 - enabled

The documentation for this struct was generated from the following file:

- vdpau/vdpau.h

6.7 VdpPictureInfoHEVC Struct Reference

Picture parameter information for an H.265/HEVC picture.

```
#include <vdpau.h>
```

Data Fields

- int32_t CurrPicOrderCntVal
- VdpVideoSurface RefPics [16]
- int32_t PicOrderCntVal [16]
- uint8_t IsLongTerm [16]
- uint8_t NumPocStCurrBefore
- uint8_t NumPocStCurrAfter
- uint8_t NumPocLtCurr
- uint8_t RefPicSetStCurrBefore [8]
- uint8_t RefPicSetStCurrAfter [8]
- uint8_t RefPicSetLtCurr [8]

HEVC Sequence Parameter Set

Copies of the HEVC Sequence Parameter Set bitstream fields.

- uint8_t chroma_format_idc
- uint8_t separate_colour_plane_flag
- uint32_t pic_width_in_luma_samples
- uint32_t pic_height_in_luma_samples
- uint8_t bit_depth_luma_minus8
- uint8_t bit_depth_chroma_minus8
- uint8_t log2_max_pic_order_cnt_lsb_minus4
- uint8_t sps_max_dec_pic_buffering_minus1
- uint8_t log2_min_luma_coding_block_size_minus3
- uint8_t log2_diff_max_min_luma_coding_block_size
- uint8_t log2_min_transform_block_size_minus2
- uint8_t log2_diff_max_min_transform_block_size
- uint8_t max_transform_hierarchy_depth_inter
- uint8_t max_transform_hierarchy_depth_intra
- uint8_t scaling_list_enabled_flag
- uint8_t ScalingList4x4 [6][16]
- uint8_t ScalingList8x8 [6][64]
- uint8_t ScalingList16x16 [6][64]
- uint8_t ScalingList32x32 [2][64]
- uint8_t ScalingListDCCoeff16x16 [6]
- uint8_t ScalingListDCCoeff32x32 [2]
- uint8_t amp_enabled_flag
- uint8_t sample_adaptive_offset_enabled_flag
- uint8_t pcm_enabled_flag
- uint8_t pcm_sample_bit_depth_luma_minus1
- uint8_t pcm_sample_bit_depth_chroma_minus1
- uint8_t log2_min_pcm_luma_coding_block_size_minus3
- uint8_t log2_diff_max_min_pcm_luma_coding_block_size
- uint8_t pcm_loop_filter_disabled_flag
- uint8_t num_short_term_ref_pic_sets
- uint8_t long_term_ref_pics_present_flag
- uint8_t num_long_term_ref_pics_sps
- uint8_t sps_temporal_mvp_enabled_flag
- uint8_t strong_intra_smoothing_enabled_flag

HEVC Picture Parameter Set

Copies of the HEVC Picture Parameter Set bitstream fields.

- uint8_t dependent_slice_segments_enabled_flag
- uint8_t output_flag_present_flag
- uint8_t num_extra_slice_header_bits
- uint8_t sign_data_hiding_enabled_flag
- uint8_t cabac_init_present_flag
- uint8_t num_ref_idx_l0_default_active_minus1

- uint8_t num_ref_idx_l1_default_active_minus1
- int8_t init_qp_minus26
- uint8_t constrained_intra_pred_flag
- uint8_t transform_skip_enabled_flag
- uint8_t cu_qp_delta_enabled_flag
- uint8_t diff_cu_qp_delta_depth
- int8_t pps_cb_qp_offset
- int8_t pps_cr_qp_offset
- uint8_t pps_slice_chroma_qp_offsets_present_flag
- uint8_t weighted_pred_flag
- uint8_t weighted_bipred_flag
- uint8_t transquant_bypass_enabled_flag
- uint8_t tiles_enabled_flag
- uint8_t entropy_coding_sync_enabled_flag
- uint8_t num_tile_columns_minus1
- uint8_t num_tile_rows_minus1
- uint8_t uniform_spacing_flag
- uint16_t column_width_minus1 [20]
- uint16_t row_height_minus1 [22]
- uint8_t loop_filter_across_tiles_enabled_flag
- uint8_t pps_loop_filter_across_slices_enabled_flag
- uint8_t deblocking_filter_control_present_flag
- uint8_t deblocking_filter_override_enabled_flag
- uint8_t pps_deblocking_filter_disabled_flag
- int8_t pps_beta_offset_div2
- int8_t pps_tc_offset_div2
- uint8_t lists_modification_present_flag
- uint8_t log2_parallel_merge_level_minus2
- uint8_t slice_segment_header_extension_present_flag

HEVC Slice Segment Header

Copies of the HEVC Slice Segment Header bitstream fields and calculated values detailed in the specification.

- uint8_t IDRPicFlag
- uint8_t RAPPicFlag
- uint8_t CurrRpsIdx
- uint32_t NumPocTotalCurr
- uint32_t NumDeltaPocsOfRefRpsIdx
- uint32_t NumShortTermPictureSliceHeaderBits
- uint32_t NumLongTermPictureSliceHeaderBits

6.7.1 Detailed Description

Picture parameter information for an H.265/HEVC picture.

References to bitsream fields below may refer to data literally parsed from the bitstream, or derived from the bitstream using a mechanism described in Rec. ITU-T H.265 (04/2013), hereafter referred to as "the H.265/HEVC Specification".

VDPAU H.265/HEVC implementations implement the portion of the decoding process described by clauses 8.4, 8.5, 8.6 and 8.7 of the the H.265/HEVC Specification. VdpPictureInfoHEVC provides enough data to complete this portion of the decoding process, plus additional information not defined in the H.265/HEVC Specification that may be useful to particular implementations.

Client applications must supply every field in this struct.

6.7.2 Field Documentation

6.7.2.1 uint8_t VdpPictureInfoHEVC::amp_enabled_flag

6.7.2.2 uint8_t VdpPictureInfoHEVC::bit_depth_chroma_minus8

6.7.2.3 uint8_t VdpPictureInfoHEVC::bit_depth_luma_minus8

6.7.2.4 uint8_t VdpPictureInfoHEVC::cabac_init_present_flag

6.7.2.5 uint8_t VdpPictureInfoHEVC::chroma_format_idc

6.7.2.6 uint16_t VdpPictureInfoHEVC::column_width_minus1[20]

Only need to set 0..num_tile_columns_minus1. The struct definition reserves up to the maximum of 20. Invalid values are ignored.

6.7.2.7 uint8_t VdpPictureInfoHEVC::constrained_intra_pred_flag

6.7.2.8 uint8_t VdpPictureInfoHEVC::cu_qp_delta_enabled_flag

6.7.2.9 int32_t VdpPictureInfoHEVC::CurrPicOrderCntVal

Slice Decoding Process - Picture Order Count The value of PicOrderCntVal of the picture in the access unit containing the SEI message. The picture being decoded.

6.7.2.10 uint8_t VdpPictureInfoHEVC::CurrRpsIdx

See section 7.4.7.1 of the specification.

6.7.2.11 uint8_t VdpPictureInfoHEVC::deblocking_filter_control_present_flag

6.7.2.12 uint8_t VdpPictureInfoHEVC::deblocking_filter_override_enabled_flag

Only valid if deblocking_filter_control_present_flag is set. Ignored otherwise.

6.7.2.13 uint8_t VdpPictureInfoHEVC::dependent_slice_segments_enabled_flag

6.7.2.14 uint8_t VdpPictureInfoHEVC::diff_cu_qp_delta_depth

Only needed if cu_qp_delta_enabled_flag is set. Ignored otherwise.

6.7.2.15 uint8_t VdpPictureInfoHEVC::entropy_coding_sync_enabled_flag

6.7.2.16 uint8_t VdpPictureInfoHEVC::IDRPicFlag

Set to 1 if nal_unit_type is equal to IDR_W_RADL or IDR_N_LP. Set to zero otherwise.

6.7.2.17 int8_t VdpPictureInfoHEVC::init_qp_minus26

6.7.2.18 uint8_t VdpPictureInfoHEVC::IsLongTerm[16]

Array used to specify whether a particular RefPic is a long term reference. A value of "1" indicates a long-term reference.

6.7.2.19 uint8_t VdpPictureInfoHEVC::lists_modification_present_flag

6.7.2.20 uint8_t VdpPictureInfoHEVC::log2_diff_max_min_luma_coding_block_size

6.7.2.21 uint8_t VdpPictureInfoHEVC::log2_diff_max_min_pcm_luma_coding_block_size

Only needs to be set if pcm_enabled_flag is set. Ignored otherwise.

6.7.2.22 uint8_t VdpPictureInfoHEVC::log2_diff_max_min_transform_block_size

6.7.2.23 uint8_t VdpPictureInfoHEVC::log2_max_pic_order_cnt_lsb_minus4

6.7.2.24 uint8_t VdpPictureInfoHEVC::log2_min_luma_coding_block_size_minus3

6.7.2.25 uint8_t VdpPictureInfoHEVC::log2_min_pcm_luma_coding_block_size_minus3

Only needs to be set if pcm_enabled_flag is set. Ignored otherwise.

6.7.2.26 uint8_t VdpPictureInfoHEVC::log2_min_transform_block_size_minus2

6.7.2.27 uint8_t VdpPictureInfoHEVC::log2_parallel_merge_level_minus2

6.7.2.28 uint8_t VdpPictureInfoHEVC::long_term_ref_pics_present_flag

6.7.2.29 uint8_t VdpPictureInfoHEVC::loop_filter_across_tiles_enabled_flag

Only needed if tiles_enabled_flag is set. Invalid values are ignored.

6.7.2.30 uint8_t VdpPictureInfoHEVC::max_transform_hierarchy_depth_inter

6.7.2.31 uint8_t VdpPictureInfoHEVC::max_transform_hierarchy_depth_intra

6.7.2.32 uint8_t VdpPictureInfoHEVC::num_extra_slice_header_bits

6.7.2.33 uint8_t VdpPictureInfoHEVC::num_long_term_ref_pics_sps

Only needed if long_term_ref_pics_present_flag is set. Ignored otherwise.

6.7.2.34 uint8_t VdpPictureInfoHEVC::num_ref_idx_l0_default_active_minus1

6.7.2.35 uint8_t VdpPictureInfoHEVC::num_ref_idx_l1_default_active_minus1

6.7.2.36 uint8_t VdpPictureInfoHEVC::num_short_term_ref_pic_sets

Per spec, when zero, assume short_term_ref_pic_set_sps_flag is also zero.

6.7.2.37 uint8_t VdpPictureInfoHEVC::num_tile_columns_minus1

Only valid if tiles_enabled_flag is set. Ignored otherwise.

6.7.2.38 uint8_t VdpPictureInfoHEVC::num_tile_rows_minus1

Only valid if tiles_enabled_flag is set. Ignored otherwise.

6.7.2.39 uint32_t VdpPictureInfoHEVC::NumDeltaPocsOfRefRpsIdx

Corresponds to specification field, NumDeltaPocs[RefRpsIdx]. Only applicable when short_term_ref_pic_set_sps↩ _flag == 0. Implementations will ignore this value in other cases. See 7.4.8.

6.7.2.40 uint32_t VdpPictureInfoHEVC::NumLongTermPictureSliceHeaderBits

Second, VDPAU requires the number of bits used for long term reference pictures in the slice_segment_header. This is equal to the number of bits used for the contents of the block beginning with "if(long_term_ref_pics_present↩ _flag)".

6.7.2.41 uint8_t VdpPictureInfoHEVC::NumPocLtCurr

Copy of specification field, see Section 8.3.2 of the H.265/HEVC Specification.

6.7.2.42 uint8_t VdpPictureInfoHEVC::NumPocStCurrAfter

Copy of specification field, see Section 8.3.2 of the H.265/HEVC Specification.

6.7.2.43 uint8_t VdpPictureInfoHEVC::NumPocStCurrBefore

Copy of specification field, see Section 8.3.2 of the H.265/HEVC Specification.

6.7.2.44 uint32_t VdpPictureInfoHEVC::NumPocTotalCurr

See section 7.4.7.2 of the specification.

6.7.2.45 uint32_t VdpPictureInfoHEVC::NumShortTermPictureSliceHeaderBits

Section 7.6.3.1 of the H.265/HEVC Specification defines the syntax of the slice_segment_header. This header contains information that some VDPAU implementations may choose to skip. The VDPAU API requires client applications to track the number of bits used in the slice header for structures associated with short term and long term reference pictures. First, VDPAU requires the number of bits used by the short_term_ref_pic_set array in the slice_segment_header.

6.7.2.46 uint8_t VdpPictureInfoHEVC::output_flag_present_flag

6.7.2.47 uint8_t VdpPictureInfoHEVC::pcm_enabled_flag

6.7.2.48 uint8_t VdpPictureInfoHEVC::pcm_loop_filter_disabled_flag

Only needs to be set if pcm_enabled_flag is set. Ignored otherwise.

6.7.2.49 uint8_t VdpPictureInfoHEVC::pcm_sample_bit_depth_chroma_minus1

Only needs to be set if pcm_enabled_flag is set. Ignored otherwise.

6.7.2.50 uint8_t VdpPictureInfoHEVC::pcm_sample_bit_depth_luma_minus1

Only needs to be set if pcm_enabled_flag is set. Ignored otherwise.

6.7.2.51 uint32_t VdpPictureInfoHEVC::pic_height_in_luma_samples

6.7.2.52 uint32_t VdpPictureInfoHEVC::pic_width_in_luma_samples

6.7.2.53 int32_t VdpPictureInfoHEVC::PicOrderCntVal[16]

Array of picture order counts. These correspond to positions in the RefPics array.

6.7.2.54 int8_t VdpPictureInfoHEVC::pps_beta_offset_div2

Only valid if deblocking_filter_control_present_flag is set and pps_deblocking_filter_disabled_flag is not set. Ignored otherwise.

6.7.2.55 int8_t VdpPictureInfoHEVC::pps_cb_qp_offset

6.7.2.56 int8_t VdpPictureInfoHEVC::pps_cr_qp_offset

6.7.2.57 uint8_t VdpPictureInfoHEVC::pps_deblocking_filter_disabled_flag

Only valid if deblocking_filter_control_present_flag is set. Ignored otherwise.

6.7.2.58 uint8_t VdpPictureInfoHEVC::pps_loop_filter_across_slices_enabled_flag

6.7.2.59 uint8_t VdpPictureInfoHEVC::pps_slice_chroma_qp_offsets_present_flag

6.7.2.60 int8_t VdpPictureInfoHEVC::pps_tc_offset_div2

Only valid if deblocking_filter_control_present_flag is set and pps_deblocking_filter_disabled_flag is not set. Ignored otherwise.

6.7.2.61 uint8_t VdpPictureInfoHEVC::RAPPicFlag

Set to 1 if nal_unit_type in the range of BLA_W_LP to RSV_IRAP_VCL23, inclusive. Set to zero otherwise.

6.7.2.62 VdpVideoSurface VdpPictureInfoHEVC::RefPics[16]

Slice Decoding Process - Reference Picture Sets Array of video reference surfaces. Set any unused positions to VDP_INVALID_HANDLE.

6.7.2.63 uint8_t VdpPictureInfoHEVC::RefPicSetLtCurr[8]

Reference Picture Set list, one of the long-term RPS. These correspond to positions in the RefPics array.

6.7.2.64 uint8_t VdpPictureInfoHEVC::RefPicSetStCurrAfter[8]

Reference Picture Set list, one of the short-term RPS. These correspond to positions in the RefPics array.

6.7.2.65 uint8_t VdpPictureInfoHEVC::RefPicSetStCurrBefore[8]

Reference Picture Set list, one of the short-term RPS. These correspond to positions in the RefPics array.

6.7.2.66 uint16_t VdpPictureInfoHEVC::row_height_minus1[22]

Only need to set 0..num_tile_rows_minus1. The struct definition reserves up to the maximum of 22. Invalid values are ignored.

6.7.2.67 uint8_t VdpPictureInfoHEVC::sample_adaptive_offset_enabled_flag

6.7.2.68 uint8_t VdpPictureInfoHEVC::scaling_list_enabled_flag

6.7.2.69 uint8_t VdpPictureInfoHEVC::ScalingList16x16[6][64]

Scaling List for 16x16 quantization matrix, indexed as ScalingList16x16[matrixId][i].

6.7.2.70 uint8_t VdpPictureInfoHEVC::ScalingList32x32[2][64]

Scaling List for 32x32 quantization matrix, indexed as ScalingList32x32[matrixId][i].

6.7.2.71 uint8_t VdpPictureInfoHEVC::ScalingList4x4[6][16]

Scaling lists, in diagonal order, to be used for this frame. Scaling List for 4x4 quantization matrix, indexed as ScalingList4x4[matrixId][i].

6.7.2.72 uint8_t VdpPictureInfoHEVC::ScalingList8x8[6][64]

Scaling List for 8x8 quantization matrix, indexed as ScalingList8x8[matrixId][i].

6.7.2.73 uint8_t VdpPictureInfoHEVC::ScalingListDCCoeff16x16[6]

Scaling List DC Coefficients for 16x16, indexed as ScalingListDCCoeff16x16[matrixId].

6.7.2.74 uint8_t VdpPictureInfoHEVC::ScalingListDCCoeff32x32[2]

Scaling List DC Coefficients for 32x32, indexed as ScalingListDCCoeff32x32[matrixId].

6.7.2.75 uint8_t VdpPictureInfoHEVC::separate_colour_plane_flag

Only valid if chroma_format_idc == 3. Ignored otherwise.

6.7.2.76 uint8_t VdpPictureInfoHEVC::sign_data_hiding_enabled_flag

6.7.2.77 uint8_t VdpPictureInfoHEVC::slice_segment_header_extension_present_flag

6.7.2.78 uint8_t VdpPictureInfoHEVC::sps_max_dec_pic_buffering_minus1

Provides the value corresponding to the nuh_temporal_id of the frame to be decoded.

6.7.2.79 uint8_t VdpPictureInfoHEVC::sps_temporal_mvp_enabled_flag

6.7.2.80 uint8_t VdpPictureInfoHEVC::strong_intra_smoothing_enabled_flag

6.7.2.81 uint8_t VdpPictureInfoHEVC::tiles_enabled_flag

6.7.2.82 uint8_t VdpPictureInfoHEVC::transform_skip_enabled_flag

6.7.2.83 uint8_t VdpPictureInfoHEVC::transquant_bypass_enabled_flag

6.7.2.84 uint8_t VdpPictureInfoHEVC::uniform_spacing_flag

Only valid if tiles_enabled_flag is set. Ignored otherwise.

6.7.2.85 uint8_t VdpPictureInfoHEVC::weighted_bipred_flag

6.7.2.86 uint8_t VdpPictureInfoHEVC::weighted_pred_flag

The documentation for this struct was generated from the following file:

- vdpau/vdpau.h

6.8 VdpPictureInfoMPEG1Or2 Struct Reference

Picture parameter information for an MPEG 1 or MPEG 2 picture.

```
#include <vdpau.h>
```

Data Fields

- VdpVideoSurface forward_reference
- VdpVideoSurface backward_reference
- uint32_t slice_count

MPEG bitstream

Copies of the MPEG bitstream fields.

- uint8_t picture_structure
- uint8_t picture_coding_type
- uint8_t intra_dc_precision
- uint8_t frame_pred_frame_dct
- uint8_t concealment_motion_vectors
- uint8_t intra_vlc_format
- uint8_t alternate_scan
- uint8_t q_scale_type
- uint8_t top_field_first
- uint8_t full_pel_forward_vector
- uint8_t full_pel_backward_vector
- uint8_t f_code [2][2]
- uint8_t intra_quantizer_matrix [64]
- uint8_t non_intra_quantizer_matrix [64]

6.8.1 Detailed Description

Picture parameter information for an MPEG 1 or MPEG 2 picture.

Note: References to bitstream fields below may refer to data literally parsed from the bitstream, or derived from the bitstream using a mechanism described in the specification.

6.8.2 Field Documentation

6.8.2.1 uint8_t VdpPictureInfoMPEG1Or2::alternate_scan

6.8.2.2 VdpVideoSurface VdpPictureInfoMPEG1Or2::backward_reference

Reference used by B frames. Set to VDP_INVALID_HANDLE when not used.

6.8.2.3 uint8_t VdpPictureInfoMPEG1Or2::concealment_motion_vectors

6.8.2.4 uint8_t VdpPictureInfoMPEG1Or2::f_code[2][2]

For MPEG-1, fill both horizontal and vertical entries.

6.8.2.5 VdpVideoSurface VdpPictureInfoMPEG1Or2::forward_reference

Reference used by B and P frames. Set to VDP_INVALID_HANDLE when not used.

6.8.2.6 uint8_t VdpPictureInfoMPEG1Or2::frame_pred_frame_dct

6.8.2.7 uint8_t VdpPictureInfoMPEG1Or2::full_pel_backward_vector

MPEG-1 only. For MPEG-2, set to 0.

6.8.2.8 uint8_t VdpPictureInfoMPEG1Or2::full_pel_forward_vector

MPEG-1 only. For MPEG-2, set to 0.

6.8.2.9 uint8_t VdpPictureInfoMPEG1Or2::intra_dc_precision

6.8.2.10 uint8_t VdpPictureInfoMPEG1Or2::intra_quantizer_matrix[64]

Convert to raster order.

6.8.2.11 uint8_t VdpPictureInfoMPEG1Or2::intra_vlc_format

6.8.2.12 uint8_t VdpPictureInfoMPEG1Or2::non_intra_quantizer_matrix[64]

Convert to raster order.

6.8.2.13 uint8_t VdpPictureInfoMPEG1Or2::picture_coding_type

6.8.2.14 uint8_t VdpPictureInfoMPEG1Or2::picture_structure

6.8.2.15 uint8_t VdpPictureInfoMPEG1Or2::q_scale_type

6.8.2.16 uint32_t VdpPictureInfoMPEG1Or2::slice_count

Number of slices in the bitstream provided.

6.8.2.17 uint8_t VdpPictureInfoMPEG1Or2::top_field_first

The documentation for this struct was generated from the following file:

- vdpau/vdpau.h

6.9 VdpPictureInfoMPEG4Part2 Struct Reference

Picture parameter information for an MPEG-4 Part 2 picture.

```
#include <vdpau.h>
```

Data Fields

- VdpVideoSurface forward_reference
- VdpVideoSurface backward_reference

MPEG 4 part 2 bitstream

Copies of the MPEG 4 part 2 bitstream fields.

- int32_t trd [2]
- int32_t trb [2]
- uint16_t vop_time_increment_resolution
- uint8_t vop_coding_type
- uint8_t vop_fcode_forward
- uint8_t vop_fcode_backward
- uint8_t resync_marker_disable
- uint8_t interlaced
- uint8_t quant_type
- uint8_t quarter_sample
- uint8_t short_video_header
- uint8_t rounding_control
- uint8_t alternate_vertical_scan_flag
- uint8_t top_field_first
- uint8_t intra_quantizer_matrix [64]
- uint8_t non_intra_quantizer_matrix [64]

6.9.1 Detailed Description

Picture parameter information for an MPEG-4 Part 2 picture.

Note: References to bitstream fields below may refer to data literally parsed from the bitstream, or derived from the bitstream using a mechanism described in the specification.

6.9.2 Field Documentation

6.9.2.1 uint8_t VdpPictureInfoMPEG4Part2::alternate_vertical_scan_flag

6.9.2.2 VdpVideoSurface VdpPictureInfoMPEG4Part2::backward_reference

Reference used by B frames. Set to VDP_INVALID_HANDLE when not used.

6.9.2.3 VdpVideoSurface VdpPictureInfoMPEG4Part2::forward_reference

Reference used by B and P frames. Set to VDP_INVALID_HANDLE when not used.

6.9.2.4 uint8_t VdpPictureInfoMPEG4Part2::interlaced

6.9.2.5 uint8_t VdpPictureInfoMPEG4Part2::intra_quantizer_matrix[64]

6.9.2.6 uint8_t VdpPictureInfoMPEG4Part2::non_intra_quantizer_matrix[64]

6.9.2.7 uint8_t VdpPictureInfoMPEG4Part2::quant_type

6.9.2.8 uint8_t VdpPictureInfoMPEG4Part2::quarter_sample

6.9.2.9 uint8_t VdpPictureInfoMPEG4Part2::resync_marker_disable

6.9.2.10 uint8_t VdpPictureInfoMPEG4Part2::rounding_control

Derived from vop_rounding_type bitstream field.

6.9.2.11 uint8_t VdpPictureInfoMPEG4Part2::short_video_header

6.9.2.12 uint8_t VdpPictureInfoMPEG4Part2::top_field_first

6.9.2.13 int32_t VdpPictureInfoMPEG4Part2::trb[2]

6.9.2.14 int32_t VdpPictureInfoMPEG4Part2::trd[2]

6.9.2.15 uint8_t VdpPictureInfoMPEG4Part2::vop_coding_type

6.9.2.16 uint8_t VdpPictureInfoMPEG4Part2::vop_fcode_backward

6.9.2.17 uint8_t VdpPictureInfoMPEG4Part2::vop_fcode_forward

6.9.2.18 uint16_t VdpPictureInfoMPEG4Part2::vop_time_increment_resolution

The documentation for this struct was generated from the following file:

- vdpau/vdpau.h

6.10 VdpPictureInfoVC1 Struct Reference

Picture parameter information for a VC1 picture.

`#include <vdpau.h>`

Data Fields

- VdpVideoSurface forward_reference
- VdpVideoSurface backward_reference
- uint32_t slice_count
- uint8_t picture_type
- uint8_t frame_coding_mode
- uint8_t deblockEnable
- uint8_t pquant

VC-1 bitstream

Copies of the VC-1 bitstream fields.

- uint8_t postprocflag
- uint8_t pulldown
- uint8_t interlace
- uint8_t tfcntrflag
- uint8_t finterpflag
- uint8_t psf
- uint8_t dquant
- uint8_t panscan_flag
- uint8_t refdist_flag
- uint8_t quantizer
- uint8_t extended_mv
- uint8_t extended_dmv
- uint8_t overlap
- uint8_t vstransform
- uint8_t loopfilter
- uint8_t fastuvmc
- uint8_t range_mapy_flag
- uint8_t range_mapy
- uint8_t range_mapuv_flag
- uint8_t range_mapuv
- uint8_t multires
- uint8_t syncmarker
- uint8_t rangered
- uint8_t maxbframes

6.10.1 Detailed Description

Picture parameter information for a VC1 picture.

Note: References to bitstream fields below may refer to data literally parsed from the bitstream, or derived from the bitstream using a mechanism described in the specification.

6.10.2 Field Documentation

6.10.2.1 VdpVideoSurface VdpPictureInfoVC1::backward_reference

Reference used by B frames. Set to VDP_INVALID_HANDLE when not used.

6.10.2.2 uint8_t VdpPictureInfoVC1::deblockEnable

Out-of-loop deblocking enable. Bit 0 of POSTPROC from VC-1 7.1.1.27 Note that bit 1 of POSTPROC (dering enable) should not be included.

6.10.2.3 uint8_t VdpPictureInfoVC1::dquant

See VC-1 6.2.8.

6.10.2.4 uint8_t VdpPictureInfoVC1::extended_dmv

See VC-1 6.2.14.

6.10.2.5 uint8_t VdpPictureInfoVC1::extended_mv

See VC-1 6.2.7.

6.10.2.6 uint8_t VdpPictureInfoVC1::fastuvmc

See VC-1 6.2.6.

6.10.2.7 uint8_t VdpPictureInfoVC1::finterpflag

See VC-1 6.1.11.

6.10.2.8 VdpVideoSurface VdpPictureInfoVC1::forward_reference

Reference used by B and P frames. Set to VDP_INVALID_HANDLE when not used.

6.10.2.9 uint8_t VdpPictureInfoVC1::frame_coding_mode

Progressive=0, Frame-interlace=2, Field-interlace=3; see VC-1 7.1.1.15.

6.10.2.10 uint8_t VdpPictureInfoVC1::interlace

See VC-1 6.1.9.

6.10.2.11 uint8_t VdpPictureInfoVC1::loopfilter

See VC-1 6.2.5.

6.10.2.12 uint8_t VdpPictureInfoVC1::maxbframes

See VC-1 J.1.17. Only used by simple and main profiles.

6.10.2.13 uint8_t VdpPictureInfoVC1::multires

See VC-1 J.1.10. Only used by simple and main profiles.

6.10.2.14 uint8_t VdpPictureInfoVC1::overlap

See VC-1 6.2.10.

6.10.2.15 uint8_t VdpPictureInfoVC1::panscan_flag

See VC-1 6.2.3.

6.10.2.16 uint8_t VdpPictureInfoVC1::picture_type

I=0, P=1, B=3, BI=4 from 7.1.1.4.

6.10.2.17 uint8_t VdpPictureInfoVC1::postprocflag

See VC-1 6.1.5.

6.10.2.18 uint8_t VdpPictureInfoVC1::pquant

Parameter used by VC-1 Annex H deblocking algorithm. Note that VDPAU implementations may choose which deblocking algorithm to use. See VC-1 7.1.1.6

6.10.2.19 uint8_t VdpPictureInfoVC1::psf

See VC-1 6.1.3.

6.10.2.20 uint8_t VdpPictureInfoVC1::pulldown

See VC-1 6.1.8.

6.10.2.21 uint8_t VdpPictureInfoVC1::quantizer

See VC-1 6.2.11.

6.10.2.22 uint8_t VdpPictureInfoVC1::range_mapuv

6.10.2.23 uint8_t VdpPictureInfoVC1::range_mapuv_flag

See VC-1 6.2.16.

6.10.2.24 uint8_t VdpPictureInfoVC1::range_mapy

6.10.2.25 uint8_t VdpPictureInfoVC1::range_mapy_flag

See VC-1 6.12.15.

6.10.2.26 uint8_t VdpPictureInfoVC1::rangered

VC-1 SP/MP range reduction control. Only used by simple and main profiles. Bit 0: Copy of rangered VC-1 bitstream field; See VC-1 J.1.17. Bit 1: Copy of rangeredfrm VC-1 bitstream fiels; See VC-1 7.1.13.

6.10.2.27 uint8_t VdpPictureInfoVC1::refdist_flag

See VC-1 6.2.4.

6.10.2.28 uint32_t VdpPictureInfoVC1::slice_count

Number of slices in the bitstream provided.

6.10.2.29 uint8_t VdpPictureInfoVC1::syncmarker

See VC-1 J.1.16. Only used by simple and main profiles.

6.10.2.30 uint8_t VdpPictureInfoVC1::tfcntrflag

See VC-1 6.1.10.

6.10.2.31 uint8_t VdpPictureInfoVC1::vstransform

See VC-1 6.2.9.

The documentation for this struct was generated from the following file:

- vdpau/vdpau.h

6.11 VdpPoint Struct Reference

A location within a surface.

`#include <vdpau.h>`

Data Fields

- uint32_t x
- uint32_t y

6.11.1 Detailed Description

A location within a surface.

The VDPAU co-ordinate system has its origin at the top-left of a surface, with x and y components increasing right and down.

6.11.2 Field Documentation

6.11.2.1 uint32_t VdpPoint::x

X co-ordinate.

6.11.2.2 uint32_t VdpPoint::y

Y co-ordinate.

The documentation for this struct was generated from the following file:

- vdpau/vdpau.h

6.12 VdpProcamp Struct Reference

Procamp operation parameterization data.

`#include <vdpau.h>`

Data Fields

- uint32_t struct_version
- float brightness
- float contrast
- float saturation
- float hue

6.12.1 Detailed Description

Procamp operation parameterization data.

When performing a color space conversion operation, various adjustments can be performed at the same time, such as brightness and contrast. This structure defines the level of adjustments to make.

6.12.2 Field Documentation

6.12.2.1 float VdpProcamp::brightness

Brightness adjustment amount. A value clamped between -1.0 and 1.0. 0.0 represents no modification.

6.12.2.2 float VdpProcamp::contrast

Contrast adjustment amount. A value clamped between 0.0 and 10.0. 1.0 represents no modification.

6.12.2.3 float VdpProcamp::hue

Hue adjustment amount. A value clamped between -PI and PI. 0.0 represents no modification.

6.12.2.4 float VdpProcamp::saturation

Saturation adjustment amount. A value clamped between 0.0 and 10.0. 1.0 represents no modification.

6.12.2.5 uint32_t VdpProcamp::struct_version

This field must be filled with VDP_PROCAMP_VERSION

The documentation for this struct was generated from the following file:

- vdpau/vdpau.h

6.13 VdpRect Struct Reference

A rectangular region of a surface.

```
#include <vdpau.h>
```

Data Fields

- uint32_t x0
- uint32_t y0
- uint32_t x1
- uint32_t y1

6.13.1 Detailed Description

A rectangular region of a surface.

The co-ordinates are top-left inclusive, bottom-right exclusive.

The VDPAU co-ordinate system has its origin at the top-left of a surface, with x and y components increasing right and down.

6.13.2 Field Documentation

6.13.2.1 uint32_t VdpRect::x0

Left X co-ordinate. Inclusive.

6.13.2.2 uint32_t VdpRect::x1

Right X co-ordinate. Exclusive.

6.13.2.3 uint32_t VdpRect::y0

Top Y co-ordinate. Inclusive.

6.13.2.4 uint32_t VdpRect::y1

Bottom Y co-ordinate. Exclusive.

The documentation for this struct was generated from the following file:

- vdpau/vdpau.h

6.14 VdpReferenceFrameH264 Struct Reference

Information about an H.264 reference frame.

```
#include <vdpau.h>
```

Data Fields

- VdpVideoSurface surface
- VdpBool is_long_term
- VdpBool top_is_reference
- VdpBool bottom_is_reference
- int32_t field_order_cnt [2]
- uint16_t frame_idx

6.14.1 Detailed Description

Information about an H.264 reference frame.

Note: References to bitstream fields below may refer to data literally parsed from the bitstream, or derived from the bitstream using a mechanism described in the specification.

6.14.2 Field Documentation

6.14.2.1 VdpBool VdpReferenceFrameH264::bottom_is_reference

Is the bottom field used as a reference. Set to VDP_FALSE for unused entries.

6.14.2.2 int32_t VdpReferenceFrameH264::field_order_cnt[2]

[0]: top, [1]: bottom

6.14.2.3 uint16_t VdpReferenceFrameH264::frame_idx

Copy of the H.264 bitstream field: frame_num from slice_header for short-term references, LongTermPicNum from decoding algorithm for long-term references.

6.14.2.4 VdpBool VdpReferenceFrameH264::is_long_term

Is this a long term reference (else short term).

6.14.2.5 VdpVideoSurface VdpReferenceFrameH264::surface

The surface that contains the reference image. Set to VDP_INVALID_HANDLE for unused entries.

6.14.2.6 VdpBool VdpReferenceFrameH264::top_is_reference

Is the top field used as a reference. Set to VDP_FALSE for unused entries.

The documentation for this struct was generated from the following file:

- vdpau/vdpau.h

Chapter 7

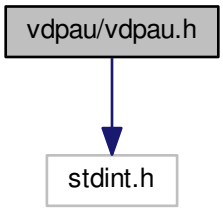
File Documentation

7.1 vdpau/vdpau.h File Reference

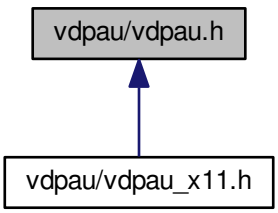
The Core API.

```
#include <stdint.h>
```

Include dependency graph for vdpau.h:



This graph shows which files directly or indirectly include this file:



Data Structures

- struct VdpPoint

  A location within a surface.
- struct VdpRect

  A rectangular region of a surface.
- struct VdpColor
- struct VdpProcamp

  Procamp operation parameterization data.
- struct VdpOutputSurfaceRenderBlendState

  Complete blending operation definition.
- struct VdpBitstreamBuffer

  Application data buffer containing compressed video data.
- struct VdpPictureInfoMPEG1Or2

  Picture parameter information for an MPEG 1 or MPEG 2 picture.
- struct VdpReferenceFrameH264

  Information about an H.264 reference frame.
- struct VdpPictureInfoH264

  Picture parameter information for an H.264 picture.
- struct VdpPictureInfoH264Predictive

  Picture parameter information for an H.264 Hi444PP picture.
- struct VdpPictureInfoVC1

  Picture parameter information for a VC1 picture.
- struct VdpPictureInfoMPEG4Part2

  Picture parameter information for an MPEG-4 Part 2 picture.
- struct VdpPictureInfoHEVC

  Picture parameter information for an H.265/HEVC picture.
- struct VdpLayer

  Definition of an additional VdpOutputSurface layer in the composting model.

Macros

- #define VDP_TRUE 1

  A true VdpBool value.
- #define VDP_FALSE 0

  A false VdpBool value.
- #define VDP_INVALID_HANDLE 0xffffffffU

  An invalid object handle value.
- #define VDP_CHROMA_TYPE_420

  4:2:0 chroma format.
- #define VDP_CHROMA_TYPE_422

  4:2:2 chroma format.
- #define VDP_CHROMA_TYPE_444

  4:4:4 chroma format.
- #define VDP_YCBCR_FORMAT_NV12

  The "NV12" YCbCr surface format.
- #define VDP_YCBCR_FORMAT_YV12

  The "YV12" YCbCr surface format.
- #define VDP_YCBCR_FORMAT_UYVY

  The "UYVY" YCbCr surface format.

- #define VDP_YCBCR_FORMAT_YUYV

  The "YUYV" YCbCr surface format.
- #define VDP_YCBCR_FORMAT_Y8U8V8A8

  A packed YCbCr format.
- #define VDP_YCBCR_FORMAT_V8U8Y8A8

  A packed YCbCr format.
- #define VDP_RGBA_FORMAT_B8G8R8A8

  A packed RGB format.
- #define VDP_RGBA_FORMAT_R8G8B8A8

  A packed RGB format.
- #define VDP_RGBA_FORMAT_R10G10B10A2

  A packed RGB format.
- #define VDP_RGBA_FORMAT_B10G10R10A2

  A packed RGB format.
- #define VDP_RGBA_FORMAT_A8

  An alpha-only surface format.
- #define VDP_INDEXED_FORMAT_A4I4

  A 4-bit indexed format, with alpha.
- #define VDP_INDEXED_FORMAT_I4A4

  A 4-bit indexed format, with alpha.
- #define VDP_INDEXED_FORMAT_A8I8

  A 8-bit indexed format, with alpha.
- #define VDP_INDEXED_FORMAT_I8A8

  A 8-bit indexed format, with alpha.
- #define VDPAU_INTERFACE_VERSION 1

  The VDPAU interface version described by this header file.
- #define VDPAU_VERSION 1

  The VDPAU version described by this header file.
- #define VDP_PROCAMP_VERSION 0
- #define VDP_COLOR_STANDARD_ITUR_BT_601

  ITU-R BT.601.
- #define VDP_COLOR_STANDARD_ITUR_BT_709

  ITU-R BT.709.
- #define VDP_COLOR_STANDARD_SMPTE_240M

  SMPTE-240M.
- #define VDP_COLOR_TABLE_FORMAT_B8G8R8X8

  8-bit per component packed into 32-bits
- #define VDP_OUTPUT_SURFACE_RENDER_BLEND_STATE_VERSION 0
- #define VDP_OUTPUT_SURFACE_RENDER_ROTATE_0

  Do not rotate source_surface prior to compositing.
- #define VDP_OUTPUT_SURFACE_RENDER_ROTATE_90

  Rotate source_surface 90 degrees clockwise prior to compositing.
- #define VDP_OUTPUT_SURFACE_RENDER_ROTATE_180

  Rotate source_surface 180 degrees prior to compositing.
- #define VDP_OUTPUT_SURFACE_RENDER_ROTATE_270

  Rotate source_surface 270 degrees clockwise prior to compositing.
- #define VDP_OUTPUT_SURFACE_RENDER_COLOR_PER_VERTEX

  A separate color is used for each vertex of the smooth-shaded quad. Hence, colors array contains 4 elements rather than 1. See description of colors array.
- #define VDP_DECODER_PROFILE_MPEG1
- #define VDP_DECODER_PROFILE_MPEG2_SIMPLE

- #define VDP_DECODER_PROFILE_MPEG2_MAIN
- #define VDP_DECODER_PROFILE_H264_BASELINE

  MPEG 4 part 10 == H.264 == AVC.
- #define VDP_DECODER_PROFILE_H264_MAIN
- #define VDP_DECODER_PROFILE_H264_HIGH
- #define VDP_DECODER_PROFILE_VC1_SIMPLE
- #define VDP_DECODER_PROFILE_VC1_MAIN
- #define VDP_DECODER_PROFILE_VC1_ADVANCED
- #define VDP_DECODER_PROFILE_MPEG4_PART2_SP
- #define VDP_DECODER_PROFILE_MPEG4_PART2_ASP
- #define VDP_DECODER_PROFILE_DIVX4_QMOBILE
- #define VDP_DECODER_PROFILE_DIVX4_MOBILE
- #define VDP_DECODER_PROFILE_DIVX4_HOME_THEATER
- #define VDP_DECODER_PROFILE_DIVX4_HD_1080P
- #define VDP_DECODER_PROFILE_DIVX5_QMOBILE
- #define VDP_DECODER_PROFILE_DIVX5_MOBILE
- #define VDP_DECODER_PROFILE_DIVX5_HOME_THEATER
- #define VDP_DECODER_PROFILE_DIVX5_HD_1080P
- #define VDP_DECODER_PROFILE_H264_CONSTRAINED_BASELINE
- #define VDP_DECODER_PROFILE_H264_EXTENDED
- #define VDP_DECODER_PROFILE_H264_PROGRESSIVE_HIGH
- #define VDP_DECODER_PROFILE_H264_CONSTRAINED_HIGH
- #define VDP_DECODER_PROFILE_H264_HIGH_444_PREDICTIVE

  Support for 8 bit depth only.
- #define VDP_DECODER_PROFILE_HEVC_MAIN

  MPEG-H Part 2 == H.265 == HEVC.
- #define VDP_DECODER_PROFILE_HEVC_MAIN_10
- #define VDP_DECODER_PROFILE_HEVC_MAIN_STILL
- #define VDP_DECODER_PROFILE_HEVC_MAIN_12
- #define VDP_DECODER_PROFILE_HEVC_MAIN_444
- #define VDP_DECODER_LEVEL_MPEG1_NA
- #define VDP_DECODER_LEVEL_MPEG2_LL
- #define VDP_DECODER_LEVEL_MPEG2_ML
- #define VDP_DECODER_LEVEL_MPEG2_HL14
- #define VDP_DECODER_LEVEL_MPEG2_HL
- #define VDP_DECODER_LEVEL_H264_1
- #define VDP_DECODER_LEVEL_H264_1b
- #define VDP_DECODER_LEVEL_H264_1_1
- #define VDP_DECODER_LEVEL_H264_1_2
- #define VDP_DECODER_LEVEL_H264_1_3
- #define VDP_DECODER_LEVEL_H264_2
- #define VDP_DECODER_LEVEL_H264_2_1
- #define VDP_DECODER_LEVEL_H264_2_2
- #define VDP_DECODER_LEVEL_H264_3
- #define VDP_DECODER_LEVEL_H264_3_1
- #define VDP_DECODER_LEVEL_H264_3_2
- #define VDP_DECODER_LEVEL_H264_4
- #define VDP_DECODER_LEVEL_H264_4_1
- #define VDP_DECODER_LEVEL_H264_4_2
- #define VDP_DECODER_LEVEL_H264_5
- #define VDP_DECODER_LEVEL_H264_5_1
- #define VDP_DECODER_LEVEL_VC1_SIMPLE_LOW
- #define VDP_DECODER_LEVEL_VC1_SIMPLE_MEDIUM
- #define VDP_DECODER_LEVEL_VC1_MAIN_LOW

- #define VDP_DECODER_LEVEL_VC1_MAIN_MEDIUM
- #define VDP_DECODER_LEVEL_VC1_MAIN_HIGH
- #define VDP_DECODER_LEVEL_VC1_ADVANCED_L0
- #define VDP_DECODER_LEVEL_VC1_ADVANCED_L1
- #define VDP_DECODER_LEVEL_VC1_ADVANCED_L2
- #define VDP_DECODER_LEVEL_VC1_ADVANCED_L3
- #define VDP_DECODER_LEVEL_VC1_ADVANCED_L4
- #define VDP_DECODER_LEVEL_MPEG4_PART2_SP_L0
- #define VDP_DECODER_LEVEL_MPEG4_PART2_SP_L1
- #define VDP_DECODER_LEVEL_MPEG4_PART2_SP_L2
- #define VDP_DECODER_LEVEL_MPEG4_PART2_SP_L3
- #define VDP_DECODER_LEVEL_MPEG4_PART2_ASP_L0
- #define VDP_DECODER_LEVEL_MPEG4_PART2_ASP_L1
- #define VDP_DECODER_LEVEL_MPEG4_PART2_ASP_L2
- #define VDP_DECODER_LEVEL_MPEG4_PART2_ASP_L3
- #define VDP_DECODER_LEVEL_MPEG4_PART2_ASP_L4
- #define VDP_DECODER_LEVEL_MPEG4_PART2_ASP_L5
- #define VDP_DECODER_LEVEL_DIVX_NA
- #define VDP_DECODER_LEVEL_HEVC_1 30
- #define VDP_DECODER_LEVEL_HEVC_2
- #define VDP_DECODER_LEVEL_HEVC_2_1
- #define VDP_DECODER_LEVEL_HEVC_3
- #define VDP_DECODER_LEVEL_HEVC_3_1
- #define VDP_DECODER_LEVEL_HEVC_4
- #define VDP_DECODER_LEVEL_HEVC_4_1
- #define VDP_DECODER_LEVEL_HEVC_5
- #define VDP_DECODER_LEVEL_HEVC_5_1
- #define VDP_DECODER_LEVEL_HEVC_5_2
- #define VDP_DECODER_LEVEL_HEVC_6
- #define VDP_DECODER_LEVEL_HEVC_6_1
- #define VDP_DECODER_LEVEL_HEVC_6_2
- #define VDP_BITSTREAM_BUFFER_VERSION 0
- #define VDP_VIDEO_MIXER_FEATURE_DEINTERLACE_TEMPORAL

  A VdpVideoMixerFeature.
- #define VDP_VIDEO_MIXER_FEATURE_DEINTERLACE_TEMPORAL_SPATIAL

  A VdpVideoMixerFeature.
- #define VDP_VIDEO_MIXER_FEATURE_INVERSE_TELECINE

  A VdpVideoMixerFeature.
- #define VDP_VIDEO_MIXER_FEATURE_NOISE_REDUCTION

  A VdpVideoMixerFeature.
- #define VDP_VIDEO_MIXER_FEATURE_SHARPNESS

  A VdpVideoMixerFeature.
- #define VDP_VIDEO_MIXER_FEATURE_LUMA_KEY

  A VdpVideoMixerFeature.
- #define VDP_VIDEO_MIXER_FEATURE_HIGH_QUALITY_SCALING_L1

  A VdpVideoMixerFeature.
- #define VDP_VIDEO_MIXER_FEATURE_HIGH_QUALITY_SCALING_L2

  A VdpVideoMixerFeature.
- #define VDP_VIDEO_MIXER_FEATURE_HIGH_QUALITY_SCALING_L3

  A VdpVideoMixerFeature.
- #define VDP_VIDEO_MIXER_FEATURE_HIGH_QUALITY_SCALING_L4

  A VdpVideoMixerFeature.
- #define VDP_VIDEO_MIXER_FEATURE_HIGH_QUALITY_SCALING_L5

A VdpVideoMixerFeature.

- #define VDP_VIDEO_MIXER_FEATURE_HIGH_QUALITY_SCALING_L6

  A VdpVideoMixerFeature.
- #define VDP_VIDEO_MIXER_FEATURE_HIGH_QUALITY_SCALING_L7

  A VdpVideoMixerFeature.
- #define VDP_VIDEO_MIXER_FEATURE_HIGH_QUALITY_SCALING_L8

  A VdpVideoMixerFeature.
- #define VDP_VIDEO_MIXER_FEATURE_HIGH_QUALITY_SCALING_L9

  A VdpVideoMixerFeature.
- #define VDP_VIDEO_MIXER_PARAMETER_VIDEO_SURFACE_WIDTH

  The exact width of input video surfaces.
- #define VDP_VIDEO_MIXER_PARAMETER_VIDEO_SURFACE_HEIGHT

  The exact height of input video surfaces.
- #define VDP_VIDEO_MIXER_PARAMETER_CHROMA_TYPE

  The chroma type of the input video surfaces the will process.
- #define VDP_VIDEO_MIXER_PARAMETER_LAYERS

  The number of auxiliary layers in the mixer's compositing model.
- #define VDP_VIDEO_MIXER_ATTRIBUTE_BACKGROUND_COLOR

  The background color in the VdpVideoMixer's compositing model.
- #define VDP_VIDEO_MIXER_ATTRIBUTE_CSC_MATRIX

  The color-space conversion matrix used by the VdpVideoMixer.
- #define VDP_VIDEO_MIXER_ATTRIBUTE_NOISE_REDUCTION_LEVEL

  The amount of noise reduction algorithm to apply.
- #define VDP_VIDEO_MIXER_ATTRIBUTE_SHARPNESS_LEVEL

  The amount of sharpening, or blurring, to apply.
- #define VDP_VIDEO_MIXER_ATTRIBUTE_LUMA_KEY_MIN_LUMA

  The minimum luma value for the luma key algorithm.
- #define VDP_VIDEO_MIXER_ATTRIBUTE_LUMA_KEY_MAX_LUMA

  The maximum luma value for the luma key algorithm.
- #define VDP_VIDEO_MIXER_ATTRIBUTE_SKIP_CHROMA_DEINTERLACE

  Whether de-interlacers should operate solely on luma, and bob chroma.
- #define VDP_LAYER_VERSION 0
- #define VDP_FUNC_ID_GET_ERROR_STRING
- #define VDP_FUNC_ID_GET_PROC_ADDRESS
- #define VDP_FUNC_ID_GET_API_VERSION
- #define VDP_FUNC_ID_GET_INFORMATION_STRING
- #define VDP_FUNC_ID_DEVICE_DESTROY
- #define VDP_FUNC_ID_GENERATE_CSC_MATRIX
- #define VDP_FUNC_ID_VIDEO_SURFACE_QUERY_CAPABILITIES
- #define VDP_FUNC_ID_VIDEO_SURFACE_QUERY_GET_PUT_BITS_Y_CB_CR_CAPABILITIES
- #define VDP_FUNC_ID_VIDEO_SURFACE_CREATE
- #define VDP_FUNC_ID_VIDEO_SURFACE_DESTROY
- #define VDP_FUNC_ID_VIDEO_SURFACE_GET_PARAMETERS
- #define VDP_FUNC_ID_VIDEO_SURFACE_GET_BITS_Y_CB_CR
- #define VDP_FUNC_ID_VIDEO_SURFACE_PUT_BITS_Y_CB_CR
- #define VDP_FUNC_ID_OUTPUT_SURFACE_QUERY_CAPABILITIES
- #define VDP_FUNC_ID_OUTPUT_SURFACE_QUERY_GET_PUT_BITS_NATIVE_CAPABILITIES
- #define VDP_FUNC_ID_OUTPUT_SURFACE_QUERY_PUT_BITS_INDEXED_CAPABILITIES
- #define VDP_FUNC_ID_OUTPUT_SURFACE_QUERY_PUT_BITS_Y_CB_CR_CAPABILITIES
- #define VDP_FUNC_ID_OUTPUT_SURFACE_CREATE
- #define VDP_FUNC_ID_OUTPUT_SURFACE_DESTROY
- #define VDP_FUNC_ID_OUTPUT_SURFACE_GET_PARAMETERS

- #define VDP_FUNC_ID_OUTPUT_SURFACE_GET_BITS_NATIVE
- #define VDP_FUNC_ID_OUTPUT_SURFACE_PUT_BITS_NATIVE
- #define VDP_FUNC_ID_OUTPUT_SURFACE_PUT_BITS_INDEXED
- #define VDP_FUNC_ID_OUTPUT_SURFACE_PUT_BITS_Y_CB_CR
- #define VDP_FUNC_ID_BITMAP_SURFACE_QUERY_CAPABILITIES
- #define VDP_FUNC_ID_BITMAP_SURFACE_CREATE
- #define VDP_FUNC_ID_BITMAP_SURFACE_DESTROY
- #define VDP_FUNC_ID_BITMAP_SURFACE_GET_PARAMETERS
- #define VDP_FUNC_ID_BITMAP_SURFACE_PUT_BITS_NATIVE
- #define VDP_FUNC_ID_OUTPUT_SURFACE_RENDER_OUTPUT_SURFACE
- #define VDP_FUNC_ID_OUTPUT_SURFACE_RENDER_BITMAP_SURFACE
- #define VDP_FUNC_ID_OUTPUT_SURFACE_RENDER_VIDEO_SURFACE_LUMA
- #define VDP_FUNC_ID_DECODER_QUERY_CAPABILITIES
- #define VDP_FUNC_ID_DECODER_CREATE
- #define VDP_FUNC_ID_DECODER_DESTROY
- #define VDP_FUNC_ID_DECODER_GET_PARAMETERS
- #define VDP_FUNC_ID_DECODER_RENDER
- #define VDP_FUNC_ID_VIDEO_MIXER_QUERY_FEATURE_SUPPORT
- #define VDP_FUNC_ID_VIDEO_MIXER_QUERY_PARAMETER_SUPPORT
- #define VDP_FUNC_ID_VIDEO_MIXER_QUERY_ATTRIBUTE_SUPPORT
- #define VDP_FUNC_ID_VIDEO_MIXER_QUERY_PARAMETER_VALUE_RANGE
- #define VDP_FUNC_ID_VIDEO_MIXER_QUERY_ATTRIBUTE_VALUE_RANGE
- #define VDP_FUNC_ID_VIDEO_MIXER_CREATE
- #define VDP_FUNC_ID_VIDEO_MIXER_SET_FEATURE_ENABLES
- #define VDP_FUNC_ID_VIDEO_MIXER_SET_ATTRIBUTE_VALUES
- #define VDP_FUNC_ID_VIDEO_MIXER_GET_FEATURE_SUPPORT
- #define VDP_FUNC_ID_VIDEO_MIXER_GET_FEATURE_ENABLES
- #define VDP_FUNC_ID_VIDEO_MIXER_GET_PARAMETER_VALUES
- #define VDP_FUNC_ID_VIDEO_MIXER_GET_ATTRIBUTE_VALUES
- #define VDP_FUNC_ID_VIDEO_MIXER_DESTROY
- #define VDP_FUNC_ID_VIDEO_MIXER_RENDER
- #define VDP_FUNC_ID_PRESENTATION_QUEUE_TARGET_DESTROY
- #define VDP_FUNC_ID_PRESENTATION_QUEUE_CREATE
- #define VDP_FUNC_ID_PRESENTATION_QUEUE_DESTROY
- #define VDP_FUNC_ID_PRESENTATION_QUEUE_SET_BACKGROUND_COLOR
- #define VDP_FUNC_ID_PRESENTATION_QUEUE_GET_BACKGROUND_COLOR
- #define VDP_FUNC_ID_PRESENTATION_QUEUE_GET_TIME
- #define VDP_FUNC_ID_PRESENTATION_QUEUE_DISPLAY
- #define VDP_FUNC_ID_PRESENTATION_QUEUE_BLOCK_UNTIL_SURFACE_IDLE
- #define VDP_FUNC_ID_PRESENTATION_QUEUE_QUERY_SURFACE_STATUS
- #define VDP_FUNC_ID_PREEMPTION_CALLBACK_REGISTER
- #define VDP_FUNC_ID_BASE_WINSYS 0x1000

Typedefs

- typedef int VdpBool

  A boolean value, holding VDP_TRUE or VDP_FALSE.
- typedef uint32_t VdpChromaType

  The set of all chroma formats for VdpVideoSurfaces.
- typedef uint32_t VdpYCbCrFormat

  The set of all known YCbCr surface formats.
- typedef uint32_t VdpRGBAFormat

  The set of all known RGB surface formats.

- typedef uint32_t VdpIndexedFormat

  The set of all known indexed surface formats.
- typedef char const * VdpGetErrorString(VdpStatus status)

  Retrieve a string describing an error code.
- typedef VdpStatus VdpGetApiVersion(uint32_t *api_version)

  Retrieve the VDPAU version implemented by the backend.
- typedef VdpStatus VdpGetInformationString(char const **information_string)

  Retrieve an implementation-specific string description of the implementation. This typically includes detailed version information.
- typedef uint32_t VdpDevice

  An opaque handle representing a VdpDevice object.
- typedef VdpStatus VdpDeviceDestroy(VdpDevice device)

  Destroy a VdpDevice.
- typedef float VdpCSCMatrix[3][4]

  Storage for a color space conversion matrix.
- typedef uint32_t VdpColorStandard

  YCbCr color space specification.
- typedef VdpStatus VdpGenerateCSCMatrix(VdpProcamp *procamp, VdpColorStandard standard, VdpCSCMatrix *csc_matrix)

  Generate a color space conversion matrix.
- typedef VdpStatus VdpVideoSurfaceQueryCapabilities(VdpDevice device, VdpChromaType surface_chroma_type, VdpBool *is_supported, uint32_t *max_width, uint32_t *max_height)

  Query the implementation's VdpVideoSurface capabilities.
- typedef VdpStatus VdpVideoSurfaceQueryGetPutBitsYCbCrCapabilities(VdpDevice device, VdpChromaType surface_chroma_type, VdpYCbCrFormat bits_ycbcr_format, VdpBool *is_supported)

  Query the implementation's VdpVideoSurface GetBits/PutBits capabilities.
- typedef uint32_t VdpVideoSurface

  An opaque handle representing a VdpVideoSurface object.
- typedef VdpStatus VdpVideoSurfaceCreate(VdpDevice device, VdpChromaType chroma_type, uint32_t width, uint32_t height, VdpVideoSurface *surface)

  Create a VdpVideoSurface.
- typedef VdpStatus VdpVideoSurfaceDestroy(VdpVideoSurface surface)

  Destroy a VdpVideoSurface.
- typedef VdpStatus VdpVideoSurfaceGetParameters(VdpVideoSurface surface, VdpChromaType *chroma_type, uint32_t *width, uint32_t *height)

  Retrieve the parameters used to create a VdpVideoSurface.
- typedef VdpStatus VdpVideoSurfaceGetBitsYCbCr(VdpVideoSurface surface, VdpYCbCrFormat destination_ycbcr_format, void *const *destination_data, uint32_t const *destination_pitches)

  Copy image data from a VdpVideoSurface to application memory in a specified YCbCr format.
- typedef VdpStatus VdpVideoSurfacePutBitsYCbCr(VdpVideoSurface surface, VdpYCbCrFormat source_ycbcr_format, void const *const *source_data, uint32_t const *source_pitches)

  Copy image data from application memory in a specific YCbCr format to a VdpVideoSurface.
- typedef uint32_t VdpColorTableFormat

  The set of all known color table formats, for use with VdpOutputSurfacePutBitsIndexed.
- typedef VdpStatus VdpOutputSurfaceQueryCapabilities(VdpDevice device, VdpRGBAFormat surface_rgba_format, VdpBool *is_supported, uint32_t *max_width, uint32_t *max_height)

  Query the implementation's VdpOutputSurface capabilities.
- typedef VdpStatus VdpOutputSurfaceQueryGetPutBitsNativeCapabilities(VdpDevice device, VdpRGBAFormat surface_rgba_format, VdpBool *is_supported)

  Query the implementation's capability to perform a PutBits operation using application data matching the surface's format.

- typedef VdpStatus VdpOutputSurfaceQueryPutBitsIndexedCapabilities(VdpDevice device, VdpRGBAFormat surface_rgba_format, VdpIndexedFormat bits_indexed_format, VdpColorTableFormat color_table_format, VdpBool *is_supported)

  Query the implementation's capability to perform a PutBits operation using application data in a specific indexed format.
- typedef VdpStatus VdpOutputSurfaceQueryPutBitsYCbCrCapabilities(VdpDevice device, VdpRGBAFormat surface_rgba_format, VdpYCbCrFormat bits_ycbcr_format, VdpBool *is_supported)

  Query the implementation's capability to perform a PutBits operation using application data in a specific YCbCr/YUB format.
- typedef uint32_t VdpOutputSurface

  An opaque handle representing a VdpOutputSurface object.
- typedef VdpStatus VdpOutputSurfaceCreate(VdpDevice device, VdpRGBAFormat rgba_format, uint32_t width, uint32_t height, VdpOutputSurface *surface)

  Create a VdpOutputSurface.
- typedef VdpStatus VdpOutputSurfaceDestroy(VdpOutputSurface surface)

  Destroy a VdpOutputSurface.
- typedef VdpStatus VdpOutputSurfaceGetParameters(VdpOutputSurface surface, VdpRGBAFormat *rgba_format, uint32_t *width, uint32_t *height)

  Retrieve the parameters used to create a VdpOutputSurface.
- typedef VdpStatus VdpOutputSurfaceGetBitsNative(VdpOutputSurface surface, VdpRect const *source_rect, void *const *destination_data, uint32_t const *destination_pitches)

  Copy image data from a VdpOutputSurface to application memory in the surface's native format.
- typedef VdpStatus VdpOutputSurfacePutBitsNative(VdpOutputSurface surface, void const *const *source_data, uint32_t const *source_pitches, VdpRect const *destination_rect)

  Copy image data from application memory in the surface's native format to a VdpOutputSurface.
- typedef VdpStatus VdpOutputSurfacePutBitsIndexed(VdpOutputSurface surface, VdpIndexedFormat source_indexed_format, void const *const *source_data, uint32_t const *source_pitch, VdpRect const *destination_rect, VdpColorTableFormat color_table_format, void const *color_table)

  Copy image data from application memory in a specific indexed format to a VdpOutputSurface.
- typedef VdpStatus VdpOutputSurfacePutBitsYCbCr(VdpOutputSurface surface, VdpYCbCrFormat source_ycbcr_format, void const *const *source_data, uint32_t const *source_pitches, VdpRect const *destination_rect, VdpCSCMatrix const *csc_matrix)

  Copy image data from application memory in a specific YCbCr format to a VdpOutputSurface.
- typedef VdpStatus VdpBitmapSurfaceQueryCapabilities(VdpDevice device, VdpRGBAFormat surface_rgba_format, VdpBool *is_supported, uint32_t *max_width, uint32_t *max_height)

  Query the implementation's VdpBitmapSurface capabilities.
- typedef uint32_t VdpBitmapSurface

  An opaque handle representing a VdpBitmapSurface object.
- typedef VdpStatus VdpBitmapSurfaceCreate(VdpDevice device, VdpRGBAFormat rgba_format, uint32_t width, uint32_t height, VdpBool frequently_accessed, VdpBitmapSurface *surface)

  Create a VdpBitmapSurface.
- typedef VdpStatus VdpBitmapSurfaceDestroy(VdpBitmapSurface surface)

  Destroy a VdpBitmapSurface.
- typedef VdpStatus VdpBitmapSurfaceGetParameters(VdpBitmapSurface surface, VdpRGBAFormat *rgba_format, uint32_t *width, uint32_t *height, VdpBool *frequently_accessed)

  Retrieve the parameters used to create a VdpBitmapSurface.
- typedef VdpStatus VdpBitmapSurfacePutBitsNative(VdpBitmapSurface surface, void const *const *source_data, uint32_t const *source_pitches, VdpRect const *destination_rect)

  Copy image data from application memory in the surface's native format to a VdpBitmapSurface.
- typedef VdpStatus VdpOutputSurfaceRenderOutputSurface(VdpOutputSurface destination_surface, VdpRect const *destination_rect, VdpOutputSurface source_surface, VdpRect const *source_rect, VdpColor const *colors, VdpOutputSurfaceRenderBlendState const *blend_state, uint32_t flags)

  Composite a sub-rectangle of a VdpOutputSurface into a sub-rectangle of another VdpOutputSurface; Output Surfaceobject VdpOutputSurface.

- typedef VdpStatus VdpOutputSurfaceRenderBitmapSurface(VdpOutputSurface destination_surface, VdpRect const *destination_rect, VdpBitmapSurface source_surface, VdpRect const *source_rect, VdpColor const *colors, VdpOutputSurfaceRenderBlendState const *blend_state, uint32_t flags)

  Composite a sub-rectangle of a VdpBitmapSurface into a sub-rectangle of a VdpOutputSurface; Output Surfaceobject VdpOutputSurface.
- typedef uint32_t VdpDecoderProfile

  The set of all known compressed video formats, and associated profiles, that may be decoded.
- typedef VdpStatus VdpDecoderQueryCapabilities(VdpDevice device, VdpDecoderProfile profile, VdpBool *is_supported, uint32_t *max_level, uint32_t *max_macroblocks, uint32_t *max_width, uint32_t *max_height)

  Query the implementation's VdpDecoder capabilities.
- typedef uint32_t VdpDecoder

  An opaque handle representing a VdpDecoder object.
- typedef VdpStatus VdpDecoderCreate(VdpDevice device, VdpDecoderProfile profile, uint32_t width, uint32_t height, uint32_t max_references, VdpDecoder *decoder)

  Create a VdpDecoder.
- typedef VdpStatus VdpDecoderDestroy(VdpDecoder decoder)

  Destroy a VdpDecoder.
- typedef VdpStatus VdpDecoderGetParameters(VdpDecoder decoder, VdpDecoderProfile *profile, uint32_t *width, uint32_t *height)

  Retrieve the parameters used to create a VdpDecoder.
- typedef void VdpPictureInfo

  A generic "picture information" type.
- typedef VdpPictureInfoMPEG4Part2 VdpPictureInfoDivX4

  Picture parameter information for a DivX 4 picture.
- typedef VdpPictureInfoMPEG4Part2 VdpPictureInfoDivX5

  Picture parameter information for a DivX 5 picture.
- typedef VdpStatus VdpDecoderRender(VdpDecoder decoder, VdpVideoSurface target, VdpPictureInfo const *picture_info, uint32_t bitstream_buffer_count, VdpBitstreamBuffer const *bitstream_buffers)

  Decode a compressed field/frame and render the result into a VdpVideoSurface.
- typedef uint32_t VdpVideoMixerFeature

  A VdpVideoMixer feature that must be requested at creation time to be used.
- typedef uint32_t VdpVideoMixerParameter

  A VdpVideoMixer creation parameter.
- typedef uint32_t VdpVideoMixerAttribute

  An adjustable attribute of VdpVideoMixer operation.
- typedef VdpStatus VdpVideoMixerQueryFeatureSupport(VdpDevice device, VdpVideoMixerFeature feature, VdpBool *is_supported)

  Query the implementation's support for a specific feature.
- typedef VdpStatus VdpVideoMixerQueryParameterSupport(VdpDevice device, VdpVideoMixerParameter parameter, VdpBool *is_supported)

  Query the implementation's support for a specific parameter.
- typedef VdpStatus VdpVideoMixerQueryAttributeSupport(VdpDevice device, VdpVideoMixerAttribute attribute, VdpBool *is_supported)

  Query the implementation's support for a specific attribute.
- typedef VdpStatus VdpVideoMixerQueryParameterValueRange(VdpDevice device, VdpVideoMixerParameter parameter, void *min_value, void *max_value)

  Query the implementation's supported for a specific parameter.
- typedef VdpStatus VdpVideoMixerQueryAttributeValueRange(VdpDevice device, VdpVideoMixerAttribute attribute, void *min_value, void *max_value)

  Query the implementation's supported for a specific attribute.
- typedef uint32_t VdpVideoMixer

An opaque handle representing a VdpVideoMixer object.

- typedef VdpStatus VdpVideoMixerCreate(VdpDevice device, uint32_t feature_count, VdpVideoMixerFeature const *features, uint32_t parameter_count, VdpVideoMixerParameter const *parameters, void const *const *parameter_values, VdpVideoMixer *mixer)

  Create a VdpVideoMixer.
- typedef VdpStatus VdpVideoMixerSetFeatureEnables(VdpVideoMixer mixer, uint32_t feature_count, VdpVideoMixerFeature const *features, VdpBool const *feature_enables)

  Enable or disable features.
- typedef VdpStatus VdpVideoMixerSetAttributeValues(VdpVideoMixer mixer, uint32_t attribute_count, VdpVideoMixerAttribute const *attributes, void const *const *attribute_values)

  Set attribute values.
- typedef VdpStatus VdpVideoMixerGetFeatureSupport(VdpVideoMixer mixer, uint32_t feature_count, VdpVideoMixerFeature const *features, VdpBool *feature_supports)

  Retrieve whether features were requested at creation time.
- typedef VdpStatus VdpVideoMixerGetFeatureEnables(VdpVideoMixer mixer, uint32_t feature_count, VdpVideoMixerFeature const *features, VdpBool *feature_enables)

  Retrieve whether features are enabled.
- typedef VdpStatus VdpVideoMixerGetParameterValues(VdpVideoMixer mixer, uint32_t parameter_count, VdpVideoMixerParameter const *parameters, void *const *parameter_values)

  Retrieve parameter values given at creation time.
- typedef VdpStatus VdpVideoMixerGetAttributeValues(VdpVideoMixer mixer, uint32_t attribute_count, VdpVideoMixerAttribute const *attributes, void *const *attribute_values)

  Retrieve current attribute values.
- typedef VdpStatus VdpVideoMixerDestroy(VdpVideoMixer mixer)

  Destroy a VdpVideoMixer.
- typedef VdpStatus VdpVideoMixerRender(VdpVideoMixer mixer, VdpOutputSurface background_surface, VdpRect const *background_source_rect, VdpVideoMixerPictureStructure current_picture_structure, uint32_t video_surface_past_count, VdpVideoSurface const *video_surface_past, VdpVideoSurface video_surface_current, uint32_t video_surface_future_count, VdpVideoSurface const *video_surface_future, VdpRect const *video_source_rect, VdpOutputSurface destination_surface, VdpRect const *destination_rect, VdpRect const *destination_video_rect, uint32_t layer_count, VdpLayer const *layers)

  Perform a video post-processing and compositing operation.
- typedef uint64_t VdpTime

  The representation of a point in time.
- typedef uint32_t VdpPresentationQueueTarget

  An opaque handle representing the location where video will be presented.
- typedef VdpStatus VdpPresentationQueueTargetDestroy(VdpPresentationQueueTarget presentation_queue_target)

  Destroy a VdpPresentationQueueTarget.
- typedef uint32_t VdpPresentationQueue

  An opaque handle representing a presentation queue object.
- typedef VdpStatus VdpPresentationQueueCreate(VdpDevice device, VdpPresentationQueueTarget presentation_queue_target, VdpPresentationQueue *presentation_queue)

  Create a VdpPresentationQueue.
- typedef VdpStatus VdpPresentationQueueDestroy(VdpPresentationQueue presentation_queue)

  Destroy a VdpPresentationQueue.
- typedef VdpStatus VdpPresentationQueueSetBackgroundColor(VdpPresentationQueue presentation_queue, VdpColor *const background_color)

  Configure the background color setting.
- typedef VdpStatus VdpPresentationQueueGetBackgroundColor(VdpPresentationQueue presentation_queue, VdpColor *background_color)

  Retrieve the current background color setting.

- typedef VdpStatus VdpPresentationQueueGetTime(VdpPresentationQueue presentation_queue, VdpTime *current_time)

  Retrieve the presentation queue's "current" time.
- typedef VdpStatus VdpPresentationQueueDisplay(VdpPresentationQueue presentation_queue, VdpOutputSurface surface, uint32_t clip_width, uint32_t clip_height, VdpTime earliest_presentation_time)

  Enter a surface into the presentation queue.
- typedef VdpStatus VdpPresentationQueueBlockUntilSurfaceIdle(VdpPresentationQueue presentation_queue, VdpOutputSurface surface, VdpTime *first_presentation_time)

  Wait for a surface to finish being displayed.
- typedef VdpStatus VdpPresentationQueueQuerySurfaceStatus(VdpPresentationQueue presentation_queue, VdpOutputSurface surface, VdpPresentationQueueStatus *status, VdpTime *first_presentation_time)

  Poll the current queue status of a surface.
- typedef void VdpPreemptionCallback(VdpDevice device, void *context)

  A callback to notify the client application that a device's display has been preempted.
- typedef VdpStatus VdpPreemptionCallbackRegister(VdpDevice device, VdpPreemptionCallback callback, void *context)

  Configure the display preemption callback.
- typedef uint32_t VdpFuncId

  *A type suitable for VdpGetProcAddress's **function_id** parameter.*
- typedef VdpStatus VdpGetProcAddress(VdpDevice device, VdpFuncId function_id, void **function_pointer)

  Retrieve a VDPAU function pointer.

Enumerations

- enum VdpStatus {
  VDP_STATUS_OK = 0, VDP_STATUS_NO_IMPLEMENTATION, VDP_STATUS_DISPLAY_PREEMPTED, VDP_STATUS_INVALID_HANDLE,
  VDP_STATUS_INVALID_POINTER, VDP_STATUS_INVALID_CHROMA_TYPE, VDP_STATUS_INVALID_Y_CB_CR_FORMAT, VDP_STATUS_INVALID_RGBA_FORMAT,
  VDP_STATUS_INVALID_INDEXED_FORMAT, VDP_STATUS_INVALID_COLOR_STANDARD, VDP_STATUS_INVALID_COLOR_TABLE_FORMAT, VDP_STATUS_INVALID_BLEND_FACTOR,
  VDP_STATUS_INVALID_BLEND_EQUATION, VDP_STATUS_INVALID_FLAG, VDP_STATUS_INVALID_DECODER_PROFILE, VDP_STATUS_INVALID_VIDEO_MIXER_FEATURE,
  VDP_STATUS_INVALID_VIDEO_MIXER_PARAMETER, VDP_STATUS_INVALID_VIDEO_MIXER_ATTRIBUTE, VDP_STATUS_INVALID_VIDEO_MIXER_PICTURE_STRUCTURE, VDP_STATUS_INVALID_FUNC_ID,
  VDP_STATUS_INVALID_SIZE, VDP_STATUS_INVALID_VALUE, VDP_STATUS_INVALID_STRUCT_VERSION, VDP_STATUS_RESOURCES,
  VDP_STATUS_HANDLE_DEVICE_MISMATCH, VDP_STATUS_ERROR }

  The set of all possible error codes.
- enum VdpOutputSurfaceRenderBlendFactor {
  VDP_OUTPUT_SURFACE_RENDER_BLEND_FACTOR_ZERO = 0, VDP_OUTPUT_SURFACE_RENDER_BLEND_FACTOR_ONE = 1, VDP_OUTPUT_SURFACE_RENDER_BLEND_FACTOR_SRC_COLOR = 2, VDP_OUTPUT_SURFACE_RENDER_BLEND_FACTOR_ONE_MINUS_SRC_COLOR = 3,
  VDP_OUTPUT_SURFACE_RENDER_BLEND_FACTOR_SRC_ALPHA = 4, VDP_OUTPUT_SURFACE_RENDER_BLEND_FACTOR_ONE_MINUS_SRC_ALPHA = 5, VDP_OUTPUT_SURFACE_RENDER_BLEND_FACTOR_DST_ALPHA = 6, VDP_OUTPUT_SURFACE_RENDER_BLEND_FACTOR_ONE_MINUS_DST_ALPHA = 7,
  VDP_OUTPUT_SURFACE_RENDER_BLEND_FACTOR_DST_COLOR = 8, VDP_OUTPUT_SURFACE_RENDER_BLEND_FACTOR_ONE_MINUS_DST_COLOR = 9, VDP_OUTPUT_SURFACE_RENDER_BLEND_FACTOR_SRC_ALPHA_SATURATE = 10, VDP_OUTPUT_SURFACE_RENDER_BLEND_FACTOR_CONSTANT_COLOR = 11,
  VDP_OUTPUT_SURFACE_RENDER_BLEND_FACTOR_ONE_MINUS_CONSTANT_COLOR = 12, VDP_OUTPUT_SURFACE_RENDER_BLEND_FACTOR_CONSTANT_ALPHA = 13, VDP_OUTPUT_SURFACE_RENDER_BLEND_FACTOR_ONE_MINUS_CONSTANT_ALPHA = 14 }

The blending equation factors.

- enum VdpOutputSurfaceRenderBlendEquation { VDP_OUTPUT_SURFACE_RENDER_BLEND_EQUATION_SUBTRACT = 0, VDP_OUTPUT_SURFACE_RENDER_BLEND_EQUATION_REVERSE_SUBTRACT = 1, VDP_OUTPUT_SURFACE_RENDER_BLEND_EQUATION_ADD = 2, VDP_OUTPUT_SURFACE_RENDER_BLEND_EQUATION_MIN = 3, VDP_OUTPUT_SURFACE_RENDER_BLEND_EQUATION_MAX = 4 }

  The blending equations.

- enum VdpVideoMixerPictureStructure { VDP_VIDEO_MIXER_PICTURE_STRUCTURE_TOP_FIELD, VDP_VIDEO_MIXER_PICTURE_STRUCTURE_BOTTOM_FIELD, VDP_VIDEO_MIXER_PICTURE_STRUCTURE_FRAME }

  The structure of the picture present in a VdpVideoSurface.

- enum VdpPresentationQueueStatus { VDP_PRESENTATION_QUEUE_STATUS_IDLE, VDP_PRESENTATION_QUEUE_STATUS_QUEUED, VDP_PRESENTATION_QUEUE_STATUS_VISIBLE }

  The status of a surface within a presentation queue.

7.1.1 Detailed Description

The Core API.

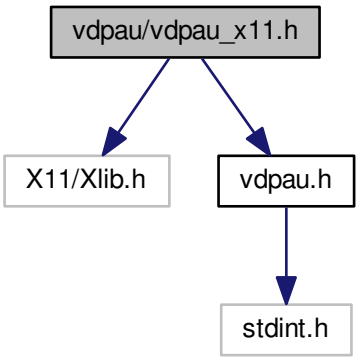
This file contains the Core API.

7.2 vdpau/vdpau_x11.h File Reference

X11 Window System Integration Layer.

```
#include <X11/Xlib.h>
#include "vdpau.h"
```

Include dependency graph for vdpau_x11.h:



- #define VDP_FUNC_ID_PRESENTATION_QUEUE_TARGET_CREATE_X11
- typedef VdpStatus VdpDeviceCreateX11(Display *display, int screen, VdpDevice *device, VdpGetProcAddress **get_proc_address)

Create a VdpDevice object for use with X11.

- typedef VdpStatus VdpPresentationQueueTargetCreateX11(VdpDevice device, Drawable drawable, VdpPresentationQueueTarget *target)

  Create a VdpPresentationQueueTarget for use with X11.

- VdpDeviceCreateX11 vdp_device_create_x11

  Create a VdpDevice object for use with X11. This is an actual symbol of type VdpDeviceCreateX11.

7.2.1 Detailed Description

X11 Window System Integration Layer.

This file contains the X11 Window System Integration Layer X11 Window System Integration Layer.

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