

AMDSMI

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Chapter 1

AMD System Management Interface (AMD SMI) Library

The AMD System Management Interface Library, or AMD SMI library, is a C library for Linux that provides a user space interface for applications to monitor and control AMD devices.

1.1 Supported platforms

At initial release, the AMD SMI library will support Linux bare metal and Linux virtual machine guest for AMD GPUs. In the future release, the library will be extended to support AMD EPYC™ CPUs.

AMD SMI library can run on AMD ROCm supported platforms, please refer to [List of Supported Operating Systems and GPUs](#)

To run the AMD SMI library, the amdgpu driver needs to be installed. Optionally, the libdrm can be installed to query firmware information and hardware IPs.

1.2 Building AMD SMI

1.2.1 Additional Required software for building

In order to build the AMD SMI library, the following components are required. Note that the software versions listed are what was used in development. Earlier versions are not guaranteed to work:

- CMake (v3.11.0)
- g++ (5.4.0)

In order to build the latest documentation, the following are required:

- DOxygen (1.8.11)
- latex (pdfTeX 3.14159265-2.6-1.40.16)

The source code for AMD SMI is available on Github.

After the AMD SMI library git repository has been cloned to a local Linux machine, building the library is achieved by following the typical CMake build sequence. Specifically,

```
mkdir -p build
cd build
cmake <location of root of AMD SMI library CMakeLists.txt>
make -j $(nproc)
# Install library file and header; default location is /opt/rocm
make instal
```

The built library will appear in the `build` folder.

To build the rpm and deb packages follow the above steps with:

```
make packag
```

1.2.2 Documentation

The reference manual, `refman.pdf` will be in the `latex` directory upon a successful build.

1.2.3 Building the Tests

In order to verify the build and capability of AMD SMI on your system and to see an example of how AMD SMI can be used, you may build and run the tests that are available in the repo. To build the tests, follow these steps:

```
mkdir -p build
cd build
cmake -DBUILD_TESTS=ON <location of root of AMD SMI library CMakeLists.txt>
make -j $(nproc)
```

1.2.4 Run the Tests

To run the test, execute the program `amdsmitst` that is built from the steps above.

1.3 Usage Basics

1.3.1 Device/Socket handles

Many of the functions in the library take a "socket handle" or "device handle". The socket is an abstraction of hardware physical socket. This will enable amd-smi to provide a better representation of the hardware to user. Although there is always one distinct GPU for a socket, the APU may have both GPU device and CPU device on the same socket. Moreover, for MI200, it may have multiple GCDs.

To discover the sockets in the system, `amdsmi_get_socket_handles()` is called to get list of sockets handles, which in turn can be used to query the devices in that socket using `amdsmi_get_device_handles()`. The device handler is used to distinguish the detected devices from one another. It is important to note that a device may end up with a different device handles after restart application, so a device handle should not be relied upon to be constant over process.

1.4 Hello AMD SMI

The only required AMD-SMI call for any program that wants to use AMD-SMI is the `amdsmi_init()` call. This call initializes some internal data structures that will be used by subsequent AMD-SMI calls. In the call, a flag can be passed if the application is only interested in a specific device type.

When AMD-SMI is no longer being used, `amdsmi_shut_down()` should be called. This provides a way to do any releasing of resources that AMD-SMI may have held.

A simple "Hello World" type program that displays the temperature of detected devices would look like this:

```
{c++}
#include <iostream>
#include <vector>
#include "amd_smi/amdsmi.h"
int main() {
    amdsmi_status_t ret;

    // Init amdsmi for sockets and devices. Here we are only interested in AMD_GPUS.
    ret = amdsmi_init(AMD_SMI_INIT_AMD_GPUS);

    // Get the socket count available in the system.
    ret = amdsmi_get_socket_handles(&socket_count, nullptr);

    // Allocate the memory for the sockets
    std::vector<amdsmi_socket_handle> sockets(socket_count);
    // Get the socket handles in the system
    ret = amdsmi_get_socket_handles(&socket_count, &sockets[0]);

    std::cout << "Total Socket: " << socket_count << std::endl;

    // For each socket, get identifier and devices
    for (uint32_t i=0; i < socket_count; i++) {
        // Get Socket info
        char socket_info[128];
        ret = amdsmi_get_socket_info(sockets[i], socket_info, 128);
        std::cout << "Socket " << socket_info << std::endl;

        // Get the device count for the socket.
        uint32_t device_count = 0;
        ret = amdsmi_get_device_handles(sockets[i], &device_count, nullptr);

        // Allocate the memory for the device handlers on the socket
        std::vector<amdsmi_device_handle> device_handles(device_count);
        // Get all devices of the socket
        ret = amdsmi_get_device_handles(sockets[i],
                                         &device_count, &device_handles[0]);

        // For each device of the socket, get name and temperature.
        for (uint32_t j=0; j < device_count; j++) {
            // Get device type. Since the amdsmi is initialized with
            // AMD_SMI_INIT_AMD_GPUS, the device_type must be AMD_GPU.
            device_type_t device_type;
            ret = amdsmi_get_device_type(device_handles[j], &device_type);
            if (device_type != AMD_GPU) {
                std::cout << "Expect AMD_GPU device type!\n";
                return 1;
            }

            // Get device name
            amdsmi_board_info_t board_info;
            ret = amdsmi_get_board_info(device_handles[j], &board_info);
            std::cout << "\tdevice "
                      << j << "\n\t\tName:" << board_info.product_name << std::endl;

            // Get temperature
            int64_t val_i64 = 0;
            ret = amdsmi_dev_get_temp_metric(device_handles[j], TEMPERATURE_TYPE_EDGE,
                                             AMDSMI_TEMP_CURRENT, &val_i64);
            std::cout << "\t\tTemperature: " << val_i64/1000 << "C" << std::endl;
        }
    }

    // Clean up resources allocated at amdsmi_init. It will invalidate sockets
    // and devices pointers
    ret = amdsmi_shut_down();

    return 0;
}
```

1.4.1 DISCLAIMER

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Chapter 2

Deprecated List

Global [amdsmi_dev_set_perf_level](#) (amdsmi_device_handle device_handle, amdsmi_dev_perf_level_↵
t perf_lvl)

:: [amdsmi_dev_set_perf_level_v1\(\)](#) is preferred, with an interface that more closely matches the rest of the amd_smi API.

Global [amdsmi_dev_set_overdrive_level](#) (amdsmi_device_handle device_handle, uint32_t od)

This function is deprecated. :: amdsmi_dev_set_overdrive_level_v1 has the same functionalty, with an interface that more closely matches the rest of the amd_smi API.

Chapter 3

Module Index

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Data Structure Index

4.1 Data Structures

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Chapter 5

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Chapter 6

Module Documentation

6.1 Initialization and Shutdown

These functions are used for initialization of AMD SMI and clean up when done.

Functions

- [amdsmi_status_t amdsmi_init](#) (uint64_t init_flags)
Initialize the AMD SMI library.
- [amdsmi_status_t amdsmi_shut_down](#) (void)
Shutdown the AMD SMI library.

6.1.1 Detailed Description

These functions are used for initialization of AMD SMI and clean up when done.

6.1.2 Function Documentation

6.1.2.1 amdsmi_init()

```
amdsmi_status_t amdsmi_init (  
    uint64_t init_flags )
```

Initialize the AMD SMI library.

This function initializes the library and the internal data structures, including those corresponding to sources of information that SMI provides.

The `init_flags` decides which type of device can be discovered by [amdsmi_get_socket_handles\(\)](#). `AMDSMI_INIT_AMD_GPUS` returns sockets with AMD GPUS, and `AMDSMI_INIT_AMD_GPUS | AMDSMI_INIT_AMD_CPUS` returns sockets with either AMD GPUS or CPUS. Currently, only `AMDSMI_INIT_AMD_GPUS` is supported.

Parameters

in	<i>init_flags</i>	Bit flags that tell SMI how to initialize. Values of amdsmi_init_flags_t may be OR'd together and passed through <i>init_flags</i> to modify how AMDSMI initializes.
----	-------------------	--

Returns

[amdsmi_status_t](#) | [AMDSMI_STATUS_SUCCESS](#) on success, non-zero on fail

6.1.2.2 amdsmi_shut_down()

```
amdsmi_status_t amdsmi_shut_down (  
    void )
```

Shutdown the AMD SMI library.

This function shuts down the library and internal data structures and performs any necessary clean ups.

Returns

[amdsmi_status_t](#) | [AMDSMI_STATUS_SUCCESS](#) on success, non-zero on fail

6.2 Discovery Queries

These functions provide discovery of the sockets.

Functions

- `amdsmi_status_t amdsmi_get_socket_handles` (`uint32_t *socket_count`, `amdsmi_socket_handle *socket_handles`)
Get the list of socket handles in the system.
- `amdsmi_status_t amdsmi_get_socket_info` (`amdsmi_socket_handle socket_handle`, `char *name`, `size_t len`)
Get information about the given socket.
- `amdsmi_status_t amdsmi_get_device_handles` (`amdsmi_socket_handle socket_handle`, `uint32_t *device_count`, `amdsmi_device_handle *device_handles`)
Get the list of the device handles associated to a socket.
- `amdsmi_status_t amdsmi_get_device_type` (`amdsmi_device_handle device_handle`, `device_type_t *device_type`)
Get the device type of the device_handle.
- `amdsmi_status_t amdsmi_get_device_handle_from_bdf` (`amdsmi_bdf_t bdf`, `amdsmi_device_handle *device_handle`)
Get device handle with the matching bdf.

6.2.1 Detailed Description

These functions provide discovery of the sockets.

6.2.2 Function Documentation

6.2.2.1 amdsmi_get_socket_handles()

```
amdsmi_status_t amdsmi_get_socket_handles (
    uint32_t * socket_count,
    amdsmi_socket_handle * socket_handles )
```

Get the list of socket handles in the system.

Depends on what flag is passed to `amdsmi_init`. `AMDSMI_INIT_AMD_GPUS` returns sockets with AMD GPUS, and `AMDSMI_INIT_AMD_GPUS | AMDSMI_INIT_AMD_CPUS` returns sockets with either AMD GPUS or CPUS. The socket handles can be used to query the device handles in that socket, which will be used in other APIs to get device detail information or telemtries.

Parameters

in, out	<i>socket_count</i>	As input, the value passed through this parameter is the number of <code>::amdsmi_socket_handle</code> that may be safely written to the memory pointed to by <code>socket_handles</code> . This is the limit on how many socket handles will be written to <code>socket_handles</code> . On return, <code>socket_count</code> will contain the number of socket handles written to <code>socket_handles</code> , or the number of socket handles that could have been written if enough memory had been provided. If <code>socket_handles</code> is NULL, as output, <code>socket_count</code> will contain how many sockets are available to read in the system.
in, out	<i>socket_handles</i>	A pointer to a block of memory to which the <code>::amdsmi_socket_handle</code> values will be written. This value may be NULL. In this case, this function can be used to query how many sockets are available to read in the system.

Returns

`amdsmi_status_t` | [AMDSMI_STATUS_SUCCESS](#) on success, non-zero on fail

6.2.2.2 `amdsmi_get_socket_info()`

```
amdsmi_status_t amdsmi_get_socket_info (
    amdsmi_socket_handle socket_handle,
    char * name,
    size_t len )
```

Get information about the given socket.

This function retrieves socket information. The `socket_handle` must be provided to retrieve the Socket ID.

Parameters

in	<i>socket_handle</i>	a socket handle
out	<i>name</i>	The id of the socket.
in	<i>len</i>	the length of the caller provided buffer <code>name</code> .

Returns

`amdsmi_status_t` | [AMDSMI_STATUS_SUCCESS](#) on success, non-zero on fail

6.2.2.3 `amdsmi_get_device_handles()`

```
amdsmi_status_t amdsmi_get_device_handles (
    amdsmi_socket_handle socket_handle,
    uint32_t * device_count,
    amdsmi_device_handle * device_handles )
```

Get the list of the device handles associated to a socket.

This function retrieves the device handles of a socket. The `socket_handle` must be provided for the device. A socket may have multiple different type devices: An APU on a socket have both CPUs and GPUs. Currently, only AMD GPUs are supported.

The number of device count is returned through `device_count` if `device_handles` is NULL. Then the number of `device_count` can be pass as input to retrieval all devices on the socket to `device_handles`.

Parameters

in	<code>socket_handle</code>	The socket to query
in, out	<code>device_count</code>	As input, the value passed through this parameter is the number of <code>amdsmi_device_handle</code> 's that may be safely written to the memory pointed to by <code>device_handles</code> . This is the limit on how many device handles will be written to <code>device_handles</code> . On return, <code>device_count</code> will contain the number of device handles written to <code>device_handles</code> , or the number of device handles that could have been written if enough memory had been provided. If <code>device_handles</code> is NULL, as output, <code>device_count</code> will contain how many devices are available to read for the socket.
in, out	<code>device_handles</code>	A pointer to a block of memory to which the <code>amdsmi_device_handle</code> values will be written. This value may be NULL. In this case, this function can be used to query how many devices are available to read.

Returns

`amdsmi_status_t` | `AMDSMI_STATUS_SUCCESS` on success, non-zero on fail

6.2.2.4 amdsmi_get_device_type()

```
amdsmi_status_t amdsmi_get_device_type (
    amdsmi_device_handle device_handle,
    device_type_t * device_type )
```

Get the device type of the `device_handle`.

This function retrieves the device type. A `device_handle` must be provided for that device.

Parameters

in	<code>device_handle</code>	a device handle
out	<code>device_type</code>	a pointer to <code>device_type_t</code> to which the device type will be written. If this parameter is nullptr, this function will return <code>AMDSMI_STATUS_INVALID</code> .

Returns

`amdsmi_status_t` | `AMDSMI_STATUS_SUCCESS` on success, non-zero on fail

6.2.2.5 amdsmi_get_device_handle_from_bdf()

```
amdsmi_status_t amdsmi_get_device_handle_from_bdf (
    amdsmi_bdf_t bdf,
    amdsmi_device_handle * device_handle )
```

Get device handle with the matching bdf.

Given bdf info `bdf`, this function will get the device handle with the matching bdf.

Parameters

in	<i>bdf</i>	The bdf to match with corresponding device handle.
out	<i>device_handle</i>	device handle with the matching bdf.

Returns

[amdsmi_status_t](#) | [AMDSMI_STATUS_SUCCESS](#) on success, non-zero on fail

6.3 Identifier Queries

These functions provide identification information.

Functions

- `amdsmi_status_t amdsmi_dev_get_id (amdsmi_device_handle device_handle, uint16_t *id)`
Get the device id associated with the device with provided device handler.
- `amdsmi_status_t amdsmi_dev_get_vendor_name (amdsmi_device_handle device_handle, char *name, size_t len)`
Get the name string for a give vendor ID.
- `amdsmi_status_t amdsmi_dev_get_vram_vendor (amdsmi_device_handle device_handle, char *brand, uint32_t len)`
Get the vram vendor string of a device.
- `amdsmi_status_t amdsmi_dev_get_subsystem_id (amdsmi_device_handle device_handle, uint16_t *id)`
Get the subsystem device id associated with the device with provided device handle.
- `amdsmi_status_t amdsmi_dev_get_subsystem_name (amdsmi_device_handle device_handle, char *name, size_t len)`
Get the name string for the device subsystem.
- `amdsmi_status_t amdsmi_dev_get_drm_render_minor (amdsmi_device_handle device_handle, uint32_t *minor)`
Get the drm minor number associated with this device.

6.3.1 Detailed Description

These functions provide identification information.

6.3.2 Function Documentation

6.3.2.1 amdsmi_dev_get_id()

```
amdsmi_status_t amdsmi_dev_get_id (
    amdsmi_device_handle device_handle,
    uint16_t * id )
```

Get the device id associated with the device with provided device handler.

Given a device handle `device_handle` and a pointer to a `uint32_t id`, this function will write the device id value to the `uint64_t` pointed to by `id`. This ID is an identification of the type of device, so calling this function for different devices will give the same value if they are kind of device. Consequently, this function should not be used to distinguish one device from another. `amdsmi_dev_get_pci_id()` should be used to get a unique identifier.

Parameters

in	<i>device_handle</i>	a device handle
in, out	<i>id</i>	a pointer to <code>uint64_t</code> to which the device id will be written If this parameter is nullptr, this function will return <code>AMDSMI_STATUS_INVALID</code> if the function is
Generated by Doxygen		supported with the provided, arguments and <code>AMDSMI_STATUS_NOT_SUPPORTED</code> if it is not supported with the provided arguments.

Returns

[amdsmi_status_t](#) | [AMDSMI_STATUS_SUCCESS](#) on success, non-zero on fail

6.3.2.2 amdsmi_dev_get_vendor_name()

```
amdsmi_status_t amdsmi_dev_get_vendor_name (
    amdsmi_device_handle device_handle,
    char * name,
    size_t len )
```

Get the name string for a give vendor ID.

Given a device handle `device_handle`, a pointer to a caller provided char buffer `name`, and a length of this buffer `len`, this function will write the name of the vendor (up to `len` characters) buffer `name`. The `id` may be a device vendor or subsystem vendor ID.

If the integer ID associated with the vendor is not found in one of the system files containing device name information (e.g. `/usr/share/misc/pci.ids`), then this function will return the hex vendor ID as a string. Updating the system name files can be accomplished with "sudo update-pciids".

Parameters

in	<i>device_handle</i>	a device handle
in, out	<i>name</i>	a pointer to a caller provided char buffer to which the name will be written If this parameter is nullptr, this function will return AMDSMI_STATUS_INVALID if the function is supported with the provided, arguments and AMDSMI_STATUS_NOT_SUPPORTED if it is not supported with the provided arguments.
in	<i>len</i>	the length of the caller provided buffer <code>name</code> .

Note

[AMDSMI_STATUS_INSUFFICIENT_SIZE](#) is returned if `len` bytes is not large enough to hold the entire name. In this case, only `len` bytes will be written.

Returns

[amdsmi_status_t](#) | [AMDSMI_STATUS_SUCCESS](#) on success, non-zero on fail

6.3.2.3 amdsmi_dev_get_vram_vendor()

```
amdsmi_status_t amdsmi_dev_get_vram_vendor (
    amdsmi_device_handle device_handle,
    char * brand,
    uint32_t len )
```

Get the vram vendor string of a device.

This function retrieves the vram vendor name given a device handle `device_handle`, a pointer to a caller provided char buffer `brand`, and a length of this buffer `len`, this function will write the vram vendor of the device (up to `len` characters) to the buffer `brand`.

If the vram vendor for the device is not found as one of the values contained within `amdsmi_dev_get_vram_vendor`, then this function will return the string 'unknown' instead of the vram vendor.

Parameters

in	<i>device_handle</i>	a device handle
in, out	<i>brand</i>	a pointer to a caller provided char buffer to which the vram vendor will be written
in	<i>len</i>	the length of the caller provided buffer <code>brand</code> .

Returns

[amdsmi_status_t](#) | [AMDSMI_STATUS_SUCCESS](#) on success, non-zero on fail

6.3.2.4 `amdsmi_dev_get_subsystem_id()`

```
amdsmi_status_t amdsmi_dev_get_subsystem_id (
    amdsmi_device_handle device_handle,
    uint16_t * id )
```

Get the subsystem device id associated with the device with provided device handle.

Given a device handle `device_handle` and a pointer to a `uint32_t` `id`, this function will write the subsystem device id value to the `uint64_t` pointed to by `id`.

Parameters

in	<i>device_handle</i>	a device handle
in, out	<i>id</i>	a pointer to <code>uint64_t</code> to which the subsystem device id will be written. If this parameter is nullptr, this function will return AMDSMI_STATUS_INVALID if the function is supported with the provided arguments and AMDSMI_STATUS_NOT_SUPPORTED if it is not supported with the provided arguments.

Returns

[amdsmi_status_t](#) | [AMDSMI_STATUS_SUCCESS](#) on success, non-zero on fail

6.3.2.5 `amdsmi_dev_get_subsystem_name()`

```
amdsmi_status_t amdsmi_dev_get_subsystem_name (
    amdsmi_device_handle device_handle,
```

```
char * name,
size_t len )
```

Get the name string for the device subsystem.

Given a device handle `device_handle`, a pointer to a caller provided char buffer `name`, and a length of this buffer `len`, this function will write the name of the device subsystem (up to `len` characters) to the buffer `name`.

If the integer ID associated with the sub-system is not found in one of the system files containing device name information (e.g. `/usr/share/misc/pci.ids`), then this function will return the hex sub-system ID as a string. Updating the system name files can be accomplished with "sudo update-pciids".

Parameters

in	<i>device_handle</i>	a device handle
in, out	<i>name</i>	a pointer to a caller provided char buffer to which the name will be written. If this parameter is nullptr, this function will return AMDSMI_STATUS_INVALID if the function is supported with the provided arguments and AMDSMI_STATUS_NOT_SUPPORTED if it is not supported with the provided arguments.
in	<i>len</i>	the length of the caller provided buffer <code>name</code> .

Note

[AMDSMI_STATUS_INSUFFICIENT_SIZE](#) is returned if `len` bytes is not large enough to hold the entire name. In this case, only `len` bytes will be written.

Returns

[amdsmi_status_t](#) | [AMDSMI_STATUS_SUCCESS](#) on success, non-zero on fail

6.3.2.6 amdsmi_dev_get_drm_render_minor()

```
amdsmi_status_t amdsmi_dev_get_drm_render_minor (
    amdsmi_device_handle device_handle,
    uint32_t * minor )
```

Get the drm minor number associated with this device.

Given a device handle `device_handle`, find its render device file `/dev/dri/renderDN` where N corresponds to its minor number.

Parameters

in	<i>device_handle</i>	a device handle
in, out	<i>minor</i>	a pointer to a <code>uint32_t</code> into which minor number will be copied

Returns

`amdsmi_status_t` | `AMDSMI_STATUS_SUCCESS` on success, non-zero on fail

6.4 PCIe Queries

These functions provide information about PCIe.

Functions

- `amdsmi_status_t amdsmi_dev_get_pcie_bandwidth (amdsmi_device_handle device_handle, amdsmi_pcie_bandwidth_t *bandwidth)`
Get the list of possible PCIe bandwidths that are available.
- `amdsmi_status_t amdsmi_dev_get_pcie_id (amdsmi_device_handle device_handle, uint64_t *bdfid)`
Get the unique PCI device identifier associated for a device.
- `amdsmi_status_t amdsmi_topo_get_numa_affinity (amdsmi_device_handle device_handle, uint32_t *numa_node)`
Get the NUMA node associated with a device.
- `amdsmi_status_t amdsmi_dev_get_pcie_throughput (amdsmi_device_handle device_handle, uint64_t *sent, uint64_t *received, uint64_t *max_pkt_sz)`
Get PCIe traffic information.
- `amdsmi_status_t amdsmi_dev_get_pcie_replay_counter (amdsmi_device_handle device_handle, uint64_t *counter)`
Get PCIe replay counter.

6.4.1 Detailed Description

These functions provide information about PCIe.

6.4.2 Function Documentation

6.4.2.1 amdsmi_dev_get_pcie_bandwidth()

```
amdsmi_status_t amdsmi_dev_get_pcie_bandwidth (
    amdsmi_device_handle device_handle,
    amdsmi_pcie_bandwidth_t * bandwidth )
```

Get the list of possible PCIe bandwidths that are available.

Given a device handle `device_handle` and a pointer to a to an `amdsmi_pcie_bandwidth_t` structure `bandwidth`, this function will fill in `bandwidth` with the possible T/s values and associated number of lanes, and indication of the current selection.

Parameters

in	<code>device_handle</code>	a device handle
in, out	<code>bandwidth</code>	a pointer to a caller provided <code>amdsmi_pcie_bandwidth_t</code> structure to which the frequency information will be written

Returns

`amdsmi_status_t` | `AMDSMI_STATUS_SUCCESS` on success, non-zero on fail

6.4.2.2 `amdsmi_dev_get_pci_id()`

```
amdsmi_status_t amdsmi_dev_get_pci_id (
    amdsmi_device_handle device_handle,
    uint64_t * bdfid )
```

Get the unique PCI device identifier associated for a device.

Give a device handle `device_handle` and a pointer to a `uint64_t bdfid`, this function will write the Bus/Device/Function PCI identifier (BDFID) associated with device `device_handle` to the value pointed to by `bdfid`.

The format of `bdfid` will be as follows:

$$\text{BDFID} = ((\text{DOMAIN} \ \& \ 0\text{xffffffff}) \ll 32) \mid ((\text{BUS} \ \& \ 0\text{xff}) \ll 8) \mid ((\text{DEVICE} \ \& \ 0\text{xf}) \ll 3) \mid (\text{FUNCTION} \ \& \ 0\text{x7})$$

Name	Field
Domain	[64:32]
Reserved	[31:16]
Bus	[15: 8]
Device	[7: 3]
Function	[2: 0]

Parameters

in	<i>device_handle</i>	a device handle
in, out	<i>bdfid</i>	a pointer to <code>uint64_t</code> to which the device bdfid value will be written. If this parameter is nullptr, this function will return <code>AMDSMI_STATUS_INVALID</code> if the function is supported with the provided arguments and <code>AMDSMI_STATUS_NOT_SUPPORTED</code> if it is not supported with the provided arguments.

Returns

`amdsmi_status_t` | `AMDSMI_STATUS_SUCCESS` on success, non-zero on fail

6.4.2.3 `amdsmi_topo_get_numa_affinity()`

```
amdsmi_status_t amdsmi_topo_get_numa_affinity (
    amdsmi_device_handle device_handle,
    uint32_t * numa_node )
```

Get the NUMA node associated with a device.

Given a device handle `device_handle` and a pointer to a `uint32_t` `numa_node`, this function will retrieve the NUMA node value associated with device `device_handle` and store the value at location pointed to by `numa_node`.

Parameters

in	<i>device_handle</i>	a device handle
in, out	<i>numa_node</i>	pointer to location where NUMA node value will be written. If this parameter is nullptr, this function will return AMDSMI_STATUS_INVALID if the function is supported with the provided arguments and AMDSMI_STATUS_NOT_SUPPORTED if it is not supported with the provided arguments.

Returns

[amdsmi_status_t](#) | [AMDSMI_STATUS_SUCCESS](#) on success, non-zero on fail

6.4.2.4 amdsmi_dev_get_pci_throughput()

```
amdsmi_status_t amdsmi_dev_get_pci_throughput (
    amdsmi_device_handle device_handle,
    uint64_t * sent,
    uint64_t * received,
    uint64_t * max_pkt_sz )
```

Get PCIe traffic information.

Give a device handle `device_handle` and pointers to a `uint64_t`'s, `sent`, `received` and `max_pkt_sz`, this function will write the number of bytes sent and received in 1 second to `sent` and `received`, respectively. The maximum possible packet size will be written to `max_pkt_sz`.

Parameters

in	<i>device_handle</i>	a device handle
in, out	<i>sent</i>	a pointer to <code>uint64_t</code> to which the number of bytes sent will be written in 1 second. If pointer is NULL, it will be ignored.
in, out	<i>received</i>	a pointer to <code>uint64_t</code> to which the number of bytes received will be written. If pointer is NULL, it will be ignored.
in, out	<i>max_pkt_sz</i>	a pointer to <code>uint64_t</code> to which the maximum packet size will be written. If pointer is NULL, it will be ignored.

Returns

[amdsmi_status_t](#) | [AMDSMI_STATUS_SUCCESS](#) on success, non-zero on fail

6.4.2.5 amdsmi_dev_get_pci_replay_counter()

```
amdsmi_status_t amdsmi_dev_get_pci_replay_counter (
    amdsmi_device_handle device_handle,
    uint64_t * counter )
```

Get PCIe replay counter.

Given a device handle `device_handle` and a pointer to a `uint64_t` `counter`, this function will write the sum of the number of NAK's received by the GPU and the NAK's generated by the GPU to memory pointed to by `counter`.

Parameters

in	<i>device_handle</i>	a device handle
in, out	<i>counter</i>	a pointer to <code>uint64_t</code> to which the sum of the NAK's received and generated by the GPU is written. If this parameter is <code>nullptr</code> , this function will return <code>AMDSMI_STATUS_INVALID</code> if the function is supported with the provided arguments and <code>AMDSMI_STATUS_NOT_SUPPORTED</code> if it is not supported with the provided arguments.

Returns

`amdsmi_status_t` | `AMDSMI_STATUS_SUCCESS` on success, non-zero on fail

6.5 PCIe Control

These functions provide some control over PCIe.

Functions

- [amdsmi_status_t](#) [amdsmi_dev_set_pci_bandwidth](#) ([amdsmi_device_handle](#) device_handle, [uint64_t](#) bw_bitmask)

Control the set of allowed PCIe bandwidths that can be used.

6.5.1 Detailed Description

These functions provide some control over PCIe.

6.5.2 Function Documentation

6.5.2.1 [amdsmi_dev_set_pci_bandwidth\(\)](#)

```
amdsmi_status_t amdsmi_dev_set_pci_bandwidth (
    amdsmi_device_handle device_handle,
    uint64_t bw_bitmask )
```

Control the set of allowed PCIe bandwidths that can be used.

Given a device handle [device_handle](#) and a 64 bit bitmask [bw_bitmask](#), this function will limit the set of allowable bandwidths. If a bit in [bw_bitmask](#) has a value of 1, then the frequency (as ordered in an [amdsmi_frequencies_t](#) returned by :: [amdsmi_dev_get_gpu_clk_freq\(\)](#)) corresponding to that bit index will be allowed.

This function will change the performance level to [AMDSMI_DEV_PERF_LEVEL_MANUAL](#) in order to modify the set of allowable bandwidths. Caller will need to set to [AMDSMI_DEV_PERF_LEVEL_AUTO](#) in order to get back to default state.

All bits with indices greater than or equal to the value of the [amdsmi_frequencies_t::num_supported](#) field of [amdsmi_pcie_bandwidth_t](#) will be ignored.

Note

This function requires root access

Parameters

in	device_handle	a device handle
in	bw_bitmask	A bitmask indicating the indices of the bandwidths that are to be enabled (1) and disabled (0). Only the lowest amdsmi_frequencies_t::num_supported (of amdsmi_pcie_bandwidth_t) bits of this mask are relevant.

Returns

`amdsmi_status_t` | `AMDSMI_STATUS_SUCCESS` on success, non-zero on fail

6.6 Power Queries

These functions provide information about power usage.

Functions

- `amdsmi_status_t amdsmi_dev_get_power_ave` (`amdsmi_device_handle` device_handle, `uint32_t` sensor_ind, `uint64_t` *power)
Get the average power consumption of a device.
- `amdsmi_status_t amdsmi_dev_get_energy_count` (`amdsmi_device_handle` device_handle, `uint64_t` *power, `float` *counter_resolution, `uint64_t` *timestamp)
Get the energy accumulator counter of the device with provided device handle.

6.6.1 Detailed Description

These functions provide information about power usage.

6.6.2 Function Documentation

6.6.2.1 amdsmi_dev_get_power_ave()

```
amdsmi_status_t amdsmi_dev_get_power_ave (
    amdsmi_device_handle device_handle,
    uint32_t sensor_ind,
    uint64_t * power )
```

Get the average power consumption of a device.

This function will write the current average power consumption (in microwatts) to the `uint64_t` pointed to by `power`, for the given device handle `device_handle` and a pointer to a `uint64_t` `power`

Parameters

in	<i>device_handle</i>	a device handle
in	<i>sensor_ind</i>	a 0-based sensor index. Normally, this will be 0. If a device has more than one sensor, it could be greater than 0.
in, out	<i>power</i>	a pointer to <code>uint64_t</code> to which the average power consumption will be written If this parameter is nullptr, this function will return <code>AMDSMI_STATUS_INVALID</code> if the function is supported with the provided, arguments and <code>AMDSMI_STATUS_NOT_SUPPORTED</code> if it is not supported with the provided arguments.

Returns

`amdsmi_status_t` | `AMDSMI_STATUS_SUCCESS` on success, non-zero on fail

6.6.2.2 amdsmi_dev_get_energy_count()

```
amdsmi_status_t amdsmi_dev_get_energy_count (
    amdsmi_device_handle device_handle,
    uint64_t * power,
    float * counter_resolution,
    uint64_t * timestamp )
```

Get the energy accumulator counter of the device with provided device handle.

Given a device handle `device_handle`, a pointer to a `uint64_t` `power`, and a pointer to a `uint64_t` `timestamp`, this function will write amount of energy consumed to the `uint64_t` pointed to by `power`, and the timestamp to the `uint64_t` pointed to by `timestamp`. The `amdsmi_dev_get_power_ave()` is an average of a short time. This function accumulates all energy consumed.

Parameters

in	<code>device_handle</code>	a device handle
in, out	<code>counter_resolution</code>	resolution of the counter <code>power</code> in micro Joules
in, out	<code>power</code>	a pointer to <code>uint64_t</code> to which the energy counter will be written. If this parameter is nullptr, this function will return <code>AMDSMI_STATUS_INVALID</code> if the function is supported with the provided, and <code>AMDSMI_STATUS_NOT_SUPPORTED</code> if it is not supported with the provided arguments.
in, out	<code>timestamp</code>	a pointer to <code>uint64_t</code> to which the timestamp will be written. Resolution: 1 ns.

Returns

`amdsmi_status_t` | `AMDSMI_STATUS_SUCCESS` on success, non-zero on fail

6.7 Power Control

These functions provide ways to control power usage.

Functions

- [amdsmi_status_t](#) [amdsmi_dev_set_power_cap](#) ([amdsmi_device_handle](#) device_handle, [uint32_t](#) sensor_ind, [uint64_t](#) cap)
Set the maximum gpu power cap value.
- [amdsmi_status_t](#) [amdsmi_dev_set_power_profile](#) ([amdsmi_device_handle](#) device_handle, [uint32_t](#) reserved, [amdsmi_power_profile_preset_masks_t](#) profile)
Set the power performance profile.

6.7.1 Detailed Description

These functions provide ways to control power usage.

6.7.2 Function Documentation

6.7.2.1 [amdsmi_dev_set_power_cap\(\)](#)

```
amdsmi_status_t amdsmi_dev_set_power_cap (
    amdsmi\_device\_handle device_handle,
    uint32\_t sensor_ind,
    uint64\_t cap )
```

Set the maximum gpu power cap value.

This function will set the power cap to the provided value `cap`. `cap` must be between the minimum and maximum power cap values set by the system, which can be obtained from `::amdsmi_dev_power_cap_range_get`.

Parameters

in	<i>device_handle</i>	a device handle
in	<i>sensor_ind</i>	a 0-based sensor index. Normally, this will be 0. If a device has more than one sensor, it could be greater than 0.
in	<i>cap</i>	a uint64_t that indicates the desired power cap, in microwatts

Returns

[amdsmi_status_t](#) | [AMDSMI_STATUS_SUCCESS](#) on success, non-zero on fail

6.7.2.2 amdsmi_dev_set_power_profile()

```
amdsmi_status_t amdsmi_dev_set_power_profile (
    amdsmi_device_handle device_handle,
    uint32_t reserved,
    amdsmi_power_profile_preset_masks_t profile )
```

Set the power performance profile.

This function will attempt to set the current profile to the provided profile, given a device handle `device_handle` and a `profile`. The provided profile must be one of the currently supported profiles, as indicated by a call to `::amdsmi_dev_get_power_profile_presets()`

Parameters

in	<i>device_handle</i>	a device handle
in	<i>reserved</i>	Not currently used. Set to 0.
in	<i>profile</i>	a <code>amdsmi_power_profile_preset_masks_t</code> that hold the mask of the desired new power profile

Returns

`amdsmi_status_t` | `AMDSMI_STATUS_SUCCESS` on success, non-zero on fail

6.8 Memory Queries

These functions provide information about memory systems.

Functions

- `amdsmi_status_t amdsmi_dev_get_memory_total (amdsmi_device_handle device_handle, amdsmi_memory_type_t mem_type, uint64_t *total)`
Get the total amount of memory that exists.
- `amdsmi_status_t amdsmi_dev_get_memory_usage (amdsmi_device_handle device_handle, amdsmi_memory_type_t mem_type, uint64_t *used)`
Get the current memory usage.
- `amdsmi_status_t amdsmi_get_bad_page_info (amdsmi_device_handle device_handle, uint32_t *num_pages, amdsmi_retired_page_record_t *info)`
The first call to this API returns the number of bad pages which should be used to allocate the buffer that should contain the bad page records.
- `amdsmi_status_t amdsmi_get_ras_block_features_enabled (amdsmi_device_handle device_handle, amdsmi_gpu_block_t block, amdsmi_ras_err_state_t *state)`
Returns if RAS features are enabled or disabled for given block.
- `amdsmi_status_t amdsmi_dev_get_memory_busy_percent (amdsmi_device_handle device_handle, uint32_t *busy_percent)`
Get percentage of time any device memory is being used.
- `amdsmi_status_t amdsmi_dev_get_memory_reserved_pages (amdsmi_device_handle device_handle, uint32_t *num_pages, amdsmi_retired_page_record_t *records)`
Get information about reserved ("retired") memory pages.

6.8.1 Detailed Description

These functions provide information about memory systems.

6.8.2 Function Documentation

6.8.2.1 amdsmi_dev_get_memory_total()

```
amdsmi_status_t amdsmi_dev_get_memory_total (
    amdsmi_device_handle device_handle,
    amdsmi_memory_type_t mem_type,
    uint64_t * total )
```

Get the total amount of memory that exists.

Given a device handle `device_handle`, a type of memory `mem_type`, and a pointer to a `uint64_t total`, this function will write the total amount of `mem_type` memory that exists to the location pointed to by `total`.

Parameters

in	<i>device_handle</i>	a device handle
in	<i>mem_type</i>	The type of memory for which the total amount will be found
in, out	<i>total</i>	a pointer to <code>uint64_t</code> to which the total amount of memory will be written. If this parameter is <code>nullptr</code> , this function will return <code>AMDSMI_STATUS_INVALID</code> if the function is supported with the provided arguments and <code>AMDSMI_STATUS_NOT_SUPPORTED</code> if it is not supported with the provided arguments.

Returns

`amdsmi_status_t` | `AMDSMI_STATUS_SUCCESS` on success, non-zero on fail

6.8.2.2 `amdsmi_dev_get_memory_usage()`

```
amdsmi_status_t amsmi_dev_get_memory_usage (
    amsmi_device_handle device_handle,
    amsmi_memory_type_t mem_type,
    uint64_t * used )
```

Get the current memory usage.

This function will write the amount of `mem_type` memory that is currently being used to the location pointed to by `used`.

Parameters

in	<i>device_handle</i>	a device handle
in	<i>mem_type</i>	The type of memory for which the amount being used will be found
in, out	<i>used</i>	a pointer to <code>uint64_t</code> to which the amount of memory currently being used will be written. If this parameter is <code>nullptr</code> , this function will return <code>AMDSMI_STATUS_INVALID</code> if the function is supported with the provided arguments and <code>AMDSMI_STATUS_NOT_SUPPORTED</code> if it is not supported with the provided arguments.

Returns

`amdsmi_status_t` | `AMDSMI_STATUS_SUCCESS` on success, non-zero on fail

6.8.2.3 `amdsmi_get_bad_page_info()`

```
amdsmi_status_t amsmi_get_bad_page_info (
    amsmi_device_handle device_handle,
    uint32_t * num_pages,
    amsmi_retired_page_record_t * info )
```

The first call to this API returns the number of bad pages which should be used to allocate the buffer that should contain the bad page records.

This call will query the device `device_handle` for the number of bad pages (written to `num_pages` address). The results are written to address held by the `info` pointer.

Parameters

in	<i>device_handle</i>	a device handle
out	<i>num_pages</i>	Number of bad page records.
out	<i>info</i>	The results will be written to the amdsmi_retired_page_record_t pointer.

Returns

[amdsmi_status_t](#) | [AMDSMI_STATUS_SUCCESS](#) on success, non-zero on fail

6.8.2.4 amdsmi_get_ras_block_features_enabled()

```
amdsmi_status_t amdsmi_get_ras_block_features_enabled (
    amdsmi_device_handle device_handle,
    amdsmi_gpu_block_t block,
    amdsmi_ras_err_state_t * state )
```

Returns if RAS features are enabled or disabled for given block.

Given a device handle `device_handle`, this function queries the state of RAS features for a specific block `block`. Result will be written to address held by pointer `state`.

Parameters

in	<i>device_handle</i>	Device handle which to query
in	<i>block</i>	Block which to query
in, out	<i>state</i>	A pointer to amdsmi_ras_err_state_t to which the state of block will be written. If this parameter is nullptr, this function will return AMDSMI_STATUS_INVALID if the function is supported with the provided arguments and AMDSMI_STATUS_NOT_SUPPORTED if it is not supported with the provided arguments.

Returns

[amdsmi_status_t](#) | [AMDSMI_STATUS_SUCCESS](#) on success, non-zero on fail

6.8.2.5 amdsmi_dev_get_memory_busy_percent()

```
amdsmi_status_t amdsmi_dev_get_memory_busy_percent (
    amdsmi_device_handle device_handle,
    uint32_t * busy_percent )
```

Get percentage of time any device memory is being used.

Given a device handle `device_handle`, this function returns the percentage of time that any device memory is being used for the specified device.

Parameters

in	<i>device_handle</i>	a device handle
in, out	<i>busy_percent</i>	a pointer to the <code>uint32_t</code> to which the busy percent will be written. If this parameter is <code>nullptr</code> , this function will return <code>AMDSMI_STATUS_INVALID</code> if the function is supported with the provided arguments and <code>AMDSMI_STATUS_NOT_SUPPORTED</code> if it is not supported with the provided arguments.

Returns

`amdsmi_status_t` | `AMDSMI_STATUS_SUCCESS` on success, non-zero on fail

6.8.2.6 `amdsmi_dev_get_memory_reserved_pages()`

```
amdsmi_status_t amsmi_dev_get_memory_reserved_pages (
    amdsmi_device_handle device_handle,
    uint32_t * num_pages,
    amdsmi_retired_page_record_t * records )
```

Get information about reserved ("retired") memory pages.

Given a device handle `device_handle`, this function returns retired page information `records` corresponding to the device with the provided device handle `device_handle`. The number of retired page records is returned through `num_pages`. `records` may be `NULL` on input. In this case, the number of records available for retrieval will be returned through `num_pages`.

Parameters

in	<i>device_handle</i>	a device handle
in, out	<i>num_pages</i>	a pointer to a <code>uint32</code> . As input, the value passed through this parameter is the number of <code>amdsmi_retired_page_record_t</code> 's that may be safely written to the memory pointed to by <code>records</code> . This is the limit on how many records will be written to <code>records</code> . On return, <code>num_pages</code> will contain the number of records written to <code>records</code> , or the number of records that could have been written if enough memory had been provided. If this parameter is <code>nullptr</code> , this function will return <code>AMDSMI_STATUS_INVALID</code> if the function is supported with the provided arguments and <code>AMDSMI_STATUS_NOT_SUPPORTED</code> if it is not supported with the provided arguments.
in, out	<i>records</i>	A pointer to a block of memory to which the <code>amdsmi_retired_page_record_t</code> values will be written. This value may be <code>NULL</code> . In this case, this function can be used to query how many records are available to read.

Returns

[amdsmi_status_t](#) | [AMDSMI_STATUS_SUCCESS](#) on success, non-zero on fail

6.9 Physical State Queries

These functions provide information about the physical characteristics of the device.

Functions

- `amdsmi_status_t amdsmi_dev_get_fan_rpms (amdsmi_device_handle device_handle, uint32_t sensor_ind, int64_t *speed)`
Get the fan speed in RPMs of the device with the specified device handle and 0-based sensor index.
- `amdsmi_status_t amdsmi_dev_get_fan_speed (amdsmi_device_handle device_handle, uint32_t sensor_ind, int64_t *speed)`
Get the fan speed for the specified device as a value relative to [AMDSMI_MAX_FAN_SPEED](#).
- `amdsmi_status_t amdsmi_dev_get_fan_speed_max (amdsmi_device_handle device_handle, uint32_t sensor_ind, uint64_t *max_speed)`
Get the max. fan speed of the device with provided device handle.
- `amdsmi_status_t amdsmi_dev_get_temp_metric (amdsmi_device_handle device_handle, amdsmi_temperature_type_t sensor_type, amdsmi_temperature_metric_t metric, int64_t *temperature)`
Get the temperature metric value for the specified metric, from the specified temperature sensor on the specified device.
- `amdsmi_status_t amdsmi_dev_get_volt_metric (amdsmi_device_handle device_handle, amdsmi_voltage_type_t sensor_type, amdsmi_voltage_metric_t metric, int64_t *voltage)`
Get the voltage metric value for the specified metric, from the specified voltage sensor on the specified device.

6.9.1 Detailed Description

These functions provide information about the physical characteristics of the device.

6.9.2 Function Documentation

6.9.2.1 amdsmi_dev_get_fan_rpms()

```
amdsmi_status_t amdsmi_dev_get_fan_rpms (
    amdsmi_device_handle device_handle,
    uint32_t sensor_ind,
    int64_t * speed )
```

Get the fan speed in RPMs of the device with the specified device handle and 0-based sensor index.

Given a device handle `device_handle` and a pointer to a `uint32_t` `speed`, this function will write the current fan speed in RPMs to the `uint32_t` pointed to by `speed`

Parameters

in	<code>device_handle</code>	a device handle
in	<code>sensor_ind</code>	a 0-based sensor index. Normally, this will be 0. If a device has more than one sensor, it could be greater than 0.
in, out	<code>speed</code>	a pointer to <code>uint32_t</code> to which the speed will be written If this parameter is nullptr, this function will return AMDSMI_STATUS_INVALID if the function is supported with the provided, arguments and AMDSMI_STATUS_NOT_SUPPORTED if it is not supported with the provided arguments.
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Returns

[amdsmi_status_t](#) | [AMDSMI_STATUS_SUCCESS](#) on success, non-zero on fail

6.9.2.2 amdsmi_dev_get_fan_speed()

```
amdsmi_status_t amdsmi_dev_get_fan_speed (
    amdsmi_device_handle device_handle,
    uint32_t sensor_ind,
    int64_t * speed )
```

Get the fan speed for the specified device as a value relative to [AMDSMI_MAX_FAN_SPEED](#).

Given a device handle `device_handle` and a pointer to a `uint32_t` `speed`, this function will write the current fan speed (a value between 0 and the maximum fan speed, [AMDSMI_MAX_FAN_SPEED](#)) to the `uint32_t` pointed to by `speed`

Parameters

in	<i>device_handle</i>	a device handle
in	<i>sensor_ind</i>	a 0-based sensor index. Normally, this will be 0. If a device has more than one sensor, it could be greater than 0.
in, out	<i>speed</i>	a pointer to <code>uint32_t</code> to which the speed will be written. If this parameter is nullptr, this function will return AMDSMI_STATUS_INVALID if the function is supported with the provided arguments and AMDSMI_STATUS_NOT_SUPPORTED if it is not supported with the provided arguments.

Returns

[amdsmi_status_t](#) | [AMDSMI_STATUS_SUCCESS](#) on success, non-zero on fail

6.9.2.3 amdsmi_dev_get_fan_speed_max()

```
amdsmi_status_t amdsmi_dev_get_fan_speed_max (
    amdsmi_device_handle device_handle,
    uint32_t sensor_ind,
    uint64_t * max_speed )
```

Get the max. fan speed of the device with provided device handle.

Given a device handle `device_handle` and a pointer to a `uint32_t` `max_speed`, this function will write the maximum fan speed possible to the `uint32_t` pointed to by `max_speed`

Parameters

in	<i>device_handle</i>	a device handle
in	<i>sensor_ind</i>	a 0-based sensor index. Normally, this will be 0. If a device has more than one sensor, it could be greater than 0.
in, out	<i>max_speed</i>	a pointer to <code>uint32_t</code> to which the maximum speed will be written. If this parameter is nullptr, this function will return AMDSMI_STATUS_INVALID if the function is supported with the provided arguments and AMDSMI_STATUS_NOT_SUPPORTED if it is not supported with the provided arguments.

Returns

`amdsmi_status_t` | `AMDSMI_STATUS_SUCCESS` on success, non-zero on fail

6.9.2.4 `amdsmi_dev_get_temp_metric()`

```
amdsmi_status_t amdsmi_dev_get_temp_metric (
    amdsmi_device_handle device_handle,
    amdsmi_temperature_type_t sensor_type,
    amdsmi_temperature_metric_t metric,
    int64_t * temperature )
```

Get the temperature metric value for the specified metric, from the specified temperature sensor on the specified device.

Given a device handle `device_handle`, a sensor type `sensor_type`, a `amdsmi_temperature_metric_t` `metric` and a pointer to an `int64_t` `temperature`, this function will write the value of the metric indicated by `metric` and `sensor_type` to the memory location `temperature`.

Parameters

in	<code>device_handle</code>	a device handle
in	<code>sensor_type</code>	part of device from which temperature should be obtained. This should come from the enum <code>amdsmi_temperature_type_t</code>
in	<code>metric</code>	enum indicated which temperature value should be retrieved
in, out	<code>temperature</code>	a pointer to <code>int64_t</code> to which the temperature will be written, in millidegrees Celcius. If this parameter is nullptr, this function will return <code>AMDSMI_STATUS_INVALID</code> if the function is supported with the provided arguments and <code>AMDSMI_STATUS_NOT_SUPPORTED</code> if it is not supported with the provided arguments.

Returns

`amdsmi_status_t` | `AMDSMI_STATUS_SUCCESS` on success, non-zero on fail

6.9.2.5 `amdsmi_dev_get_volt_metric()`

```
amdsmi_status_t amdsmi_dev_get_volt_metric (
    amdsmi_device_handle device_handle,
    amdsmi_voltage_type_t sensor_type,
    amdsmi_voltage_metric_t metric,
    int64_t * voltage )
```

Get the voltage metric value for the specified metric, from the specified voltage sensor on the specified device.

Given a device handle `device_handle`, a sensor type `sensor_type`, a `amdsmi_voltage_metric_t` `metric` and a pointer to an `int64_t` `voltage`, this function will write the value of the metric indicated by `metric` and `sensor_type` to the memory location `voltage`.

Parameters

in	<i>device_handle</i>	a device handle
in	<i>sensor_type</i>	part of device from which voltage should be obtained. This should come from the enum amdsmi_voltage_type_t
in	<i>metric</i>	enum indicated which voltage value should be retrieved
in, out	<i>voltage</i>	a pointer to <code>int64_t</code> to which the voltage will be written, in millivolts. If this parameter is <code>nullptr</code> , this function will return AMDSMI_STATUS_INVALID if the function is supported with the provided arguments and AMDSMI_STATUS_NOT_SUPPORTED if it is not supported with the provided arguments.

Returns

[amdsmi_status_t](#) | [AMDSMI_STATUS_SUCCESS](#) on success, non-zero on fail

6.10 Physical State Control

These functions provide control over the physical state of a device.

Functions

- `amdsmi_status_t amdsmi_dev_reset_fan (amdsmi_device_handle device_handle, uint32_t sensor_ind)`
Reset the fan to automatic driver control.
- `amdsmi_status_t amdsmi_dev_set_fan_speed (amdsmi_device_handle device_handle, uint32_t sensor_ind, uint64_t speed)`
Set the fan speed for the specified device with the provided speed, in RPMs.

6.10.1 Detailed Description

These functions provide control over the physical state of a device.

6.10.2 Function Documentation

6.10.2.1 amdsmi_dev_reset_fan()

```
amdsmi_status_t amdsmi_dev_reset_fan (
    amdsmi_device_handle device_handle,
    uint32_t sensor_ind )
```

Reset the fan to automatic driver control.

This function returns control of the fan to the system

Parameters

in	<i>device_handle</i>	a device handle
in	<i>sensor_ind</i>	a 0-based sensor index. Normally, this will be 0. If a device has more than one sensor, it could be greater than 0.

Returns

`amdsmi_status_t` | `AMDSMI_STATUS_SUCCESS` on success, non-zero on fail

6.10.2.2 amdsmi_dev_set_fan_speed()

```
amdsmi_status_t amdsmi_dev_set_fan_speed (
    amdsmi_device_handle device_handle,
```

```
uint32_t sensor_ind,  
uint64_t speed )
```

Set the fan speed for the specified device with the provided speed, in RPMs.

Given a device handle `device_handle` and a integer value indicating speed `speed`, this function will attempt to set the fan speed to `speed`. An error will be returned if the specified speed is outside the allowable range for the device. The maximum value is 255 and the minimum is 0.

Note

This function requires root access

Parameters

in	<i>device_handle</i>	a device handle
in	<i>sensor_ind</i>	a 0-based sensor index. Normally, this will be 0. If a device has more than one sensor, it could be greater than 0.
in	<i>speed</i>	the speed to which the function will attempt to set the fan

Returns

[amdsmi_status_t](#) | [AMDSMI_STATUS_SUCCESS](#) on success, non-zero on fail

6.11 Clock, Power and Performance Queries

These functions provide information about clock frequencies and performance.

Functions

- `amdsmi_status_t amdsmi_dev_get_busy_percent (amdsmi_device_handle device_handle, uint32_t *busy_percent)`
Get percentage of time device is busy doing any processing.
- `amdsmi_status_t amdsmi_get_utilization_count (amdsmi_device_handle device_handle, amdsmi_utilization_counter_t utilization_counters[], uint32_t count, uint64_t *timestamp)`
Get coarse grain utilization counter of the specified device.
- `amdsmi_status_t amdsmi_get_pcie_link_status (amdsmi_device_handle device_handle, amdsmi_pcie_info_t *info)`
Get current PCIe info of the device with provided device handle.
- `amdsmi_status_t amdsmi_get_pcie_link_caps (amdsmi_device_handle device_handle, amdsmi_pcie_info_t *info)`
Get max PCIe capabilities of the device with provided device handle.
- `amdsmi_status_t amdsmi_dev_get_perf_level (amdsmi_device_handle device_handle, amdsmi_dev_perf_level_t *perf)`
Get the performance level of the device.
- `amdsmi_status_t amdsmi_set_perf_determinism_mode (amdsmi_device_handle device_handle, uint64_t clkvalue)`
Enter performance determinism mode with provided device handle.
- `amdsmi_status_t amdsmi_dev_get_overdrive_level (amdsmi_device_handle device_handle, uint32_t *od)`
Get the overdrive percent associated with the device with provided device handle.
- `amdsmi_status_t amdsmi_dev_get_gpu_clk_freq (amdsmi_device_handle device_handle, amdsmi_clk_type_t clk_type, amdsmi_frequencies_t *f)`
Get the list of possible system clock speeds of device for a specified clock type.
- `amdsmi_status_t amdsmi_dev_reset_gpu (amdsmi_device_handle device_handle)`
Reset the gpu associated with the device with provided device handle.
- `amdsmi_status_t amdsmi_dev_get_od_volt_info (amdsmi_device_handle device_handle, amdsmi_od_volt_freq_data_t *odv)`
This function retrieves the voltage/frequency curve information.
- `amdsmi_status_t amdsmi_dev_get_gpu_metrics_info (amdsmi_device_handle device_handle, amdsmi_gpu_metrics_t *pgpu_metrics)`
This function retrieves the gpu metrics information.
- `amdsmi_status_t amdsmi_dev_set_clk_range (amdsmi_device_handle device_handle, uint64_t minclkvalue, uint64_t maxclkvalue, amdsmi_clk_type_t clkType)`
This function sets the clock range information.
- `amdsmi_status_t amdsmi_dev_set_od_clk_info (amdsmi_device_handle device_handle, amdsmi_freq_ind_t level, uint64_t clkvalue, amdsmi_clk_type_t clkType)`
This function sets the clock frequency information.
- `amdsmi_status_t amdsmi_dev_set_od_volt_info (amdsmi_device_handle device_handle, uint32_t vpoint, uint64_t clkvalue, uint64_t voltvalue)`
This function sets 1 of the 3 voltage curve points.
- `amdsmi_status_t amdsmi_dev_get_od_volt_curve_regions (amdsmi_device_handle device_handle, uint32_t *num_regions, amdsmi_freq_volt_region_t *buffer)`
This function will retrieve the current valid regions in the frequency/voltage space.
- `amdsmi_status_t amdsmi_dev_get_power_profile_presets (amdsmi_device_handle device_handle, uint32_t sensor_ind, amdsmi_power_profile_status_t *status)`
Get the list of available preset power profiles and an indication of which profile is currently active.

6.11.1 Detailed Description

These functions provide information about clock frequencies and performance.

6.11.2 Function Documentation

6.11.2.1 amdsmi_dev_get_busy_percent()

```
amdsmi_status_t amdsmi_dev_get_busy_percent (
    amdsmi_device_handle device_handle,
    uint32_t * busy_percent )
```

Get percentage of time device is busy doing any processing.

Given a device handle `device_handle`, this function returns the percentage of time that the specified device is busy. The device is considered busy if any one or more of its sub-blocks are working, and idle if none of the sub-blocks are working.

Parameters

in	<i>device_handle</i>	a device handle
in, out	<i>busy_percent</i>	a pointer to the <code>uint32_t</code> to which the busy percent will be written. If this parameter is nullptr, this function will return <code>AMDSMI_STATUS_INVALID</code> if the function is supported with the provided arguments and <code>AMDSMI_STATUS_NOT_SUPPORTED</code> if it is not supported with the provided arguments.

Returns

`amdsmi_status_t` | `AMDSMI_STATUS_SUCCESS` on success, non-zero on fail

6.11.2.2 amdsmi_get_utilization_count()

```
amdsmi_status_t amdsmi_get_utilization_count (
    amdsmi_device_handle device_handle,
    amdsmi_utilization_counter_t utilization_counters[],
    uint32_t count,
    uint64_t * timestamp )
```

Get coarse grain utilization counter of the specified device.

Given a device handle `device_handle`, the array of the utilization counters, the size of the array, this function returns the coarse grain utilization counters and timestamp. The counter is the accumulated percentages. Every milliseconds the firmware calculates % busy count and then accumulates that value in the counter. This provides minimally invasive coarse grain GPU usage information.

Parameters

in	<i>device_handle</i>	a device handle
in, out	<i>utilization_counters</i>	Multiple utilization counters can be retrieved with a single call. The caller must allocate enough space to the <i>utilization_counters</i> array. The caller also needs to set valid <code>AMDSMI_UTILIZATION_COUNTER_TYPE</code> type for each element of the array. <code>AMDSMI_STATUS_NOT_SUPPORTED</code> if it is not supported with the provided arguments.

If the function returns `AMDSMI_STATUS_SUCCESS`, the counter will be set in the value field of the `amdsmi_utilization_counter_t`.

Parameters

in	<i>count</i>	The size of <i>utilization_counters</i> array.
----	--------------	--

Returns

`amdsmi_status_t` | `AMDSMI_STATUS_SUCCESS` on success, non-zero on fail

6.11.2.3 `amdsmi_get_pcie_link_status()`

```
amdsmi_status_t amdsmi_get_pcie_link_status (
    amdsmi_device_handle device_handle,
    amdsmi_pcie_info_t * info )
```

Get current PCIe info of the device with provided device handle.

Given a device handle *device_handle*, this function returns PCIe info of the given device.

Parameters

in	<i>device_handle</i>	a device handle
out	<i>info</i>	<code>amdsmi_pcie_info_t</code> struct which will hold all the extracted PCIe info data.

Returns

`amdsmi_status_t` | `AMDSMI_STATUS_SUCCESS` on success, non-zero on fail

6.11.2.4 `amdsmi_get_pcie_link_caps()`

```
amdsmi_status_t amdsmi_get_pcie_link_caps (
    amdsmi_device_handle device_handle,
    amdsmi_pcie_info_t * info )
```

Get max PCIe capabilities of the device with provided device handle.

Given a device handle *device_handle*, this function returns PCIe caps info of the given device.

Parameters

in	<i>device_handle</i>	a device handle
out	<i>info</i>	amdsmi_pcie_info_t struct which will hold all the extracted PCIe caps data.

Returns

[amdsmi_status_t](#) | [AMDSMI_STATUS_SUCCESS](#) on success, non-zero on fail

6.11.2.5 [amdsmi_dev_get_perf_level\(\)](#)

```
amdsmi_status_t amdsmi_dev_get_perf_level (
    amdsmi_device_handle device_handle,
    amdsmi_dev_perf_level_t * perf )
```

Get the performance level of the device.

This function will write the [amdsmi_dev_perf_level_t](#) to the [uint32_t](#) pointed to by *perf*, for a given device handle *device_handle* and a pointer to a [uint32_t](#) *perf*.

Parameters

in	<i>device_handle</i>	a device handle
in, out	<i>perf</i>	a pointer to amdsmi_dev_perf_level_t to which the performance level will be written. If this parameter is nullptr, this function will return AMDSMI_STATUS_INVALID if the function is supported with the provided arguments and AMDSMI_STATUS_NOT_SUPPORTED if it is not supported with the provided arguments.

Returns

[amdsmi_status_t](#) | [AMDSMI_STATUS_SUCCESS](#) on success, non-zero on fail

6.11.2.6 [amdsmi_set_perf_determinism_mode\(\)](#)

```
amdsmi_status_t amdsmi_set_perf_determinism_mode (
    amdsmi_device_handle device_handle,
    uint64_t clkvalue )
```

Enter performance determinism mode with provided device handle.

Given a device handle *device_handle* and *clkvalue* this function will enable performance determinism mode, which enforces a GFXCLK frequency SoftMax limit per GPU set by the user. This prevents the GFXCLK PLL from stretching when running the same workload on different GPUs, making performance variation minimal. This call will result in the performance level [amdsmi_dev_perf_level_t](#) of the device being [AMDSMI_DEV_PERF_LEVEL_DETERMINISM](#).

Parameters

in	<i>device_handle</i>	a device handle
in	<i>clkvalue</i>	Softmax value for GFXCLK in MHz.

Returns

[amdsmi_status_t](#) | [AMDSMI_STATUS_SUCCESS](#) on success, non-zero on fail

6.11.2.7 amdsmi_dev_get_overdrive_level()

```
amdsmi_status_t amdsmi_dev_get_overdrive_level (
    amdsmi_device_handle device_handle,
    uint32_t * od )
```

Get the overdrive percent associated with the device with provided device handle.

Given a device handle *device_handle* and a pointer to a `uint32_t` *od*, this function will write the overdrive percentage to the `uint32_t` pointed to by *od*

Parameters

in	<i>device_handle</i>	a device handle
in, out	<i>od</i>	a pointer to <code>uint32_t</code> to which the overdrive percentage will be written. If this parameter is nullptr, this function will return AMDSMI_STATUS_INVALID if the function is supported with the provided arguments and AMDSMI_STATUS_NOT_SUPPORTED if it is not supported with the provided arguments.

Returns

[amdsmi_status_t](#) | [AMDSMI_STATUS_SUCCESS](#) on success, non-zero on fail

6.11.2.8 amdsmi_dev_get_gpu_clk_freq()

```
amdsmi_status_t amdsmi_dev_get_gpu_clk_freq (
    amdsmi_device_handle device_handle,
    amdsmi_clk_type_t clk_type,
    amdsmi_frequencies_t * f )
```

Get the list of possible system clock speeds of device for a specified clock type.

Given a device handle *device_handle*, a clock type *clk_type*, and a pointer to a `amdsmi_frequencies_t` structure *f*, this function will fill in *f* with the possible clock speeds, and indication of the current clock speed selection.

Parameters

in	<i>device_handle</i>	a device handle
in	<i>clk_type</i>	the type of clock for which the frequency is desired
in, out	<i>f</i>	a pointer to a caller provided amdsmi_frequencies_t structure to which the frequency information will be written. Frequency values are in Hz.

Returns

[amdsmi_status_t](#) | [AMDSMI_STATUS_SUCCESS](#) on success, non-zero on fail

6.11.2.9 amdsmi_dev_reset_gpu()

```
amdsmi_status_t amdsmi_dev_reset_gpu (
    amdsmi_device_handle device_handle )
```

Reset the gpu associated with the device with provided device handle.

Given a device handle *device_handle*, this function will reset the GPU

Parameters

in	<i>device_handle</i>	a device handle
----	----------------------	-----------------

Returns

[amdsmi_status_t](#) | [AMDSMI_STATUS_SUCCESS](#) on success, non-zero on fail

6.11.2.10 amdsmi_dev_get_od_volt_info()

```
amdsmi_status_t amdsmi_dev_get_od_volt_info (
    amdsmi_device_handle device_handle,
    amdsmi_od_volt_freq_data_t * odv )
```

This function retrieves the voltage/frequency curve information.

Given a device handle *device_handle* and a pointer to a [amdsmi_od_volt_freq_data_t](#) structure *odv*, this function will populate *odv*. See [amdsmi_od_volt_freq_data_t](#) for more details.

Parameters

in	<i>device_handle</i>	a device handle
in, out	<i>odv</i>	a pointer to an amdsmi_od_volt_freq_data_t structure If this parameter is nullptr, this function will return AMDSMI_STATUS_INVALID if the function is supported with the provided arguments and AMDSMI_STATUS_NOT_SUPPORTED if it is not supported with the provided arguments.

Returns

`amdsmi_status_t` | `AMDSMI_STATUS_SUCCESS` on success, non-zero on fail

6.11.2.11 `amdsmi_dev_get_gpu_metrics_info()`

```
amdsmi_status_t amdsmi_dev_get_gpu_metrics_info (
    amdsmi_device_handle device_handle,
    amdsmi_gpu_metrics_t * pgpu_metrics )
```

This function retrieves the gpu metrics information.

Given a device handle `device_handle` and a pointer to a `amdsmi_gpu_metrics_t` structure `pgpu_metrics`, this function will populate `pgpu_metrics`. See `amdsmi_gpu_metrics_t` for more details.

Parameters

in	<code>device_handle</code>	a device handle
in, out	<code>pgpu_metrics</code>	a pointer to an <code>amdsmi_gpu_metrics_t</code> structure If this parameter is nullptr, this function will return <code>AMDSMI_STATUS_INVALID</code> if the function is supported with the provided arguments and <code>AMDSMI_STATUS_NOT_SUPPORTED</code> if it is not supported with the provided arguments.

Returns

`amdsmi_status_t` | `AMDSMI_STATUS_SUCCESS` on success, non-zero on fail

6.11.2.12 `amdsmi_dev_set_clk_range()`

```
amdsmi_status_t amdsmi_dev_set_clk_range (
    amdsmi_device_handle device_handle,
    uint64_t minclkvalue,
    uint64_t maxclkvalue,
    amdsmi_clk_type_t clkType )
```

This function sets the clock range information.

Given a device handle `device_handle`, a minimum clock value `minclkvalue`, a maximum clock value `maxclkvalue` and a clock type `clkType` this function will set the `sclk|mlck` range

Parameters

in	<code>device_handle</code>	a device handle
in	<code>minclkvalue</code>	value to apply to the clock range. Frequency values are in MHz.
in	<code>maxclkvalue</code>	value to apply to the clock range. Frequency values are in MHz.
in	<code>clkType</code>	<code>AMDSMI_CLK_TYPE_SYS</code> <code>AMDSMI_CLK_TYPE_MEM</code> range type

Returns

`amdsmi_status_t` | `AMDSMI_STATUS_SUCCESS` on success, non-zero on fail

6.11.2.13 amdsmi_dev_set_od_clk_info()

```
amdsmi_status_t amdsmi_dev_set_od_clk_info (
    amdsmi_device_handle device_handle,
    amdsmi_freq_ind_t level,
    uint64_t clkvalue,
    amdsmi_clk_type_t clkType )
```

This function sets the clock frequency information.

Given a device handle `device_handle`, a frequency level `level`, a clock value `clkvalue` and a clock type `clkType` this function will set the sclk|mlck range

Parameters

in	<i>device_handle</i>	a device handle
in	<i>level</i>	AMDSMI_FREQ_IND_MIN AMDSMI_FREQ_IND_MAX to set the minimum (0) or maximum (1) speed.
in	<i>clkvalue</i>	value to apply to the clock range. Frequency values are in MHz.
in	<i>clkType</i>	AMDSMI_CLK_TYPE_SYS AMDSMI_CLK_TYPE_MEM range type

Returns

`amdsmi_status_t` | `AMDSMI_STATUS_SUCCESS` on success, non-zero on fail

6.11.2.14 amdsmi_dev_set_od_volt_info()

```
amdsmi_status_t amdsmi_dev_set_od_volt_info (
    amdsmi_device_handle device_handle,
    uint32_t vpoint,
    uint64_t clkvalue,
    uint64_t voltvalue )
```

This function sets 1 of the 3 voltage curve points.

Given a device handle `device_handle`, a voltage point `vpoint` and a voltage value `voltvalue` this function will set voltage curve point

Parameters

in	<i>device_handle</i>	a device handle
in	<i>vpoint</i>	voltage point [0 1 2] on the voltage curve
in	<i>clkvalue</i>	clock value component of voltage curve point. Frequency values are in MHz.
in	<i>voltvalue</i>	voltage value component of voltage curve point. Voltage is in mV.

Returns

`amdsmi_status_t` | `AMDSMI_STATUS_SUCCESS` on success, non-zero on fail

6.11.2.15 `amdsmi_dev_get_od_volt_curve_regions()`

```
amdsmi_status_t amdsmi_dev_get_od_volt_curve_regions (
    amdsmi_device_handle device_handle,
    uint32_t * num_regions,
    amdsmi_freq_volt_region_t * buffer )
```

This function will retrieve the current valid regions in the frequency/voltage space.

Given a device handle `device_handle`, a pointer to an unsigned integer `num_regions` and a buffer of `amdsmi_freq_volt_region_t` structures, `buffer`, this function will populate `buffer` with the current frequency-volt space regions. The caller should assign `buffer` to memory that can be written to by this function. The caller should also indicate the number of `amdsmi_freq_volt_region_t` structures that can safely be written to `buffer` in `num_regions`.

The number of regions to expect this function provide (`num_regions`) can be obtained by calling `↔ :: amdsmi_dev_get_od_volt_info()`.

Parameters

in	<code>device_handle</code>	a device handle
in, out	<code>num_regions</code>	As input, this is the number of <code>amdsmi_freq_volt_region_t</code> structures that can be written to <code>buffer</code> . As output, this is the number of <code>amdsmi_freq_volt_region_t</code> structures that were actually written. If this parameter is nullptr, this function will return <code>AMDSMI_STATUS_INVALID</code> if the function is supported with the provided arguments and <code>AMDSMI_STATUS_NOT_SUPPORTED</code> if it is not supported with the provided arguments.
in, out	<code>buffer</code>	a caller provided buffer to which <code>amdsmi_freq_volt_region_t</code> structures will be written. If this parameter is nullptr, this function will return <code>AMDSMI_STATUS_INVALID</code> if the function is supported with the provided arguments and <code>AMDSMI_STATUS_NOT_SUPPORTED</code> if it is not supported with the provided arguments.

Returns

`amdsmi_status_t` | `AMDSMI_STATUS_SUCCESS` on success, non-zero on fail

6.11.2.16 `amdsmi_dev_get_power_profile_presets()`

```
amdsmi_status_t amdsmi_dev_get_power_profile_presets (
    amdsmi_device_handle device_handle,
    uint32_t sensor_ind,
    amdsmi_power_profile_status_t * status )
```

Get the list of available preset power profiles and an indication of which profile is currently active.

Given a device handle `device_handle` and a pointer to a `amdsmi_power_profile_status_t` `status`, this function will set the bits of the `amdsmi_power_profile_status_t.available_profiles` bit field of `status` to 1 if the profile corresponding to the respective `amdsmi_power_profile_preset_masks_t` profiles are enabled. For example, if both the VIDEO and VR power profiles are available selections, then `AMDSMI_PWR_PROF_PRST_VIDEO_MASK` AND'ed with `amdsmi_power_profile_status_t.available_profiles` will be non-zero as will `AMDSMI_PWR_PROF_PRST_VR_MASK` AND'ed with `amdsmi_power_profile_status_t.available_profiles`. Additionally, `amdsmi_power_profile_status_t.current` will be set to the `amdsmi_power_profile_preset_masks_t` of the profile that is currently active.

Parameters

in	<i>device_handle</i>	a device handle
in	<i>sensor_ind</i>	a 0-based sensor index. Normally, this will be 0. If a device has more than one sensor, it could be greater than 0.
in, out	<i>status</i>	a pointer to <code>amdsmi_power_profile_status_t</code> that will be populated by a call to this function. If this parameter is nullptr, this function will return <code>AMDSMI_STATUS_INVALID</code> if the function is supported with the provided arguments and <code>AMDSMI_STATUS_NOT_SUPPORTED</code> if it is not supported with the provided arguments.

Returns

`amdsmi_status_t` | `AMDSMI_STATUS_SUCCESS` on success, non-zero on fail

6.12 Clock, Power and Performance Control

These functions provide control over clock frequencies, power and performance.

Functions

- `amdsmi_status_t amdsmi_dev_set_perf_level (amdsmi_device_handle device_handle, amdsmi_dev_perf_level_t perf_lvl)`
Set the PowerPlay performance level associated with the device with provided device handle with the provided value.
- `amdsmi_status_t amdsmi_dev_set_perf_level_v1 (amdsmi_device_handle device_handle, amdsmi_dev_perf_level_t perf_lvl)`
Set the PowerPlay performance level associated with the device with provided device handle with the provided value.
- `amdsmi_status_t amdsmi_dev_set_overdrive_level (amdsmi_device_handle device_handle, uint32_t od)`
Set the overdrive percent associated with the device with provided device handle with the provided value. See details for WARNING.
- `amdsmi_status_t amdsmi_dev_set_overdrive_level_v1 (amdsmi_device_handle device_handle, uint32_t od)`
Set the overdrive percent associated with the device with provided device handle with the provided value. See details for WARNING.
- `amdsmi_status_t amdsmi_dev_set_clk_freq (amdsmi_device_handle device_handle, amdsmi_clk_type_t clk_type, uint64_t freq_bitmask)`
Control the set of allowed frequencies that can be used for the specified clock.

6.12.1 Detailed Description

These functions provide control over clock frequencies, power and performance.

6.12.2 Function Documentation

6.12.2.1 amdsmi_dev_set_perf_level()

```
amdsmi_status_t amdsmi_dev_set_perf_level (
    amdsmi_device_handle device_handle,
    amdsmi_dev_perf_level_t perf_lvl )
```

Set the PowerPlay performance level associated with the device with provided device handle with the provided value.

Deprecated :: `amdsmi_dev_set_perf_level_v1()` is preferred, with an interface that more closely matches the rest of the amd_smi API.

Given a device handle `device_handle` and an `amdsmi_dev_perf_level_t perf_level`, this function will set the PowerPlay performance level for the device to the value `perf_lvl`.

Note

This function requires root access

Parameters

in	<i>device_handle</i>	a device handle
in	<i>perf_lvl</i>	the value to which the performance level should be set

Returns

[amdsmi_status_t](#) | [AMDSMI_STATUS_SUCCESS](#) on success, non-zero on fail

6.12.2.2 amdsmi_dev_set_perf_level_v1()

```
amdsmi_status_t amdsmi_dev_set_perf_level_v1 (
    amdsmi_device_handle device_handle,
    amdsmi_dev_perf_level_t perf_lvl )
```

Set the PowerPlay performance level associated with the device with provided device handle with the provided value.

Given a device handle `device_handle` and an [amdsmi_dev_perf_level_t](#) `perf_level`, this function will set the PowerPlay performance level for the device to the value `perf_lvl`.

Note

This function requires root access

Parameters

in	<i>device_handle</i>	a device handle
in	<i>perf_lvl</i>	the value to which the performance level should be set

Returns

[amdsmi_status_t](#) | [AMDSMI_STATUS_SUCCESS](#) on success, non-zero on fail

6.12.2.3 amdsmi_dev_set_overdrive_level()

```
amdsmi_status_t amdsmi_dev_set_overdrive_level (
    amdsmi_device_handle device_handle,
    uint32_t od )
```

Set the overdrive percent associated with the device with provided device handle with the provided value. See details for WARNING.

Deprecated This function is deprecated. :: `amdsmi_dev_set_overdrive_level_v1` has the same functionality, with an interface that more closely matches the rest of the `amd_smi` API.

Given a device handle `device_handle` and an overdrive level `od`, this function will set the overdrive level for the device to the value `od`. The overdrive level is an integer value between 0 and 20, inclusive, which represents the overdrive percentage; e.g., a value of 5 specifies an overclocking of 5%.

The overdrive level is specific to the gpu system clock.

The overdrive level is the percentage above the maximum Performance Level to which overclocking will be limited. The overclocking percentage does not apply to clock speeds other than the maximum. This percentage is limited to 20%.

*****WARNING***** Operating your AMD GPU outside of official AMD specifications or outside of factory settings, including but not limited to the conducting of overclocking (including use of this overclocking software, even if such software has been directly or indirectly provided by AMD or otherwise affiliated in any way with AMD), may cause damage to your AMD GPU, system components and/or result in system failure, as well as cause other problems. DAMAGES CAUSED BY USE OF YOUR AMD GPU OUTSIDE OF OFFICIAL AMD SPECIFICATIONS OR OUTSIDE OF FACTORY SETTINGS ARE NOT COVERED UNDER ANY AMD PRODUCT WARRANTY AND MAY NOT BE COVERED BY YOUR BOARD OR SYSTEM MANUFACTURER'S WARRANTY. Please use this utility with caution.

Parameters

in	<code>device_handle</code>	a device handle
in	<code>od</code>	the value to which the overdrive level should be set

Returns

`amdsmi_status_t` | `AMDSMI_STATUS_SUCCESS` on success, non-zero on fail

6.12.2.4 `amdsmi_dev_set_overdrive_level_v1()`

```
amdsmi_status_t amdsmi_dev_set_overdrive_level_v1 (
    amdsmi_device_handle device_handle,
    uint32_t od )
```

Set the overdrive percent associated with the device with provided device handle with the provided value. See details for WARNING.

Given a device handle `device_handle` and an overdrive level `od`, this function will set the overdrive level for the device to the value `od`. The overdrive level is an integer value between 0 and 20, inclusive, which represents the overdrive percentage; e.g., a value of 5 specifies an overclocking of 5%.

The overdrive level is specific to the gpu system clock.

The overdrive level is the percentage above the maximum Performance Level to which overclocking will be limited. The overclocking percentage does not apply to clock speeds other than the maximum. This percentage is limited to 20%.

*****WARNING***** Operating your AMD GPU outside of official AMD specifications or outside of factory settings, including but not limited to the conducting of overclocking (including use of this overclocking software, even if such software has been directly or indirectly provided by AMD or otherwise affiliated in any way with AMD), may cause damage to your AMD GPU, system components and/or result in system failure, as well as cause other problems. DAMAGES CAUSED BY USE OF YOUR AMD GPU OUTSIDE OF OFFICIAL AMD SPECIFICATIONS OR OUTSIDE OF FACTORY SETTINGS ARE NOT COVERED UNDER ANY AMD PRODUCT WARRANTY AND MAY NOT BE COVERED BY YOUR BOARD OR SYSTEM MANUFACTURER'S WARRANTY. Please use this utility with caution.

Note

This function requires root access

Parameters

in	<i>device_handle</i>	a device handle
in	<i>od</i>	the value to which the overdrive level should be set

Returns

[amdsmi_status_t](#) | [AMDSMI_STATUS_SUCCESS](#) on success, non-zero on fail

6.12.2.5 amdsmi_dev_set_clk_freq()

```
amdsmi_status_t amdsmi_dev_set_clk_freq (
    amdsmi_device_handle device_handle,
    amdsmi_clk_type_t clk_type,
    uint64_t freq_bitmask )
```

Control the set of allowed frequencies that can be used for the specified clock.

Given a device handle *device_handle*, a clock type *clk_type*, and a 64 bit bitmask *freq_bitmask*, this function will limit the set of allowable frequencies. If a bit in *freq_bitmask* has a value of 1, then the frequency (as ordered in an [amdsmi_frequencies_t](#) returned by [amdsmi_dev_get_gpu_clk_freq\(\)](#)) corresponding to that bit index will be allowed.

This function will change the performance level to [AMDSMI_DEV_PERF_LEVEL_MANUAL](#) in order to modify the set of allowable frequencies. Caller will need to set to [AMDSMI_DEV_PERF_LEVEL_AUTO](#) in order to get back to default state.

All bits with indices greater than or equal to [amdsmi_frequencies_t::num_supported](#) will be ignored.

Note

This function requires root access

Parameters

in	<i>device_handle</i>	a device handle
in	<i>clk_type</i>	the type of clock for which the set of frequencies will be modified
in	<i>freq_bitmask</i>	A bitmask indicating the indices of the frequencies that are to be enabled (1) and disabled (0). Only the lowest amdsmi_frequencies_t.num_supported bits of this mask are relevant.

Returns

[amdsmi_status_t](#) | [AMDSMI_STATUS_SUCCESS](#) on success, non-zero on fail

6.13 Version Queries

These functions provide version information about various subsystems.

Functions

- `amdsmi_status_t amdsmi_get_version (amdsmi_version_t *version)`
Get the build version information for the currently running build of AMDSMI.
- `amdsmi_status_t amdsmi_get_version_str (amdsmi_sw_component_t component, char *ver_str, uint32_t len)`
Get the driver version string for the current system.

6.13.1 Detailed Description

These functions provide version information about various subsystems.

6.13.2 Function Documentation

6.13.2.1 amdsmi_get_version()

```
amdsmi_status_t amdsmi_get_version (
    amdsmi_version_t * version )
```

Get the build version information for the currently running build of AMDSMI.

Get the major, minor, patch and build string for AMDSMI build currently in use through `version`

Parameters

<code>in, out</code>	<code>version</code>	A pointer to an <code>amdsmi_version_t</code> structure that will be updated with the version information upon return.
----------------------	----------------------	--

Returns

`amdsmi_status_t` | `AMDSMI_STATUS_SUCCESS` on success, non-zero on fail

6.13.2.2 amdsmi_get_version_str()

```
amdsmi_status_t amdsmi_get_version_str (
    amdsmi_sw_component_t component,
```

```
char * ver_str,  
uint32_t len )
```

Get the driver version string for the current system.

Given a software component `component`, a pointer to a char buffer, `ver_str`, this function will write the driver version string (up to `len` characters) for the current system to `ver_str`. The caller must ensure that it is safe to write at least `len` characters to `ver_str`.

Parameters

in	<i>component</i>	The component for which the version string is being requested
in, out	<i>ver_str</i>	A pointer to a buffer of char's to which the version of <code>component</code> will be written
in	<i>len</i>	the length of the caller provided buffer <code>name</code> .

Note

[AMDSMI_STATUS_INSUFFICIENT_SIZE](#) is returned if `len` bytes is not large enough to hold the entire name. In this case, only `len` bytes will be written.

Returns

[amdsmi_status_t](#) | [AMDSMI_STATUS_SUCCESS](#) on success, non-zero on fail

6.14 Error Queries

These functions provide error information about AMDSMI calls as well as device errors.

Functions

- `amdsmi_status_t amdsmi_dev_get_ecc_count (amdsmi_device_handle device_handle, amdsmi_gpu_block_t block, amdsmi_error_count_t *ec)`
Retrieve the error counts for a GPU block.
- `amdsmi_status_t amdsmi_dev_get_ecc_enabled (amdsmi_device_handle device_handle, uint64_t *enabled_blocks)`
Retrieve the enabled ECC bit-mask.
- `amdsmi_status_t amdsmi_dev_get_ecc_status (amdsmi_device_handle device_handle, amdsmi_gpu_block_t block, amdsmi_ras_err_state_t *state)`
Retrieve the ECC status for a GPU block.
- `amdsmi_status_t amdsmi_status_string (amdsmi_status_t status, const char **status_string)`
Get a description of a provided AMDSMI error status.

6.14.1 Detailed Description

These functions provide error information about AMDSMI calls as well as device errors.

6.14.2 Function Documentation

6.14.2.1 amdsmi_dev_get_ecc_count()

```
amdsmi_status_t amdsmi_dev_get_ecc_count (
    amdsmi_device_handle device_handle,
    amdsmi_gpu_block_t block,
    amdsmi_error_count_t * ec )
```

Retrieve the error counts for a GPU block.

Given a device handle `device_handle`, an `amdsmi_gpu_block_t` `block` and a pointer to an `amdsmi_error_count_t` `ec`, this function will write the error count values for the GPU block indicated by `block` to memory pointed to by `ec`.

Parameters

in	<code>device_handle</code>	a device handle
in	<code>block</code>	The block for which error counts should be retrieved
in, out	<code>ec</code>	A pointer to an <code>amdsmi_error_count_t</code> to which the error counts should be written. If this parameter is nullptr, this function will return <code>AMDSMI_STATUS_INVALID</code> if the function is supported with the provided arguments and <code>AMDSMI_STATUS_NOT_SUPPORTED</code> if it is not supported with the provided arguments.

Returns

[amdsmi_status_t](#) | [AMDSMI_STATUS_SUCCESS](#) on success, non-zero on fail

6.14.2.2 amdsmi_dev_get_ecc_enabled()

```
amdsmi_status_t amdsmi_dev_get_ecc_enabled (
    amdsmi_device_handle device_handle,
    uint64_t * enabled_blocks )
```

Retrieve the enabled ECC bit-mask.

Given a device handle `device_handle`, and a pointer to a `uint64_t` `enabled_mask`, this function will write bits to memory pointed to by `enabled_blocks`. Upon a successful call, `enabled_blocks` can then be AND'd with elements of the [amdsmi_gpu_block_t](#) enumeration to determine if the corresponding block has ECC enabled. Note that whether a block has ECC enabled or not in the device is independent of whether there is kernel support for error counting for that block. Although a block may be enabled, but there may not be kernel support for reading error counters for that block.

Parameters

in	<i>device_handle</i>	a device handle
in, out	<i>enabled_blocks</i>	A pointer to a <code>uint64_t</code> to which the enabled blocks bits will be written. If this parameter is nullptr, this function will return AMDSMI_STATUS_INVALID if the function is supported with the provided arguments and AMDSMI_STATUS_NOT_SUPPORTED if it is not supported with the provided arguments.

Returns

[amdsmi_status_t](#) | [AMDSMI_STATUS_SUCCESS](#) on success, non-zero on fail

6.14.2.3 amdsmi_dev_get_ecc_status()

```
amdsmi_status_t amdsmi_dev_get_ecc_status (
    amdsmi_device_handle device_handle,
    amdsmi_gpu_block_t block,
    amdsmi_ras_err_state_t * state )
```

Retrieve the ECC status for a GPU block.

Given a device handle `device_handle`, an [amdsmi_gpu_block_t](#) `block` and a pointer to an [amdsmi_ras_err_state_t](#) `state`, this function will write the current state for the GPU block indicated by `block` to memory pointed to by `state`.

Parameters

in	<i>device_handle</i>	a device handle
in	<i>block</i>	The block for which error counts should be retrieved

Parameters

<code>in, out</code>	<code>state</code>	A pointer to an amdsmi_ras_err_state_t to which the ECC state should be written. If this parameter is nullptr, this function will return AMDSMI_STATUS_INVALID if the function is supported with the provided arguments and AMDSMI_STATUS_NOT_SUPPORTED if it is not supported with the provided arguments.
----------------------	--------------------	---

Returns

[amdsmi_status_t](#) | [AMDSMI_STATUS_SUCCESS](#) on success, non-zero on fail

6.14.2.4 `amdsmi_status_string()`

```
amdsmi_status_t amdsmi_status_string (
    amdsmi_status_t status,
    const char ** status_string )
```

Get a description of a provided AMDSMI error status.

Set the provided pointer to a const char *, `status_string`, to a string containing a description of the provided error code `status`.

Parameters

<code>in</code>	<code>status</code>	The error status for which a description is desired
<code>in, out</code>	<code>status_string</code>	A pointer to a const char * which will be made to point to a description of the provided error code

Returns

[amdsmi_status_t](#) | [AMDSMI_STATUS_SUCCESS](#) on success, non-zero on fail

6.15 Performance Counter Functions

These functions are used to configure, query and control performance counting.

Functions

- [amdsmi_status_t amdsmi_dev_counter_group_supported](#) ([amdsmi_device_handle](#) device_handle, [amdsmi_event_group_t](#) group)
Tell if an event group is supported by a given device.
- [amdsmi_status_t amdsmi_dev_create_counter](#) ([amdsmi_device_handle](#) device_handle, [amdsmi_event_type_t](#) type, [amdsmi_event_handle_t](#) *evnt_handle)
Create a performance counter object.
- [amdsmi_status_t amdsmi_dev_destroy_counter](#) ([amdsmi_event_handle_t](#) evnt_handle)
Deallocate a performance counter object.
- [amdsmi_status_t amdsmi_control_counter](#) ([amdsmi_event_handle_t](#) evt_handle, [amdsmi_counter_command_t](#) cmd, void *cmd_args)
Issue performance counter control commands.
- [amdsmi_status_t amdsmi_read_counter](#) ([amdsmi_event_handle_t](#) evt_handle, [amdsmi_counter_value_t](#) *value)
Read the current value of a performance counter.
- [amdsmi_status_t amdsmi_counter_get_available_counters](#) ([amdsmi_device_handle](#) device_handle, [amdsmi_event_group_t](#) grp, [uint32_t](#) *available)
Get the number of currently available counters.

6.15.1 Detailed Description

These functions are used to configure, query and control performance counting.

These functions use the same mechanisms as the "perf" command line utility. They share the same underlying resources and have some similarities in how they are used. The events supported by this API should have corresponding perf events that can be seen with "perf stat ...". The events supported by perf can be seen with "perf list"

The types of events available and the ability to count those events are dependent on which device is being targeted and if counters are still available for that device, respectively. [amdsmi_dev_counter_group_supported\(\)](#) can be used to see which event types ([amdsmi_event_group_t](#)) are supported for a given device. Assuming a device supports a given event type, we can then check to see if there are counters available to count a specific event with :: [amdsmi_counter_get_available_counters\(\)](#). Counters may be occupied by other perf based programs.

Once it is determined that events are supported and counters are available, an event counter can be created/destroyed and controlled.

[amdsmi_dev_create_counter\(\)](#) allocates internal data structures that will be used to control the event counter, and return a handle to this data structure.

Once an event counter handle is obtained, the event counter can be controlled (i.e., started, stopped,...) with [amdsmi_control_counter\(\)](#) by passing [amdsmi_counter_command_t](#) commands. [AMDSMI_CNTR_CMD_START](#) starts an event counter and [AMDSMI_CNTR_CMD_STOP](#) stops a counter. [amdsmi_read_counter\(\)](#) reads an event counter.

Once the counter is no longer needed, the resources it uses should be freed by calling [amdsmi_dev_destroy_counter\(\)](#).

6.15.2 Important Notes about Counter Values

- A running "absolute" counter is kept internally. For the discussion that follows, we will call the internal counter value at time t val_t
- Issuing `AMDSMI_CNTR_CMD_START` or calling `amdsmi_read_counter()`, causes AMDSMI (in kernel) to internally record the current absolute counter value
- `amdsmi_read_counter()` returns the number of events that have occurred since the previously recorded value (ie, a relative value, $val_t - val_{t-1}$) from the issuing of `AMDSMI_CNTR_CMD_START` or calling `amdsmi_read_counter()`

Example of event counting sequence:

```

amdsmi_counter_value_t value;
// Determine if AMDSMI_EVT_GRP_XGMI is supported for device dv_ind
ret = amsmi_dev_counter_group_supported(dv_ind, AMDSMI_EVT_GRP_XGMI);
// See if there are counters available for device dv_ind for event
// AMDSMI_EVT_GRP_XGMI
ret = amsmi_counter_get_available_counters(dv_ind,
                                           AMDSMI_EVT_GRP_XGMI, &counters_available);
// Assuming AMDSMI_EVT_GRP_XGMI is supported and there is at least 1
// counter available for AMDSMI_EVT_GRP_XGMI on device dv_ind, create
// an event object for an event of group AMDSMI_EVT_GRP_XGMI (e.g.,
// AMDSMI_EVT_XGMI_0_BEATS_TX) and get the handle
// (amdsmi_event_handle_t).
ret = amsmi_dev_create_counter(dv_ind, AMDSMI_EVT_XGMI_0_BEATS_TX,
                               &evnt_handle);
// A program that generates the events of interest can be started
// immediately before or after starting the counters.
// Start counting:
ret = amsmi_control_counter(evnt_handle, AMDSMI_CNTR_CMD_START, NULL);
// Wait...
// Get the number of events since AMDSMI_CNTR_CMD_START was issued:
ret = amsmi_read_counter(amdsmi_event_handle_t evt_handle, &value)
// Wait...
// Get the number of events since amsmi_read_counter() was last called:
ret = amsmi_read_counter(amdsmi_event_handle_t evt_handle, &value)
// Stop counting.
ret = amsmi_control_counter(evnt_handle, AMDSMI_CNTR_CMD_STOP, NULL);
// Release all resources (e.g., counter and memory resources) associated
// with evnt_handle.
ret = amsmi_dev_destroy_counter(evnt_handle);

```

6.15.3 Function Documentation

6.15.3.1 amsmi_dev_counter_group_supported()

```

amdsmi_status_t amsmi_dev_counter_group_supported (
    amsmi_device_handle device_handle,
    amsmi_event_group_t group )

```

Tell if an event group is supported by a given device.

Given a device handle `device_handle` and an event group specifier `group`, tell if group type events are supported by the device associated with `device_handle`

Parameters

in	<i>device_handle</i>	device handle of device being queried
in	<i>group</i>	amdsmi_event_group_t identifier of group for which support is being queried

Returns

[amdsmi_status_t](#) | [AMDSMI_STATUS_SUCCESS](#) on success, non-zero on fail

6.15.3.2 amsmi_dev_create_counter()

```

amdsmi_status_t amsmi_dev_create_counter (
    amsmi_device_handle device_handle,

```

```
amdsmi_event_type_t type,
amdsmi_event_handle_t * evnt_handle )
```

Create a performance counter object.

Create a performance counter object of type `type` for the device with a device handle of `device_handle`, and write a handle to the object to the memory location pointed to by `evnt_handle`. `evnt_handle` can be used with other performance event operations. The handle should be deallocated with `amdsmi_dev_destroy_counter()` when no longer needed.

Note

This function requires root access

Parameters

in	<code>device_handle</code>	a device handle
in	<code>type</code>	the <code>amdsmi_event_type_t</code> of performance event to create
in, out	<code>evnt_handle</code>	A pointer to a <code>amdsmi_event_handle_t</code> which will be associated with a newly allocated counter. If this parameter is nullptr, this function will return <code>AMDSMI_STATUS_INVALID</code> if the function is supported with the provided arguments and <code>AMDSMI_STATUS_NOT_SUPPORTED</code> if it is not supported with the provided arguments.

Returns

`amdsmi_status_t` | `AMDSMI_STATUS_SUCCESS` on success, non-zero on fail

6.15.3.3 `amdsmi_dev_destroy_counter()`

```
amdsmi_status_t amdsmi_dev_destroy_counter (
    amdsmi_event_handle_t evnt_handle )
```

Deallocate a performance counter object.

Deallocate the performance counter object with the provided `amdsmi_event_handle_t` `evnt_handle`

Note

This function requires root access

Parameters

in	<code>evnt_handle</code>	handle to event object to be deallocated
----	--------------------------	--

Returns

`amdsmi_status_t` | `AMDSMI_STATUS_SUCCESS` on success, non-zero on fail

6.15.3.4 amdsmi_control_counter()

```
amdsmi_status_t amdsmi_control_counter (
    amdsmi_event_handle_t evt_handle,
    amdsmi_counter_command_t cmd,
    void * cmd_args )
```

Issue performance counter control commands.

Issue a command `cmd` on the event counter associated with the provided handle `evt_handle`.

Note

This function requires root access

Parameters

in	<i>evt_handle</i>	an event handle
in	<i>cmd</i>	The event counter command to be issued
in, out	<i>cmd_args</i>	Currently not used. Should be set to NULL.

Returns

[amdsmi_status_t](#) | [AMDSMI_STATUS_SUCCESS](#) on success, non-zero on fail

6.15.3.5 amdsmi_read_counter()

```
amdsmi_status_t amdsmi_read_counter (
    amdsmi_event_handle_t evt_handle,
    amdsmi_counter_value_t * value )
```

Read the current value of a performance counter.

Read the current counter value of the counter associated with the provided handle `evt_handle` and write the value to the location pointed to by `value`.

Note

This function requires root access

Parameters

in	<i>evt_handle</i>	an event handle
in, out	<i>value</i>	pointer to memory of size of amdsmi_counter_value_t to which the counter value will be written

Returns

`amdsmi_status_t` | `AMDSMI_STATUS_SUCCESS` on success, non-zero on fail

6.15.3.6 amdsmi_counter_get_available_counters()

```
amdsmi_status_t amdsmi_counter_get_available_counters (
    amdsmi_device_handle device_handle,
    amdsmi_event_group_t grp,
    uint32_t * available )
```

Get the number of currently available counters.

Given a device handle `device_handle`, a performance event group `grp`, and a pointer to a `uint32_t` `available`, this function will write the number of `grp` type counters that are available on the device with handle `device_handle` to the memory that `available` points to.

Parameters

in	<i>device_handle</i>	a device handle
in	<i>grp</i>	an event device group
in, out	<i>available</i>	A pointer to a <code>uint32_t</code> to which the number of available counters will be written

Returns

`amdsmi_status_t` | `AMDSMI_STATUS_SUCCESS` on success, non-zero on fail

6.16 System Information Functions

These functions are used to configure, query and control performance counting.

Functions

- `amdsmi_status_t amdsmi_get_compute_process_info` (`amdsmi_process_info_t` *procs, uint32_t *num_items)
Get process information about processes currently using GPU.
- `amdsmi_status_t amdsmi_get_compute_process_info_by_pid` (uint32_t pid, `amdsmi_process_info_t` *proc)
Get process information about a specific process.
- `amdsmi_status_t amdsmi_get_compute_process_gpus` (uint32_t pid, uint32_t *dv_indices, uint32_t *num_devices)
Get the device indices currently being used by a process.

6.16.1 Detailed Description

These functions are used to configure, query and control performance counting.

6.16.2 Function Documentation

6.16.2.1 amdsmi_get_compute_process_info()

```
amdsmi_status_t amdsmi_get_compute_process_info (
    amdsmi_process_info_t * procs,
    uint32_t * num_items )
```

Get process information about processes currently using GPU.

Given a non-NULL pointer to an array `procs` of `amdsmi_process_info_t`'s, of length `*num_items`, this function will write up to `*num_items` instances of `amdsmi_process_info_t` to the memory pointed to by `procs`. These instances contain information about each process utilizing a GPU. If `procs` is not NULL, `num_items` will be updated with the number of processes actually written. If `procs` is NULL, `num_items` will be updated with the number of processes for which there is current process information. Calling this function with `procs` being NULL is a way to determine how much memory should be allocated for when `procs` is not NULL.

Parameters

in, out	<code>procs</code>	a pointer to memory provided by the caller to which process information will be written. This may be NULL in which case only <code>num_items</code> will be updated with the number of processes found.
in, out	<code>num_items</code>	A pointer to a <code>uint32_t</code> , which on input, should contain the amount of memory in <code>amdsmi_process_info_t</code> 's which have been provided by the <code>procs</code> argument. On output, if <code>procs</code> is non-NULL, this will be updated with the number <code>amdsmi_process_info_t</code> structs actually written. If <code>procs</code> is NULL, this argument will be updated with the number processes for which there is information.

Returns

`amdsmi_status_t` | `AMDSMI_STATUS_SUCCESS` on success, non-zero on fail

6.16.2.2 `amdsmi_get_compute_process_info_by_pid()`

```
amdsmi_status_t amdsmi_get_compute_process_info_by_pid (
    uint32_t pid,
    amdsmi_process_info_t * proc )
```

Get process information about a specific process.

Given a pointer to an `amdsmi_process_info_t` `proc` and a process id `pid`, this function will write the process information for `pid`, if available, to the memory pointed to by `proc`.

Parameters

in	<i>pid</i>	The process ID for which process information is being requested
in, out	<i>proc</i>	a pointer to a <code>amdsmi_process_info_t</code> to which process information for <code>pid</code> will be written if it is found.

Returns

`amdsmi_status_t` | `AMDSMI_STATUS_SUCCESS` on success, non-zero on fail

6.16.2.3 `amdsmi_get_compute_process_gpus()`

```
amdsmi_status_t amdsmi_get_compute_process_gpus (
    uint32_t pid,
    uint32_t * dv_indices,
    uint32_t * num_devices )
```

Get the device indices currently being used by a process.

Given a process id `pid`, a non-NULL pointer to an array of `uint32_t`'s `device_handleices` of length `*num_devices`, this function will write up to `num_devices` device indices to the memory pointed to by `device_handleices`. If `device_handleices` is not NULL, `num_devices` will be updated with the number of gpu's currently being used by process `pid`. If `device_handleices` is NULL, `device_handleices` will be updated with the number of gpus currently being used by `pid`. Calling this function with `dv_indices` being NULL is a way to determine how much memory is required for when `device_handleices` is not NULL.

Parameters

in	<i>pid</i>	The process id of the process for which the number of gpus currently being used is requested
in, out	<i>dv_indices</i>	a pointer to memory provided by the caller to which indices of devices currently being used by the process will be written. This may be NULL in which case only <code>num_devices</code> will be updated with the number of devices being used.
in, out	<i>num_devices</i>	A pointer to a <code>uint32_t</code> , which on input, should contain the amount of memory in <code>uint32_t</code> 's which have been provided by the <code>device_handleices</code> argument. On output, if <code>device_handleices</code> is non-NULL, this will be updated with the number <code>uint32_t</code> 's actually written. If <code>device_handleices</code> is NULL, this argument will be updated with the number devices being used.
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Returns

[amdsmi_status_t](#) | [AMDSMI_STATUS_SUCCESS](#) on success, non-zero on fail

6.17 XGMI Functions

These functions are used to configure, query and control XGMI.

Functions

- `amdsmi_status_t amdsmi_dev_xgmi_error_status (amdsmi_device_handle device_handle, amdsmi_xgmi_status_t *status)`
Retrieve the XGMI error status for a device.
- `amdsmi_status_t amdsmi_dev_reset_xgmi_error (amdsmi_device_handle device_handle)`
Reset the XGMI error status for a device.

6.17.1 Detailed Description

These functions are used to configure, query and control XGMI.

6.17.2 Function Documentation

6.17.2.1 amdsmi_dev_xgmi_error_status()

```
amdsmi_status_t amdsmi_dev_xgmi_error_status (
    amdsmi_device_handle device_handle,
    amdsmi_xgmi_status_t * status )
```

Retrieve the XGMI error status for a device.

Given a device handle `device_handle`, and a pointer to an `amdsmi_xgmi_status_t` `status`, this function will write the current XGMI error state `amdsmi_xgmi_status_t` for the device `device_handle` to the memory pointed to by `status`.

Parameters

in	<code>device_handle</code>	a device handle
in, out	<code>status</code>	A pointer to an <code>amdsmi_xgmi_status_t</code> to which the XGMI error state should be written. If this parameter is nullptr, this function will return <code>AMDSMI_STATUS_INVALID</code> if the function is supported with the provided arguments and <code>AMDSMI_STATUS_NOT_SUPPORTED</code> if it is not supported with the provided arguments.

Returns

`amdsmi_status_t` | `AMDSMI_STATUS_SUCCESS` on success, non-zero on fail

6.17.2.2 amdsmi_dev_reset_xgmi_error()

```
amdsmi_status_t amdsmi_dev_reset_xgmi_error (
    amdsmi_device_handle device_handle )
```

Reset the XGMI error status for a device.

Given a device handle `device_handle`, this function will reset the current XGMI error state `amdsmi_xgmi_status_t` for the device `device_handle` to `amdsmi_xgmi_status_t::AMDSMI_XGMI_STATUS_NO_ERRORS`

Parameters

in	<i>device_handle</i>	a device handle
----	----------------------	-----------------

Returns

`amdsmi_status_t` | `AMDSMI_STATUS_SUCCESS` on success, non-zero on fail

6.18 Hardware Topology Functions

These functions are used to query Hardware topology.

Functions

- `amdsmi_status_t amdsmi_topo_get_numa_node_number (amdsmi_device_handle device_handle, uint32_t *numa_node)`
Retrieve the NUMA CPU node number for a device.
- `amdsmi_status_t amdsmi_topo_get_link_weight (amdsmi_device_handle device_handle_src, amdsmi_device_handle device_handle_dst, uint64_t *weight)`
Retrieve the weight for a connection between 2 GPUs.
- `amdsmi_status_t amdsmi_get_minmax_bandwidth (amdsmi_device_handle device_handle_src, amdsmi_device_handle device_handle_dst, uint64_t *min_bandwidth, uint64_t *max_bandwidth)`
Retrieve minimal and maximal io link bandwidth between 2 GPUs.
- `amdsmi_status_t amdsmi_topo_get_link_type (amdsmi_device_handle device_handle_src, amdsmi_device_handle device_handle_dst, uint64_t *hops, AMDSMI_IO_LINK_TYPE *type)`
Retrieve the hops and the connection type between 2 GPUs.
- `amdsmi_status_t amdsmi_is_P2P_accessible (amdsmi_device_handle device_handle_src, amdsmi_device_handle device_handle_dst, bool *accessible)`
Return P2P availability status between 2 GPUs.

6.18.1 Detailed Description

These functions are used to query Hardware topology.

6.18.2 Function Documentation

6.18.2.1 amdsmi_topo_get_numa_node_number()

```
amdsmi_status_t amdsmi_topo_get_numa_node_number (
    amdsmi_device_handle device_handle,
    uint32_t * numa_node )
```

Retrieve the NUMA CPU node number for a device.

Given a device handle `device_handle`, and a pointer to an `uint32_t` `numa_node`, this function will write the node number of NUMA CPU for the device `device_handle` to the memory pointed to by `numa_node`.

Parameters

in	<code>device_handle</code>	a device handle
in, out	<code>numa_node</code>	A pointer to an <code>uint32_t</code> to which the numa node number should be written.

Returns

`amdsmi_status_t` | `AMDSMI_STATUS_SUCCESS` on success, non-zero on fail

6.18.2.2 amdsmi_topo_get_link_weight()

```
amdsmi_status_t amdsmi_topo_get_link_weight (
    amdsmi_device_handle device_handle_src,
    amdsmi_device_handle device_handle_dst,
    uint64_t * weight )
```

Retrieve the weight for a connection between 2 GPUs.

Given a source device handle `device_handle_src` and a destination device handle `device_handle_dst`, and a pointer to an `uint64_t` `weight`, this function will write the weight for the connection between the device `device_handle_src` and `device_handle_dst` to the memory pointed to by `weight`.

Parameters

in	<code>device_handle_src</code>	the source device handle
in	<code>device_handle_dst</code>	the destination device handle
in, out	<code>weight</code>	A pointer to an <code>uint64_t</code> to which the weight for the connection should be written.

Returns

`amdsmi_status_t` | `AMDSMI_STATUS_SUCCESS` on success, non-zero on fail

6.18.2.3 amdsmi_get_minmax_bandwidth()

```
amdsmi_status_t amdsmi_get_minmax_bandwidth (
    amdsmi_device_handle device_handle_src,
    amdsmi_device_handle device_handle_dst,
    uint64_t * min_bandwidth,
    uint64_t * max_bandwidth )
```

Retreive minimal and maximal io link bandwidth between 2 GPUs.

Given a source device handle `device_handle_src` and a destination device handle `device_handle_dst`, pointer to an `uint64_t` `min_bandwidth`, and a pointer to `uint64_t` `max_bandwidth`, this function will write theoretical minimal and maximal bandwidth limits. API works if `src` and `dst` are connected via `xgmi` and have 1 hop distance.

Parameters

in	<code>device_handle_src</code>	the source device handle
in	<code>device_handle_dst</code>	the destination device handle
in, out	<code>min_bandwidth</code>	A pointer to an <code>uint64_t</code> to which the minimal bandwidth for the connection should be written.
in, out	<code>max_bandwidth</code>	A pointer to an <code>uint64_t</code> to which the maximal bandwidth for the connection should be written.

Returns

`amdsmi_status_t` | `AMDSMI_STATUS_SUCCESS` on success, non-zero on fail

6.18.2.4 amdsmi_topo_get_link_type()

```
amdsmi_status_t amdsmi_topo_get_link_type (
    amdsmi_device_handle device_handle_src,
    amdsmi_device_handle device_handle_dst,
    uint64_t * hops,
    AMDSMI_IO_LINK_TYPE * type )
```

Retrieve the hops and the connection type between 2 GPUs.

Given a source device handle `device_handle_src` and a destination device handle `device_handle_dst`, and a pointer to an `uint64_t` `hops` and a pointer to an `AMDSMI_IO_LINK_TYPE` `type`, this function will write the number of hops and the connection type between the device `device_handle_src` and `device_handle_dst` to the memory pointed to by `hops` and `type`.

Parameters

in	<code>device_handle_src</code>	the source device handle
in	<code>device_handle_dst</code>	the destination device handle
in, out	<code>hops</code>	A pointer to an <code>uint64_t</code> to which the hops for the connection should be written.
in, out	<code>type</code>	A pointer to an <code>AMDSMI_IO_LINK_TYPE</code> to which the type for the connection should be written.

Returns

`amdsmi_status_t` | `AMDSMI_STATUS_SUCCESS` on success, non-zero on fail

6.18.2.5 amdsmi_is_P2P_accessible()

```
amdsmi_status_t amdsmi_is_P2P_accessible (
    amdsmi_device_handle device_handle_src,
    amdsmi_device_handle device_handle_dst,
    bool * accessible )
```

Return P2P availability status between 2 GPUs.

Given a source device handle `device_handle_src` and a destination device handle `device_handle_dst`, and a pointer to a `bool` `accessible`, this function will write the P2P connection status between the device `device_handle_src` and `device_handle_dst` to the memory pointed to by `accessible`.

Parameters

in	<code>device_handle_src</code>	the source device handle
in	<code>device_handle_dst</code>	the destination device handle
in, out	<code>accessible</code>	A pointer to a <code>bool</code> to which the status for the P2P connection availability should be written.

Returns

[amdsmi_status_t](#) | [AMDSMI_STATUS_SUCCESS](#) on success, non-zero on fail

6.19 Supported Functions

API function support varies by both GPU type and the version of the installed ROCm stack. The functions described in this section can be used to determine, up front, which functions are supported for a given device on a system. If such "up front" knowledge of support for a function is not needed, alternatively, one can call a device related function and check the return code.

Functions

- `amdsmi_status_t amdsmi_dev_open_supported_func_iterator (amdsmi_device_handle device_handle, amdsmi_func_id_iter_handle_t *handle)`
Get a function name iterator of supported AMDSMI functions for a device.
- `amdsmi_status_t amdsmi_dev_open_supported_variant_iterator (amdsmi_func_id_iter_handle_t obj_h, amdsmi_func_id_iter_handle_t *var_iter)`
Get a variant iterator for a given handle.
- `amdsmi_status_t amdsmi_next_func_iter (amdsmi_func_id_iter_handle_t handle)`
Advance a function identifier iterator.
- `amdsmi_status_t amdsmi_dev_close_supported_func_iterator (amdsmi_func_id_iter_handle_t *handle)`
Close a variant iterator handle.
- `amdsmi_status_t amdsmi_get_func_iter_value (amdsmi_func_id_iter_handle_t handle, amdsmi_func_id_value_t *value)`
Get the value associated with a function/variant iterator.

6.19.1 Detailed Description

API function support varies by both GPU type and the version of the installed ROCm stack. The functions described in this section can be used to determine, up front, which functions are supported for a given device on a system. If such "up front" knowledge of support for a function is not needed, alternatively, one can call a device related function and check the return code.

Some functions have several variations ("variants") where some variants are supported and others are not. For example, on a given device, `::amdsmi_dev_get_temp_metric` may support some types of temperature metrics (e.g., `AMDSMI_TEMP_CRITICAL_HYST`), but not others (e.g., `AMDSMI_TEMP_EMERGENCY`).

In addition to a top level of variant support for a function, a function may have varying support for monitors/sensors. These are considered "sub-variants" in functions described in this section. Continuing the `::amdsmi_dev_get_temp_metric` example, if variant `AMDSMI_TEMP_CRITICAL_HYST` is supported, perhaps only the sub-variant sensors `::AMDSMI_TEMP_TYPE_EDGE` and `::AMDSMI_TEMP_TYPE_EDGE` are supported, but not `::AMDSMI_TEMP_TYPE_MEMORY`.

In cases where a function takes in a sensor id parameter but does not have any "top level" variants, the functions in this section will indicate a default "variant", `AMDSMI_DEFAULT_VARIANT`, for the top level variant, and the various monitor support will be sub-variants of this.

The functions in this section use the "iterator" concept to list which functions are supported; to list which variants of the supported functions are supported; and finally which monitors/sensors are supported for a variant.

Here is example code that prints out all supported functions, their supported variants and sub-variants. Please see the related descriptions functions and AMDSMI types.

```

amdsmi_func_id_iter_handle_t iter_handle, var_iter, sub_var_iter;
amdsmi_func_id_value_t value;
amdsmi_status_t err;
amdsmi_device_handle device;
// Get the device handle via amdsmi_get_device_handles()
// ... ...
std::cout << "Supported AMDSMI Functions:" << std::endl; *
err = amdsmi_dev_open_supported_func_iterator(device, &iter_handle);
while (1) {
    err = amdsmi_get_func_iter_value(iter_handle, &value);
    std::cout << "Function Name: " << value.name << std::endl;
    err = amdsmi_dev_open_supported_variant_iterator(iter_handle, &var_iter);
    if (err != AMDSMI_STATUS_NO_DATA) {
        std::cout << "\tVariants/Monitors: ";
        while (1) {
            err = amdsmi_get_func_iter_value(var_iter, &value);
            if (value.id == AMDSMI_DEFAULT_VARIANT) {
                std::cout << "Default Variant ";
            } else {
                std::cout << value.id;
            }
            std::cout << " (";
            err =
                amdsmi_dev_open_supported_variant_iterator(var_iter, &sub_var_iter);
            if (err != AMDSMI_STATUS_NO_DATA) {
                while (1) {
                    err = amdsmi_get_func_iter_value(sub_var_iter, &value);
                    std::cout << value.id << ", ";
                    err = amdsmi_next_func_iter(sub_var_iter);
                    if (err == AMDSMI_STATUS_NO_DATA) {
                        break;
                    }
                }
                err = amdsmi_dev_close_supported_func_iterator(&sub_var_iter);
            }
            std::cout << ")", ";";
            err = amdsmi_next_func_iter(var_iter);
            if (err == AMDSMI_STATUS_NO_DATA) {
                break;
            }
        }
        std::cout << std::endl;
        err = amdsmi_dev_close_supported_func_iterator(&var_iter);
    }
    err = amdsmi_next_func_iter(iter_handle);
    if (err == AMDSMI_STATUS_NO_DATA) {
        break;
    }
}
err = amdsmi_dev_close_supported_func_iterator(&iter_handle);
}

```

6.19.2 Function Documentation

6.19.2.1 amdsmi_dev_open_supported_func_iterator()

```

amdsmi_status_t amdsmi_dev_open_supported_func_iterator (
    amdsmi_device_handle device_handle,
    amdsmi_func_id_iter_handle_t * handle )

```

Get a function name iterator of supported AMDSMI functions for a device.

Given a device handle `device_handle`, this function will write a function iterator handle to the caller-provided memory pointed to by `handle`. This handle can be used to iterate through all the supported functions.

Note that although this function takes in `device_handle` as an argument, `amdsmi_dev_open_supported_func_iterator` itself will not be among the functions listed as supported. This is because `amdsmi_dev_open_supported_func_iterator` does not depend on hardware or driver support and should always be supported.

Parameters

in	<i>device_handle</i>	a device handle of device for which support information is requested
in, out	<i>handle</i>	A pointer to caller-provided memory to which the function iterator will be written.

Returns

[amdsmi_status_t](#) | [AMDSMI_STATUS_SUCCESS](#) on success, non-zero on fail

6.19.2.2 [amdsmi_dev_open_supported_variant_iterator\(\)](#)

```
amdsmi_status_t amdsmi_dev_open_supported_variant_iterator (
    amdsmi_func_id_iter_handle_t obj_h,
    amdsmi_func_id_iter_handle_t * var_iter )
```

Get a variant iterator for a given handle.

Given a [amdsmi_func_id_iter_handle_t](#) *obj_h*, this function will write a function iterator handle to the caller-provided memory pointed to by *var_iter*. This handle can be used to iterate through all the supported variants of the provided handle. *obj_h* may be a handle to a function object, as provided by a call to [amdsmi_dev_open_supported_func_iterator](#), or it may be a variant itself (from a call to [amdsmi_dev_open_supported_variant_iterator](#)), in which case *var_iter* will be an iterator of the sub-variants of *obj_h* (e.g., monitors).

This call allocates a small amount of memory to *var_iter*. To free this memory [amdsmi_dev_close_supported_func_iterator](#) should be called on the returned iterator handle *var_iter* when it is no longer needed.

Parameters

in	<i>obj_h</i>	an iterator handle for which the variants are being requested
in, out	<i>var_iter</i>	A pointer to caller-provided memory to which the sub-variant iterator will be written.

Returns

[amdsmi_status_t](#) | [AMDSMI_STATUS_SUCCESS](#) on success, non-zero on fail

6.19.2.3 [amdsmi_next_func_iter\(\)](#)

```
amdsmi_status_t amdsmi_next_func_iter (
    amdsmi_func_id_iter_handle_t handle )
```

Advance a function identifier iterator.

Given a function id iterator handle ([amdsmi_func_id_iter_handle_t](#)) *handle*, this function will increment the iterator to point to the next identifier. After a successful call to this function, obtaining the value of the iterator *handle* will provide the value of the next item in the list of functions/variants.

If there are no more items in the list, [AMDSMI_STATUS_NO_DATA](#) is returned.

Parameters

in	<i>handle</i>	A pointer to an iterator handle to be incremented
----	---------------	---

Returns

[amdsmi_status_t](#) | [AMDSMI_STATUS_SUCCESS](#) on success, non-zero on fail

6.19.2.4 amdsmi_dev_close_supported_func_iterator()

```
amdsmi_status_t amdsmi_dev_close_supported_func_iterator (
    amdsmi_func_id_iter_handle_t * handle )
```

Close a variant iterator handle.

Given a pointer to an [amdsmi_func_id_iter_handle_t](#) handle, this function will free the resources being used by the handle

Parameters

in	<i>handle</i>	A pointer to an iterator handle to be closed
----	---------------	--

Returns

[amdsmi_status_t](#) | [AMDSMI_STATUS_SUCCESS](#) on success, non-zero on fail

6.19.2.5 amdsmi_get_func_iter_value()

```
amdsmi_status_t amdsmi_get_func_iter_value (
    amdsmi_func_id_iter_handle_t handle,
    amdsmi_func_id_value_t * value )
```

Get the value associated with a function/variant iterator.

Given an [amdsmi_func_id_iter_handle_t](#) handle, this function will write the identifier of the function/variant to the user provided memory pointed to by *value*.

value may point to a function name, a variant id, or a monitor/sensor index, depending on what kind of iterator handle is

Parameters

in	<i>handle</i>	An iterator for which the value is being requested
in, out	<i>value</i>	A pointer to an amdsmi_func_id_value_t provided by the caller to which this function will write the value associated with <i>handle</i>

Returns

[amdsmi_status_t](#) | [AMDSMI_STATUS_SUCCESS](#) on success, non-zero on fail

6.20 Event Notification Functions

These functions are used to configure for and get asynchronous event notifications.

Functions

- [amdsmi_status_t amdsmi_init_event_notification](#) ([amdsmi_device_handle](#) device_handle)
Prepare to collect event notifications for a GPU.
- [amdsmi_status_t amdsmi_set_event_notification_mask](#) ([amdsmi_device_handle](#) device_handle, uint64_t mask)
Specify which events to collect for a device.
- [amdsmi_status_t amdsmi_get_event_notification](#) (int timeout_ms, uint32_t *num_elem, [amdsmi_evt_notification_data_t](#) *data)
Collect event notifications, waiting a specified amount of time.
- [amdsmi_status_t amdsmi_stop_event_notification](#) ([amdsmi_device_handle](#) device_handle)
Close any file handles and free any resources used by event notification for a GPU.

6.20.1 Detailed Description

These functions are used to configure for and get asynchronous event notifications.

6.20.2 Function Documentation

6.20.2.1 amdsmi_init_event_notification()

```
amdsmi_status_t amdsmi_init_event_notification (
    amdsmi_device_handle device_handle )
```

Prepare to collect event notifications for a GPU.

This function prepares to collect events for the GPU with device ID `device_handle`, by initializing any required system parameters. This call may open files which will remain open until [amdsmi_stop_event_notification\(\)](#) is called.

Parameters

<code>device_handle</code>	a device handle corresponding to the device on which to listen for events
----------------------------	---

Returns

[amdsmi_status_t](#) | [AMDSMI_STATUS_SUCCESS](#) on success, non-zero on fail

6.20.2.2 amdsmi_set_event_notification_mask()

```
amdsmi_status_t amdsmi_set_event_notification_mask (
    amdsmi_device_handle device_handle,
    uint64_t mask )
```

Specify which events to collect for a device.

Given a device handle `device_handle` and a mask consisting of elements of `amdsmi_evt_notification_type_t` OR'd together, this function will listen for the events specified in `mask` on the device corresponding to `device_handle`.

Parameters

<i>device_handle</i>	a device handle corresponding to the device on which to listen for events
<i>mask</i>	Bitmask generated by OR'ing 1 or more elements of <code>amdsmi_evt_notification_type_t</code> indicating which event types to listen for, where the <code>amdsmi_evt_notification_type_t</code> value indicates the bit field, with bit position starting from 1. For example, if the mask field is 0x0000000000000003, which means first bit, bit 1 (bit position start from 1) and bit 2 are set, which indicate interest in receiving <code>AMDSMI_EVT_NOTIF_VMFAULT</code> (which has a value of 1) and <code>AMDSMI_EVT_NOTIF_THERMAL_THROTTLE</code> event (which has a value of 2).

Note

`AMDSMI_STATUS_INIT_ERROR` is returned if `amdsmi_init_event_notification()` has not been called before a call to this function

Returns

`amdsmi_status_t` | `AMDSMI_STATUS_SUCCESS` on success, non-zero on fail

6.20.2.3 amdsmi_get_event_notification()

```
amdsmi_status_t amdsmi_get_event_notification (
    int timeout_ms,
    uint32_t * num_elem,
    amdsmi_evt_notification_data_t * data )
```

Collect event notifications, waiting a specified amount of time.

Given a time period `timeout_ms` in milliseconds and a caller- provided buffer of `amdsmi_evt_notification_data_t`'s `data` with a length (in `amdsmi_evt_notification_data_t`'s, also specified by the caller) in the memory location pointed to by `num_elem`, this function will collect `amdsmi_evt_notification_type_t` events for up to `timeout_ms` milliseconds, and write up to `*num_elem` event items to `data`. Upon return `num_elem` is updated with the number of events that were actually written. If events are already present when this function is called, it will write the events to the buffer then poll for new events if there is still caller-provided buffer available to write any new events that would be found.

This function requires prior calls to `amdsmi_init_event_notification()` and `::amdsmi_set_event_notification_mask()`. This function polls for the occurrence of the events on the respective devices that were previously specified by `::amdsmi_set_event_notification_mask()`.

Parameters

in	<i>timeout_ms</i>	number of milliseconds to wait for an event to occur
in, out	<i>num_elem</i>	pointer to <code>uint32_t</code> , provided by the caller. On input, this value tells how many <code>amdsmi_evt_notification_data_t</code> elements are being provided by the caller with data. On output, the location pointed to by <code>num_elem</code> will contain the number of items written to the provided buffer.
out	<i>data</i>	pointer to a caller-provided memory buffer of size <code>num_elem</code> <code>amdsmi_evt_notification_data_t</code> to which this function may safely write. If there are events found, up to <code>num_elem</code> event items will be written to <code>data</code> .

Returns

`amdsmi_status_t` | `AMDSMI_STATUS_SUCCESS` on success, non-zero on fail

6.20.2.4 `amdsmi_stop_event_notification()`

```
amdsmi_status_t amdsmi_stop_event_notification (
    amdsmi_device_handle device_handle )
```

Close any file handles and free any resources used by event notification for a GPU.

Any resources used by event notification for the GPU with device handle `device_handle` will be free with this function. This includes freeing any memory and closing file handles. This should be called for every call to `amdsmi_init_event_notification()`

Parameters

in	<i>device_handle</i>	The device handle of the GPU for which event notification resources will be free
----	----------------------	--

Returns

`amdsmi_status_t` | `AMDSMI_STATUS_SUCCESS` on success, non-zero on fail

6.21 SW Version Information

Functions

- `amdsmi_status_t amdsmi_get_driver_version (amdsmi_device_handle device_handle, int *length, char *version)`

Returns the driver version information.

6.21.1 Detailed Description

6.21.2 Function Documentation

6.21.2.1 amdsmi_get_driver_version()

```
amdsmi_status_t amdsmi_get_driver_version (
    amdsmi_device_handle device_handle,
    int * length,
    char * version )
```

Returns the driver version information.

Parameters

in	<i>device_handle</i>	Device which to query
in, out	<i>length</i>	As input parameter length of the user allocated string buffer. As output parameter length of the returned string buffer.
out	<i>version</i>	Version information in string format. Must be allocated by user.

Returns

`amdsmi_status_t` | `AMDSMI_STATUS_SUCCESS` on success, non-zero on fail

6.22 ASIC & Board Static Information

Functions

- `amdsmi_status_t amdsmi_get_asic_info (amdsmi_device_handle device_handle, amdsmi_asic_info_t *info)`
Returns the ASIC information for the device.
- `amdsmi_status_t amdsmi_get_board_info (amdsmi_device_handle device_handle, amdsmi_board_info_t *info)`
Returns the board part number and board information for the requested device.
- `amdsmi_status_t amdsmi_get_power_cap_info (amdsmi_device_handle device_handle, uint32_t sensor_ind, amdsmi_power_cap_info_t *info)`
Returns the power caps as currently configured in the system.
- `amdsmi_status_t amdsmi_get_xgmi_info (amdsmi_device_handle device_handle, amdsmi_xgmi_info_t *info)`
Returns XGMI information for the GPU.
- `amdsmi_status_t amdsmi_get_caps_info (amdsmi_device_handle device_handle, amdsmi_gpu_caps_t *info)`
Returns the device capabilities as currently configured in the system.

6.22.1 Detailed Description

6.22.2 Function Documentation

6.22.2.1 amdsmi_get_asic_info()

```
amdsmi_status_t amdsmi_get_asic_info (
    amdsmi_device_handle device_handle,
    amdsmi_asic_info_t * info )
```

Returns the ASIC information for the device.

This function returns ASIC information such as the product name, the family, the vendor ID, the subvendor ID, the device ID, the revision ID and the serial number.

Parameters

in	<i>device_handle</i>	Device which to query
out	<i>info</i>	Reference to static asic information structure. Must be allocated by user.

Returns

`amdsmi_status_t` | `AMDSMI_STATUS_SUCCESS` on success, non-zero on fail

6.22.2.2 amdsmi_get_board_info()

```
amdsmi_status_t amdsmi_get_board_info (
    amdsmi_device_handle device_handle,
    amdsmi_board_info_t * info )
```

Returns the board part number and board information for the requested device.

Parameters

in	<i>device_handle</i>	Device which to query
out	<i>info</i>	Reference to board info structure. Must be allocated by user.

Returns

[amdsmi_status_t](#) | [AMDSMI_STATUS_SUCCESS](#) on success, non-zero on fail

6.22.2.3 amdsmi_get_power_cap_info()

```
amdsmi_status_t amdsmi_get_power_cap_info (
    amdsmi_device_handle device_handle,
    uint32_t sensor_ind,
    amdsmi_power_cap_info_t * info )
```

Returns the power caps as currently configured in the system.

Parameters

in	<i>device_handle</i>	Device which to query
in	<i>sensor_ind</i>	A 0-based sensor index. Normally, this will be 0. If a device has more than one sensor, it could be greater than 0.
out	<i>info</i>	Reference to power caps information structure. Must be allocated by user.

Returns

[amdsmi_status_t](#) | [AMDSMI_STATUS_SUCCESS](#) on success, non-zero on fail

6.22.2.4 amdsmi_get_xgmi_info()

```
amdsmi_status_t amdsmi_get_xgmi_info (
    amdsmi_device_handle device_handle,
    amdsmi_xgmi_info_t * info )
```

Returns XGMI information for the GPU.

Parameters

in	<i>device_handle</i>	Device which to query
out	<i>info</i>	Reference to xgmi information structure. Must be allocated by user.

Returns

[amdsmi_status_t](#) | [AMDSMI_STATUS_SUCCESS](#) on success, non-zero on fail

6.22.2.5 amdsmi_get_caps_info()

```
amdsmi_status_t amdsmi_get_caps_info (
    amdsmi_device_handle device_handle,
    amdsmi_gpu_caps_t * info )
```

Returns the device capabilities as currently configured in the system.

Parameters

in	<i>device_handle</i>	Device which to query
out	<i>info</i>	Reference to caps information structure. Must be allocated by user.

Returns

[amdsmi_status_t](#) | [AMDSMI_STATUS_SUCCESS](#) on success, non-zero on fail

6.23 Firmware & VBIOS queries

Functions

- `amdsmi_status_t amdsmi_get_fw_info (amdsmi_device_handle device_handle, amdsmi_fw_info_t *info)`
Returns the firmware versions running on the device.
- `amdsmi_status_t amdsmi_get_vbios_info (amdsmi_device_handle device_handle, amdsmi_vbios_info_t *info)`
Returns the static information for the vBIOS on the device.

6.23.1 Detailed Description

6.23.2 Function Documentation

6.23.2.1 amdsmi_get_fw_info()

```
amdsmi_status_t amdsmi_get_fw_info (  
    amdsmi_device_handle device_handle,  
    amdsmi_fw_info_t * info )
```

Returns the firmware versions running on the device.

Parameters

in	<i>device_handle</i>	Device which to query
out	<i>info</i>	Reference to the fw info. Must be allocated by user.

Returns

`amdsmi_status_t` | `AMDSMI_STATUS_SUCCESS` on success, non-zero on fail

6.23.2.2 amdsmi_get_vbios_info()

```
amdsmi_status_t amdsmi_get_vbios_info (  
    amdsmi_device_handle device_handle,  
    amdsmi_vbios_info_t * info )
```

Returns the static information for the vBIOS on the device.

Parameters

in	<i>device_handle</i>	Device which to query
out	<i>info</i>	Reference to static vBIOS information. Must be allocated by user.

Returns

[amdsmi_status_t](#) | [AMDSMI_STATUS_SUCCESS](#) on success, non-zero on fail

6.24 GPU Monitoring

Functions

- `amdsmi_status_t amsmi_get_gpu_activity (amdsmi_device_handle device_handle, amsmi_engine_usage_t *info)`
Returns the current usage of the GPU engines (GFX, MM and MEM). Each usage is reported as a percentage from 0-100%.
- `amdsmi_status_t amsmi_get_power_measure (amdsmi_device_handle device_handle, amsmi_power_measure_t *info)`
Returns the current power and voltage of the GPU. The voltage is in units of mV and the power in units of W.
- `amdsmi_status_t amsmi_get_clock_measure (amdsmi_device_handle device_handle, amsmi_clk_type_t clk_type, amsmi_clk_measure_t *info)`
Returns the measurements of the clocks in the GPU for the GFX and multimedia engines and Memory. This call reports the averages over 1s in MHz.
- `amdsmi_status_t amsmi_get_vram_usage (amdsmi_device_handle device_handle, amsmi_vram_info_t *info)`
Returns the VRAM usage (both total and used memory) in MegaBytes.

6.24.1 Detailed Description

6.24.2 Function Documentation

6.24.2.1 amsmi_get_gpu_activity()

```
amdsmi_status_t amsmi_get_gpu_activity (
    amsmi_device_handle device_handle,
    amsmi_engine_usage_t * info )
```

Returns the current usage of the GPU engines (GFX, MM and MEM). Each usage is reported as a percentage from 0-100%.

Parameters

in	<code>device_handle</code>	Device which to query
out	<code>info</code>	Reference to the gpu engine usage structure. Must be allocated by user.

Returns

`amdsmi_status_t` | `AMDSMI_STATUS_SUCCESS` on success, non-zero on fail

6.24.2.2 amsmi_get_power_measure()

```
amdsmi_status_t amsmi_get_power_measure (
    amsmi_device_handle device_handle,
    amsmi_power_measure_t * info )
```

Returns the current power and voltage of the GPU. The voltage is in units of mV and the power in units of W.

Parameters

in	<i>device_handle</i>	Device which to query
out	<i>info</i>	Reference to the gpu power structure. Must be allocated by user.

Returns

[amdsmi_status_t](#) | [AMDSMI_STATUS_SUCCESS](#) on success, non-zero on fail

6.24.2.3 amdsmi_get_clock_measure()

```
amdsmi_status_t amdsmi_get_clock_measure (
    amdsmi_device_handle device_handle,
    amdsmi_clk_type_t clk_type,
    amdsmi_clk_measure_t * info )
```

Returns the measurements of the clocks in the GPU for the GFX and multimedia engines and Memory. This call reports the averages over 1s in MHz.

Parameters

in	<i>device_handle</i>	Device which to query
in	<i>clk_type</i>	Enum representing the clock type to query.
out	<i>info</i>	Reference to the gpu clock structure. Must be allocated by user.

Returns

[amdsmi_status_t](#) | [AMDSMI_STATUS_SUCCESS](#) on success, non-zero on fail

6.24.2.4 amdsmi_get_vram_usage()

```
amdsmi_status_t amdsmi_get_vram_usage (
    amdsmi_device_handle device_handle,
    amdsmi_vram_info_t * info )
```

Returns the VRAM usage (both total and used memory) in MegaBytes.

Parameters

in	<i>device_handle</i>	Device which to query
out	<i>info</i>	Reference to vram information. Must be allocated by user.

Returns

`amdsmi_status_t` | `AMD_SMI_STATUS_SUCCESS` on success, non-zero on fail

6.25 Power Management

Functions

- `amdsmi_status_t amsmi_get_target_frequency_range (amdsmi_device_handle device_handle, amsmi_clk_type_t clk_type, amsmi_frequency_range_t *range)`

Returns current and supported frequency range for the specified clock type.

6.25.1 Detailed Description

6.25.2 Function Documentation

6.25.2.1 amsmi_get_target_frequency_range()

```
amdsmi_status_t amsmi_get_target_frequency_range (
    amsmi_device_handle device_handle,
    amsmi_clk_type_t clk_type,
    amsmi_frequency_range_t * range )
```

Returns current and supported frequency range for the specified clock type.

Parameters

in	<i>device_handle</i>	Device which to query
in	<i>clk_type</i>	Clock type for which to get current and supported frequency range.
out	<i>range</i>	Reference to frequency range structure. Must be allocated by user.

Returns

`amdsmi_status_t` | `AMDSMI_STATUS_SUCCESS` on success, non-zero on fail

6.26 Process information

Functions

- `amdsmi_status_t amdsmi_get_process_list` (`amdsmi_device_handle` device_handle, `amdsmi_process_handle` *list, `uint32_t` *max_processes)
Returns the list of processes running on a given GPU including itself.
- `amdsmi_status_t amdsmi_get_process_info` (`amdsmi_device_handle` device_handle, `amdsmi_process_handle` process, `amdsmi_proc_info_t` *info)
Returns the process information of a given process. Engine usage show how much time the process spend using these engines in ns.

6.26.1 Detailed Description

6.26.2 Function Documentation

6.26.2.1 amdsmi_get_process_list()

```
amdsmi_status_t amdsmi_get_process_list (
    amdsmi_device_handle device_handle,
    amdsmi_process_handle * list,
    uint32_t * max_processes )
```

Returns the list of processes running on a given GPU including itself.

Note

The user provides a buffer to store the list and the maximum number of processes that can be returned. If the user sets max_processes to 0, the total number of processes will be returned.

Parameters

in	<i>device_handle</i>	Device which to query
out	<i>list</i>	Reference to a user-provided buffer where the process list will be returned. This buffer must contain at least max_processes entries of type smi_process_handle. Must be allocated by user.
in, out	<i>max_processes</i>	Reference to the size of the list buffer in number of elements. Returns the return number of elements in list or the number of running processes if equal to 0.

Returns

`amdsmi_status_t` | `AMDSMI_STATUS_SUCCESS` on success, non-zero on fail

6.26.2.2 amdsmi_get_process_info()

```
amdsmi_status_t amdsmi_get_process_info (
    amdsmi_device_handle device_handle,
    amdsmi_process_handle process,
    amdsmi_proc_info_t * info )
```

Returns the process information of a given process. Engine usage show how much time the process spend using these engines in ns.

Parameters

in	<i>device_handle</i>	Device which to query
in	<i>process</i>	Handle of process to query.
out	<i>info</i>	Reference to a process information structure where to return information. Must be allocated by user.

Returns

[amdsmi_status_t](#) | [AMDSMI_STATUS_SUCCESS](#) on success, non-zero on fail

6.27 ECC information

Functions

- `amdsmi_status_t amdsmi_get_ecc_error_count (amdsmi_device_handle device_handle, amdsmi_error_count_t *ec)`

Returns the number of ECC errors (correctable and uncorrectable) in the given GPU.

6.27.1 Detailed Description

6.27.2 Function Documentation

6.27.2.1 amdsmi_get_ecc_error_count()

```
amdsmi_status_t amdsmi_get_ecc_error_count (
    amdsmi_device_handle device_handle,
    amdsmi_error_count_t * ec )
```

Returns the number of ECC errors (correctable and uncorrectable) in the given GPU.

Parameters

in	<i>device_handle</i>	Device which to query
out	<i>ec</i>	Reference to ecc error count structure. Must be allocated by user.

Returns

`amdsmi_status_t` | `AMDSMI_STATUS_SUCCESS` on success, non-zero on fail

Chapter 7

Data Structure Documentation

7.1 amd_metrics_table_header_t Struct Reference

The following structures hold the gpu metrics values for a device.

```
#include <amdsmi.h>
```

7.1.1 Detailed Description

The following structures hold the gpu metrics values for a device.

Size and version information of metrics data

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

- [amdsmi.h](#)

7.2 amdsmi_asic_info_t Struct Reference

Data Fields

- char **market_name** [AMDSMI_MAX_STRING_LENGTH]
- uint32_t **family**
- uint32_t **vendor_id**
- uint32_t **subvendor_id**
- uint64_t **device_id**
- uint32_t **rev_id**
- char **asic_serial** [AMDSMI_NORMAL_STRING_LENGTH]

7.2.1 Field Documentation

7.2.1.1 family

```
uint32_t amdsmi_asic_info_t::family
```

Has zero value

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

- [amdsmi.h](#)

7.3 amdsmi_bdf_t Union Reference

Data Fields

- ```
struct {
 uint64_t function_number: 3
 uint64_t device_number: 5
 uint64_t bus_number: 8
 uint64_t domain_number: 48
};
```
- `uint64_t as_uint`

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

- [amdsmi.h](#)

## 7.4 amdsmi\_board\_info\_t Struct Reference

### Data Fields

- `uint64_t serial_number`
- `bool is_master`
- `char model_number [AMDSMI_NORMAL_STRING_LENGTH]`
- `char product_serial [AMDSMI_NORMAL_STRING_LENGTH]`
- `char fru_id [AMDSMI_NORMAL_STRING_LENGTH]`
- `char product_name [AMDSMI_PRODUCT_NAME_LENGTH]`
- `char manufacturer_name [AMDSMI_NORMAL_STRING_LENGTH]`

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

- [amdsmi.h](#)



## 7.5 amdsmi\_clk\_measure\_t Struct Reference

### Data Fields

- uint32\_t **cur\_clk**
- uint32\_t **avg\_clk**
- uint32\_t **min\_clk**
- uint32\_t **max\_clk**
- uint32\_t **reserved** [4]

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

- [amdsmi.h](#)

## 7.6 amdsmi\_counter\_value\_t Struct Reference

```
#include <amdsmi.h>
```

### Data Fields

- uint64\_t [value](#)  
*Counter value.*
- uint64\_t [time\\_enabled](#)
- uint64\_t [time\\_running](#)

### 7.6.1 Detailed Description

Counter value

### 7.6.2 Field Documentation

#### 7.6.2.1 time\_enabled

```
uint64_t amdsmi_counter_value_t::time_enabled
```

Time that the counter was enabled (in nanoseconds)

#### 7.6.2.2 time\_running

```
uint64_t amdsmi_counter_value_t::time_running
```

Time that the counter was running (in nanoseconds)

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

- [amdsmi.h](#)

## 7.7 amdsmi\_engine\_usage\_t Struct Reference

### Data Fields

- uint32\_t **gfx\_activity**
- uint32\_t **umc\_activity**
- uint32\_t **mm\_activity** [AMDSMI\_MAX\_MM\_IP\_COUNT]
- uint32\_t **reserved** [6]

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

- [amdsmi.h](#)

## 7.8 amdsmi\_error\_count\_t Struct Reference

This structure holds error counts.

```
#include <amdsmi.h>
```

### Data Fields

- uint64\_t [correctable\\_count](#)  
*Accumulated correctable errors.*
- uint64\_t [uncorrectable\\_count](#)  
*Accumulated uncorrectable errors.*
- uint64\_t **reserved** [2]

### 7.8.1 Detailed Description

This structure holds error counts.

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

- [amdsmi.h](#)

## 7.9 amdsmi\_evt\_notification\_data\_t Struct Reference

```
#include <amdsmi.h>
```

### Data Fields

- [amdsmi\\_device\\_handle](#) [device\\_handle](#)  
*Handler of device that corresponds to the event.*
- [amdsmi\\_evt\\_notification\\_type\\_t](#) [event](#)  
*Event type.*
- char [message](#) [MAX\_EVENT\_NOTIFICATION\_MSG\_SIZE]  
*Event message.*

### 7.9.1 Detailed Description

Event notification data returned from event notification API

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

- [amdsmi.h](#)

## 7.10 amdsmi\_freq\_volt\_region\_t Struct Reference

This structure holds 2 [amdsmi\\_range\\_t](#)'s, one for frequency and one for voltage. These 2 ranges indicate the range of possible values for the corresponding [amdsmi\\_od\\_vddc\\_point\\_t](#).

```
#include <amdsmi.h>
```

### Data Fields

- [amdsmi\\_range\\_t freq\\_range](#)  
*The frequency range for this VDDC Curve point.*
- [amdsmi\\_range\\_t volt\\_range](#)  
*The voltage range for this VDDC Curve point.*

### 7.10.1 Detailed Description

This structure holds 2 [amdsmi\\_range\\_t](#)'s, one for frequency and one for voltage. These 2 ranges indicate the range of possible values for the corresponding [amdsmi\\_od\\_vddc\\_point\\_t](#).

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

- [amdsmi.h](#)

## 7.11 amdsmi\_frequencies\_t Struct Reference

This structure holds information about clock frequencies.

```
#include <amdsmi.h>
```

### Data Fields

- uint32\_t [num\\_supported](#)
- uint32\_t [current](#)
- uint64\_t [frequency](#) [[AMD\\_SMI\\_MAX\\_NUM\\_FREQUENCIES](#)]

### 7.11.1 Detailed Description

This structure holds information about clock frequencies.

### 7.11.2 Field Documentation

#### 7.11.2.1 num\_supported

```
uint32_t amdsmi_frequencies_t::num_supported
```

The number of supported frequencies

#### 7.11.2.2 current

```
uint32_t amdsmi_frequencies_t::current
```

The current frequency index

#### 7.11.2.3 frequency

```
uint64_t amdsmi_frequencies_t::frequency[AMDSMI_MAX_NUM_FREQUENCIES]
```

List of frequencies. Only the first num\_supported frequencies are valid.

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

- [amdsmi.h](#)

## 7.12 amdsmi\_frequency\_range\_t Struct Reference

### Data Fields

- [amdsmi\\_range\\_t](#) supported\_freq\_range
- [amdsmi\\_range\\_t](#) current\_freq\_range
- uint32\_t reserved [8]

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

- [amdsmi.h](#)

## 7.13 amdsmi\_func\_id\_value\_t Union Reference

This union holds the value of an [amdsmi\\_func\\_id\\_iter\\_handle\\_t](#). The value may be a function name, or an enumerated variant value of types such as [amdsmi\\_memory\\_type\\_t](#), [amdsmi\\_temperature\\_metric\\_t](#), etc.

```
#include <amdsmi.h>
```

### Data Fields

- [uint64\\_t id](#)  
*uint64\_t representation of value*
- `const char * name`  
*name string (applicable to functions only)*
- union {  
    [amdsmi\\_memory\\_type\\_t memory\\_type](#)  
        < Used for [amdsmi\\_memory\\_type\\_t](#) variants  
    [amdsmi\\_temperature\\_metric\\_t temp\\_metric](#)  
        Used for [amdsmi\\_event\\_type\\_t](#) variants.  
    [amdsmi\\_event\\_type\\_t evnt\\_type](#)  
        Used for [amdsmi\\_event\\_group\\_t](#) variants.  
    [amdsmi\\_event\\_group\\_t evnt\\_group](#)  
        Used for [amdsmi\\_clk\\_type\\_t](#) variants.  
    [amdsmi\\_clk\\_type\\_t clk\\_type](#)  
        Used for [amdsmi\\_fw\\_block\\_t](#) variants.  
    [amdsmi\\_fw\\_block\\_t fw\\_block](#)  
        Used for [amdsmi\\_gpu\\_block\\_t](#) variants.  
    [amdsmi\\_gpu\\_block\\_t gpu\\_block\\_type](#)  
};

### 7.13.1 Detailed Description

This union holds the value of an [amdsmi\\_func\\_id\\_iter\\_handle\\_t](#). The value may be a function name, or an enumerated variant value of types such as [amdsmi\\_memory\\_type\\_t](#), [amdsmi\\_temperature\\_metric\\_t](#), etc.

### 7.13.2 Field Documentation

#### 7.13.2.1 memory\_type

[amdsmi\\_memory\\_type\\_t](#) [amdsmi\\_func\\_id\\_value\\_t::memory\\_type](#)

< Used for [amdsmi\\_memory\\_type\\_t](#) variants

Used for [amdsmi\\_temperature\\_metric\\_t](#) variants

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

- [amdsmi.h](#)

## 7.14 amdsmi\_fw\_info\_t Struct Reference

### Data Fields

- uint8\_t **num\_fw\_info**
- ```
struct {
    amdsmi_fw_block_t fw_id
    uint64_t fw_version
    uint64_t reserved [2]
} fw_info_list [FW_ID__MAX]
```
- uint32_t **reserved** [7]

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

- [amdsmi.h](#)

7.15 amdsmi_gpu_caps_t Struct Reference

```
#include <amdsmi.h>
```

Data Fields

- ```
struct {
 uint32_t gfxip_major
 uint32_t gfxip_minor
 uint16_t gfxip_cu_count
 uint32_t reserved [5]
} gfx
```
- ```
struct {
    uint8_t mm_ip_count
    uint8_t mm_ip_list [AMDSMI_MAX_MM_IP_COUNT]
    uint32_t reserved [5]
} mm
```
- bool **ras_supported**
- uint8_t **max_vf_num**
- uint32_t **gfx_ip_count**
- uint32_t **dma_ip_count**

7.15.1 Detailed Description

GPU Capability info

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

- [amdsmi.h](#)

7.16 amdsmi_gpu_metrics_t Struct Reference

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

- [amdsmi.h](#)

7.17 amdsmi_od_vddc_point_t Struct Reference

This structure represents a point on the frequency-voltage plane.

```
#include <amdsmi.h>
```

Data Fields

- `uint64_t` [frequency](#)
Frequency coordinate (in Hz)
- `uint64_t` [voltage](#)
Voltage coordinate (in mV)

7.17.1 Detailed Description

This structure represents a point on the frequency-voltage plane.

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

- [amdsmi.h](#)

7.18 amdsmi_od_volt_curve_t Struct Reference

```
#include <amdsmi.h>
```

Data Fields

- [amdsmi_od_vddc_point_t](#) `vc_points` [[AMDSMI_NUM_VOLTAGE_CURVE_POINTS](#)]

7.18.1 Detailed Description

[AMDSMI_NUM_VOLTAGE_CURVE_POINTS](#) number of [amdsmi_od_vddc_point_t](#)'s

7.18.2 Field Documentation

7.18.2.1 vc_points

```
amdsmi_od_vddc_point_t amsmi_od_volt_curve_t::vc_points[AMDSMI_NUM_VOLTAGE_CURVE_POINTS]
```

Array of [AMDSMI_NUM_VOLTAGE_CURVE_POINTS](#) [amdsmi_od_vddc_point_t](#)'s that make up the voltage frequency curve points.

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

- [amdsmi.h](#)

7.19 amsmi_od_volt_freq_data_t Struct Reference

This structure holds the frequency-voltage values for a device.

```
#include <amdsmi.h>
```

Data Fields

- [amdsmi_range_t curr_sclk_range](#)
The current SCLK frequency range.
- [amdsmi_range_t curr_mclk_range](#)
(upper bound only)
- [amdsmi_range_t sclk_freq_limits](#)
The range possible of SCLK values.
- [amdsmi_range_t mclk_freq_limits](#)
The range possible of MCLK values.
- [amdsmi_od_volt_curve_t curve](#)
The current voltage curve.
- [uint32_t num_regions](#)
The number of voltage curve regions.

7.19.1 Detailed Description

This structure holds the frequency-voltage values for a device.

7.19.2 Field Documentation

7.19.2.1 curr_mclk_range

```
amdsmi_range_t amsmi_od_volt_freq_data_t::curr_mclk_range
```

(upper bound only)

The current MCLK frequency range;

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

- [amdsmi.h](#)

7.20 amdsmi_pcie_bandwidth_t Struct Reference

This structure holds information about the possible PCIe bandwidths. Specifically, the possible transfer rates and their associated numbers of lanes are stored here.

```
#include <amdsmi.h>
```

Data Fields

- [amdsmi_frequencies_t transfer_rate](#)
- [uint32_t lanes](#) [[AMDSMI_MAX_NUM_FREQUENCIES](#)]

7.20.1 Detailed Description

This structure holds information about the possible PCIe bandwidths. Specifically, the possible transfer rates and their associated numbers of lanes are stored here.

7.20.2 Field Documentation

7.20.2.1 transfer_rate

```
amdsmi\_frequencies\_t amdsmi_pcie_bandwidth_t::transfer_rate
```

Transfer rates (T/s) that are possible

7.20.2.2 lanes

```
uint32\_t amdsmi_pcie_bandwidth_t::lanes [AMDSMI\_MAX\_NUM\_FREQUENCIES]
```

List of lanes for corresponding transfer rate. Only the first num_supported bandwidths are valid.

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

- [amdsmi.h](#)

7.21 amdsmi_pcie_info_t Struct Reference

This structure holds pcie info.

```
#include <amdsmi.h>
```

Data Fields

- uint16_t **pcie_lanes**
- uint32_t **pcie_speed**
- uint32_t **reserved** [6]

7.21.1 Detailed Description

This structure holds pcie info.

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

- [amdsmi.h](#)

7.22 amdsmi_power_cap_info_t Struct Reference

Data Fields

- uint64_t **power_cap**
- uint64_t **default_power_cap**
- uint64_t **dpm_cap**
- uint64_t **min_power_cap**
- uint64_t **max_power_cap**
- uint64_t **reserved** [3]

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

- [amdsmi.h](#)

7.23 amdsmi_power_measure_t Struct Reference

Data Fields

- uint32_t **average_socket_power**
- uint64_t **energy_accumulator**
- uint32_t **voltage_gfx**
- uint32_t **voltage_soc**
- uint32_t **voltage_mem**
- uint32_t **power_limit**
- uint32_t **reserved** [9]

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

- [amdsmi.h](#)

7.24 amdsmi_power_profile_status_t Struct Reference

This structure contains information about which power profiles are supported by the system for a given device, and which power profile is currently active.

```
#include <amdsmi.h>
```

Data Fields

- [amdsmi_bit_field_t available_profiles](#)
- [amdsmi_power_profile_preset_masks_t current](#)
- [uint32_t num_profiles](#)

7.24.1 Detailed Description

This structure contains information about which power profiles are supported by the system for a given device, and which power profile is currently active.

7.24.2 Field Documentation

7.24.2.1 available_profiles

```
amdsmi_bit_field_t amdsmi_power_profile_status_t::available_profiles
```

Which profiles are supported by this system

7.24.2.2 current

```
amdsmi_power_profile_preset_masks_t amdsmi_power_profile_status_t::current
```

Which power profile is currently active

7.24.2.3 num_profiles

```
uint32_t amdsmi_power_profile_status_t::num_profiles
```

How many power profiles are available

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

- [amdsmi.h](#)

7.25 amdsmi_proc_info_t Struct Reference

Data Fields

- char **name** [AMDSMI_NORMAL_STRING_LENGTH]
- amdsmi_process_handle **pid**
- uint64_t **mem**
- struct {
 - uint64_t **gfx**
 - uint64_t **compute**
 - uint64_t **dma**
 - uint64_t **enc**
 - uint64_t **dec**
 } **engine_usage**
- struct {
 - uint64_t **gtt_mem**
 - uint64_t **cpu_mem**
 - uint64_t **vram_mem**
 } **memory_usage**
- char **container_name** [AMDSMI_NORMAL_STRING_LENGTH]
- uint32_t **reserved** [10]

7.25.1 Field Documentation

7.25.1.1 engine_usage

```
struct { ... } amdsmi_proc_info_t::engine_usage
```

in bytes

7.25.1.2 memory_usage

```
struct { ... } amdsmi_proc_info_t::memory_usage
```

How much time the process spend using these engines in ns

7.25.1.3 container_name

```
char amdsmi_proc_info_t::container_name[AMDSMI_NORMAL_STRING_LENGTH]
```

in bytes

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

- [amdsmi.h](#)

7.26 amdsmi_process_info_t Struct Reference

This structure contains information specific to a process.

```
#include <amdsmi.h>
```

Data Fields

- `uint32_t process_id`
Process ID.
- `uint32_t pasid`
PASID.
- `uint64_t vram_usage`
VRAM usage.
- `uint64_t sdma_usage`
SDMA usage in microseconds.
- `uint32_t cu_occupancy`
Compute Unit usage in percent.

7.26.1 Detailed Description

This structure contains information specific to a process.

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

- [amdsmi.h](#)

7.27 amdsmi_range_t Struct Reference

This structure represents a range (e.g., frequencies or voltages).

```
#include <amdsmi.h>
```

Data Fields

- `uint64_t lower_bound`
Lower bound of range.
- `uint64_t upper_bound`
Upper bound of range.
- `uint64_t reserved [2]`

7.27.1 Detailed Description

This structure represents a range (e.g., frequencies or voltages).

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

- [amdsmi.h](#)

7.28 amdsmi_retired_page_record_t Struct Reference

Reserved Memory Page Record.

```
#include <amdsmi.h>
```

Data Fields

- [uint64_t page_address](#)
Start address of page.
- [uint64_t page_size](#)
Page size.
- [amdsmi_memory_page_status_t status](#)
Page "reserved" status.

7.28.1 Detailed Description

Reserved Memory Page Record.

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

- [amdsmi.h](#)

7.29 amdsmi_utilization_counter_t Struct Reference

The utilization counter data.

```
#include <amdsmi.h>
```

Data Fields

- [AMDSMI_UTILIZATION_COUNTER_TYPE type](#)
Utilization counter type.
- [uint64_t value](#)
Utilization counter value.

7.29.1 Detailed Description

The utilization counter data.

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

- [amdsmi.h](#)

7.30 amdsmi_vbios_info_t Struct Reference

Data Fields

- char **name** [AMDSMI_MAX_STRING_LENGTH]
- uint32_t **vbios_version**
- char **build_date** [AMDSMI_MAX_DATE_LENGTH]
- char **part_number** [AMDSMI_MAX_STRING_LENGTH]
- char **vbios_version_string** [AMDSMI_NORMAL_STRING_LENGTH]
- uint32_t **reserved** [15]

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

- [amdsmi.h](#)

7.31 amdsmi_version_t Struct Reference

This structure holds version information.

```
#include <amdsmi.h>
```

Data Fields

- uint32_t [major](#)
Major version.
- uint32_t [minor](#)
Minor version.
- uint32_t [patch](#)
Patch, build or stepping version.
- const char * [build](#)
Build string.
- uint32_t **reserved** [4]

7.31.1 Detailed Description

This structure holds version information.

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

- [amdsmi.h](#)

7.32 amdsmi_vram_info_t Struct Reference

Data Fields

- uint32_t **vram_total**
- uint32_t **vram_used**

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

- [amdsmi.h](#)

7.33 amdsmi_xgmi_info_t Struct Reference

Data Fields

- uint8_t **xgmi_lanes**
- uint64_t **xgmi_hive_id**
- uint64_t **xgmi_node_id**
- uint32_t **index**
- uint32_t **reserved** [9]

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

- [amdsmi.h](#)

Chapter 8

File Documentation

8.1 amdsmi.h File Reference

AMD System Management Interface API.

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

Data Structures

- struct [amdsmi_range_t](#)

This structure represents a range (e.g., frequencies or voltages).

- struct [amdsmi_xgmi_info_t](#)
- struct [amdsmi_gpu_caps_t](#)
- struct [amdsmi_vram_info_t](#)
- struct [amdsmi_frequency_range_t](#)
- union [amdsmi_bdf_t](#)
- struct [amdsmi_power_cap_info_t](#)
- struct [amdsmi_vbios_info_t](#)
- struct [amdsmi_fw_info_t](#)
- struct [amdsmi_asic_info_t](#)
- struct [amdsmi_board_info_t](#)
- struct [amdsmi_power_measure_t](#)
- struct [amdsmi_clk_measure_t](#)
- struct [amdsmi_engine_usage_t](#)
- struct [amdsmi_proc_info_t](#)
- struct [amdsmi_counter_value_t](#)
- struct [amdsmi_evt_notification_data_t](#)
- struct [amdsmi_utilization_counter_t](#)

The utilization counter data.

- struct [amdsmi_retired_page_record_t](#)

Reserved Memory Page Record.

- struct [amdsmi_power_profile_status_t](#)

This structure contains information about which power profiles are supported by the system for a given device, and which power profile is currently active.

- struct [amdsmi_frequencies_t](#)
This structure holds information about clock frequencies.
- struct [amdsmi_pcie_bandwidth_t](#)
This structure holds information about the possible PCIe bandwidths. Specifically, the possible transfer rates and their associated numbers of lanes are stored here.
- struct [amdsmi_version_t](#)
This structure holds version information.
- struct [amdsmi_od_vddc_point_t](#)
This structure represents a point on the frequency-voltage plane.
- struct [amdsmi_freq_volt_region_t](#)
This structure holds 2 [amdsmi_range_t](#)'s, one for frequency and one for voltage. These 2 ranges indicate the range of possible values for the corresponding [amdsmi_od_vddc_point_t](#).
- struct [amdsmi_od_volt_curve_t](#)
- struct [amdsmi_od_volt_freq_data_t](#)
This structure holds the frequency-voltage values for a device.
- struct [amd_metrics_table_header_t](#)
The following structures hold the gpu metrics values for a device.
- struct [amdsmi_gpu_metrics_t](#)
- struct [amdsmi_error_count_t](#)
This structure holds error counts.
- struct [amdsmi_pcie_info_t](#)
This structure holds pcie info.
- struct [amdsmi_process_info_t](#)
This structure contains information specific to a process.
- union [amdsmi_func_id_value_t](#)
This union holds the value of an [amdsmi_func_id_iter_handle_t](#). The value may be a function name, or an enumerated variant value of types such as [amdsmi_memory_type_t](#), [amdsmi_temperature_metric_t](#), etc.

Macros

- #define **AMDSMI_MAX_MM_IP_COUNT** 8
- #define [AMDSMI_MAX_DATE_LENGTH](#) 32
- #define **AMDSMI_MAX_STRING_LENGTH** 64
- #define **AMDSMI_NORMAL_STRING_LENGTH** 32
- #define **AMDSMI_MAX_DEVICES** 32
- #define **AMDSMI_MAX_NAME** 32
- #define **AMDSMI_MAX_DRIVER_VERSION_LENGTH** 80
- #define **AMDSMI_PRODUCT_NAME_LENGTH** 128
- #define **AMDSMI_MAX_CONTAINER_TYPE** 2
- #define **AMDSMI_GPU_UUID_SIZE** 38
- #define **AMDSMI_TIME_FORMAT** "%02d:%02d:%02d.%03d"
- #define **AMDSMI_DATE_FORMAT** "%04d-%02d-%02d:%02d:%02d.%03d"
- #define [AMDSMI_MAX_NUM_FREQUENCIES](#) 32
Guaranteed maximum possible number of supported frequencies.
- #define [AMDSMI_MAX_FAN_SPEED](#) 255
- #define [AMDSMI_NUM_VOLTAGE_CURVE_POINTS](#) 3
The number of points that make up a voltage-frequency curve definition.
- #define [AMDSMI_EVENT_MASK_FROM_INDEX](#)(i) (1ULL << ((i) - 1))
- #define **MAX_EVENT_NOTIFICATION_MSG_SIZE** 64
Maximum number of characters an event notification message will be.
- #define [AMDSMI_MAX_NUM_POWER_PROFILES](#) (sizeof([amdsmi_bit_field_t](#)) * 8)
Number of possible power profiles that a system could support.

- #define [AMDSMI_GPU_METRICS_API_FORMAT_VER](#) 1
The following structure holds the gpu metrics values for a device.
- #define [AMDSMI_GPU_METRICS_API_CONTENT_VER_1](#) 1
- #define [AMDSMI_GPU_METRICS_API_CONTENT_VER_2](#) 2
- #define [AMDSMI_GPU_METRICS_API_CONTENT_VER_3](#) 3
- #define [AMDSMI_NUM_HBM_INSTANCES](#) 4
- #define [CENTRIGRADE_TO_MILLI_CENTIGRADE](#) 1000
- #define [AMDSMI_DEFAULT_VARIANT](#) 0xFFFFFFFFFFFFFFFF

Typedefs

- typedef void * [amdsmi_device_handle](#)
opaque handler point to underlying implementation
- typedef void * [amdsmi_socket_handle](#)
- typedef uint32_t [amdsmi_process_handle](#)
- typedef uintptr_t [amdsmi_event_handle_t](#)
Handle to performance event counter.
- typedef uint64_t [amdsmi_bit_field_t](#)
Bitfield used in various AMDSMI calls.
- typedef struct amdsmi_func_id_iter_handle * [amdsmi_func_id_iter_handle_t](#)
Opaque handle to function-support object.

Enumerations

- enum [amdsmi_init_flags_t](#) {
 [AMDSMI_INIT_ALL_DEVICES](#) = 0x0, [AMDSMI_INIT_AMD_CPUS](#) = (1 << 0), [AMDSMI_INIT_AMD_GPUS](#) = (1 << 1), [AMDSMI_INIT_NON_AMD_CPUS](#) = (1 << 2),
 [AMDSMI_INIT_NON_AMD_GPUS](#) = (1 << 3) }
Initialization flags.
- enum [amdsmi_mm_ip_t](#) { [AMDSMI_MM_UVD](#), [AMDSMI_MM_VCE](#), [AMDSMI_MM_VCN](#), [AMDSMI_MM_MAX](#) }
- enum [amdsmi_container_types_t](#) { [CONTAINER_LXC](#), [CONTAINER_DOCKER](#) }
- enum [device_type_t](#) {
 [UNKNOWN](#) = 0, [AMD_GPU](#), [AMD_CPU](#), [NON_AMD_GPU](#),
 [NON_AMD_CPU](#) }
Device types detectable by AMD SMI.
- enum [amdsmi_status_t](#) {
 [AMDSMI_STATUS_SUCCESS](#) = 0, [AMDSMI_STATUS_INVALID](#) = 1, [AMDSMI_STATUS_NOT_SUPPORTED](#) = 2, [AMDSMI_STATUS_NOT_YET_IMPLEMENTED](#) = 3,
 [AMDSMI_STATUS_FAIL_LOAD_MODULE](#) = 4, [AMDSMI_STATUS_FAIL_LOAD_SYMBOL](#) = 5, [AMDSMI_STATUS_DRM_ERROR](#) = 6, [AMDSMI_STATUS_API_FAILED](#) = 7,
 [AMDSMI_STATUS_TIMEOUT](#) = 8, [AMDSMI_STATUS_RETRY](#) = 9, [AMDSMI_STATUS_NO_PERM](#) = 10,
 [AMDSMI_STATUS_INTERRUPT](#) = 11,
 [AMDSMI_STATUS_IO](#) = 12, [AMDSMI_STATUS_ADDRESS_FAULT](#) = 13, [AMDSMI_STATUS_FILE_ERROR](#) = 14, [AMDSMI_STATUS_OUT_OF_RESOURCES](#) = 15,
 [AMDSMI_STATUS_INTERNAL_EXCEPTION](#) = 16, [AMDSMI_STATUS_INPUT_OUT_OF_BOUNDS](#) = 17,
 [AMDSMI_STATUS_INIT_ERROR](#) = 18, [AMDSMI_STATUS_REFCOUNT_OVERFLOW](#) = 19,
 [AMDSMI_STATUS_BUSY](#) = 30, [AMDSMI_STATUS_NOT_FOUND](#) = 31, [AMDSMI_STATUS_NOT_INIT](#) = 32, [AMDSMI_STATUS_NO_SLOT](#) = 33,
 [AMDSMI_STATUS_NO_DATA](#) = 40, [AMDSMI_STATUS_INSUFFICIENT_SIZE](#) = 41, [AMDSMI_STATUS_UNEXPECTED_SIZE](#) = 42, [AMDSMI_STATUS_UNEXPECTED_DATA](#) = 43,
 [AMDSMI_STATUS_MAP_ERROR](#) = 0xFFFFFFFFFE, [AMDSMI_STATUS_UNKNOWN_ERROR](#) = 0xFFFFFFFF }
 FFF }

Event type enum. Events belonging to a particular event group [amdsmi_event_group_t](#) should begin enumerating at the [amdsmi_event_group_t](#) value for that group.

- enum [amdsmi_counter_command_t](#) { [AMDSMI_CNTR_CMD_START](#) = 0, [AMDSMI_CNTR_CMD_STOP](#) }
- enum [amdsmi_evt_notification_type_t](#) {
[AMDSMI_EVT_NOTIF_VMFault](#) = 1, [AMDSMI_EVT_NOTIF_FIRST](#) = [AMDSMI_EVT_NOTIF_VMFault](#),
[AMDSMI_EVT_NOTIF_THERMAL_THROTTLE](#) = 2, [AMDSMI_EVT_NOTIF_GPU_PRE_RESET](#) = 3,
[AMDSMI_EVT_NOTIF_GPU_POST_RESET](#) = 4, [AMDSMI_EVT_NOTIF_LAST](#) = [AMDSMI_EVT_NOTIF_GPU_POST_RESET](#) }
- enum [amdsmi_temperature_metric_t](#) {
[AMDSMI_TEMP_CURRENT](#) = 0x0, [AMDSMI_TEMP_FIRST](#) = [AMDSMI_TEMP_CURRENT](#), [AMDSMI_TEMP_MAX](#),
[AMDSMI_TEMP_MIN](#),
[AMDSMI_TEMP_MAX_HYST](#), [AMDSMI_TEMP_MIN_HYST](#), [AMDSMI_TEMP_CRITICAL](#), [AMDSMI_TEMP_CRITICAL_HYST](#),
[AMDSMI_TEMP_EMERGENCY](#), [AMDSMI_TEMP_EMERGENCY_HYST](#), [AMDSMI_TEMP_CRIT_MIN](#),
[AMDSMI_TEMP_CRIT_MIN_HYST](#),
[AMDSMI_TEMP_OFFSET](#), [AMDSMI_TEMP_LOWEST](#), [AMDSMI_TEMP_HIGHEST](#), [AMDSMI_TEMP_LAST](#) = [AMDSMI_TEMP_HIGHEST](#) }

Temperature Metrics. This enum is used to identify various temperature metrics. Corresponding values will be in millidegrees Celsius.

- enum [amdsmi_voltage_metric_t](#) {
[AMDSMI_VOLT_CURRENT](#) = 0x0, [AMDSMI_VOLT_FIRST](#) = [AMDSMI_VOLT_CURRENT](#), [AMDSMI_VOLT_MAX](#),
[AMDSMI_VOLT_MIN_CRIT](#),
[AMDSMI_VOLT_MIN](#), [AMDSMI_VOLT_MAX_CRIT](#), [AMDSMI_VOLT_AVERAGE](#), [AMDSMI_VOLT_LOWEST](#),
[AMDSMI_VOLT_HIGHEST](#), [AMDSMI_VOLT_LAST](#) = [AMDSMI_VOLT_HIGHEST](#) }

Voltage Metrics. This enum is used to identify various Voltage metrics. Corresponding values will be in millivolt.

- enum [amdsmi_voltage_type_t](#) { [AMDSMI_VOLT_TYPE_FIRST](#) = 0, [AMDSMI_VOLT_TYPE_VDDGFX](#) = [AMDSMI_VOLT_TYPE_FIRST](#), [AMDSMI_VOLT_TYPE_LAST](#) = [AMDSMI_VOLT_TYPE_VDDGFX](#), [AMDSMI_VOLT_TYPE_INVALID](#) = 0xFFFFFFFF }

This enumeration is used to indicate which type of voltage reading should be obtained.

- enum [amdsmi_power_profile_preset_masks_t](#) {
[AMDSMI_PWR_PROF_PRST_CUSTOM_MASK](#) = 0x1, [AMDSMI_PWR_PROF_PRST_VIDEO_MASK](#) = 0x2,
[AMDSMI_PWR_PROF_PRST_POWER_SAVING_MASK](#) = 0x4, [AMDSMI_PWR_PROF_PRST_COMPUTE_MASK](#) = 0x8,
[AMDSMI_PWR_PROF_PRST_VR_MASK](#) = 0x10, [AMDSMI_PWR_PROF_PRST_3D_FULL_SCR_MASK](#) = 0x20,
[AMDSMI_PWR_PROF_PRST_BOOTUP_DEFAULT](#) = 0x40, [AMDSMI_PWR_PROF_PRST_LAST](#) = [AMDSMI_PWR_PROF_PRST_BOOTUP_DEFAULT](#),
[AMDSMI_PWR_PROF_PRST_INVALID](#) = 0xFFFFFFFF }

Pre-set Profile Selections. These bitmasks can be AND'd with the [amdsmi_power_profile_status_t.available_profiles](#) returned from :: [amdsmi_dev_get_power_profile_presets](#) to determine which power profiles are supported by the system.

- enum [amdsmi_gpu_block_t](#) {
[AMDSMI_GPU_BLOCK_INVALID](#) = 0x0000000000000000, [AMDSMI_GPU_BLOCK_FIRST](#) = 0x0000000000000001,
[AMDSMI_GPU_BLOCK_UMC](#) = [AMDSMI_GPU_BLOCK_FIRST](#), [AMDSMI_GPU_BLOCK_SDMA](#) = 0x0000000000000002,
[AMDSMI_GPU_BLOCK_GFX](#) = 0x0000000000000004, [AMDSMI_GPU_BLOCK_MMHUB](#) = 0x0000000000000008,
[AMDSMI_GPU_BLOCK_ATHUB](#) = 0x0000000000000010, [AMDSMI_GPU_BLOCK_PCIE_BIF](#) = 0x0000000000000020,
[AMDSMI_GPU_BLOCK_HDP](#) = 0x0000000000000040, [AMDSMI_GPU_BLOCK_XGMI_WAFL](#) = 0x0000000000000080,
[AMDSMI_GPU_BLOCK_DF](#) = 0x0000000000000100, [AMDSMI_GPU_BLOCK_SMN](#) = 0x0000000000000200,
[AMDSMI_GPU_BLOCK_SEM](#) = 0x0000000000000400, [AMDSMI_GPU_BLOCK_MP0](#) = 0x0000000000000800,
[AMDSMI_GPU_BLOCK_MP1](#) = 0x0000000000001000, [AMDSMI_GPU_BLOCK_FUSE](#) = 0x0000000000002000,
[AMDSMI_GPU_BLOCK_LAST](#) = [AMDSMI_GPU_BLOCK_FUSE](#), [AMDSMI_GPU_BLOCK_RESERVED](#) = 0x8000000000000000 }

This enum is used to identify different GPU blocks.

- enum [amdsmi_ras_err_state_t](#) {
[AMDSMI_RAS_ERR_STATE_NONE](#) = 0, [AMDSMI_RAS_ERR_STATE_DISABLED](#), [AMDSMI_RAS_ERR_STATE_PARITY](#),
[AMDSMI_RAS_ERR_STATE_SING_C](#),
[AMDSMI_RAS_ERR_STATE_MULT_UC](#), [AMDSMI_RAS_ERR_STATE_POISON](#), [AMDSMI_RAS_ERR_STATE_ENABLED](#),
[AMDSMI_RAS_ERR_STATE_LAST](#) = [AMDSMI_RAS_ERR_STATE_ENABLED](#),
[AMDSMI_RAS_ERR_STATE_INVALID](#) = 0xFFFFFFFF }

The current ECC state.

- enum `amdsmi_memory_type_t` {
AMDSMI_MEM_TYPE_FIRST = 0, **AMDSMI_MEM_TYPE_VRAM** = **AMDSMI_MEM_TYPE_FIRST**,
AMDSMI_MEM_TYPE_VIS_VRAM, **AMDSMI_MEM_TYPE_GTT**,
AMDSMI_MEM_TYPE_LAST = **AMDSMI_MEM_TYPE_GTT** }

Types of memory.

- enum `amdsmi_freq_ind_t` { **AMDSMI_FREQ_IND_MIN** = 0, **AMDSMI_FREQ_IND_MAX** = 1, **AMDSMI_FREQ_IND_INVALID** = 0xFFFFFFFF }

The values of this enum are used as frequency identifiers.

- enum `amdsmi_xgmi_status_t` { **AMDSMI_XGMI_STATUS_NO_ERRORS** = 0, **AMDSMI_XGMI_STATUS_↵**
_ERROR, **AMDSMI_XGMI_STATUS_MULTIPLE_ERRORS** }

XGMI Status.

- enum `amdsmi_memory_page_status_t` { **AMDSMI_MEM_PAGE_STATUS_RESERVED** = 0, **AMDSMI_MEM_PAGE_STATUS_↵**
AMDSMI_MEM_PAGE_STATUS_UNRESERVABLE }

Reserved Memory Page States.

- enum `AMDSMI_IO_LINK_TYPE` {
AMDSMI_IOLINK_TYPE_UNDEFINED = 0, **AMDSMI_IOLINK_TYPE_PCIEEXPRESS** = 1, **AMDSMI_IOLINK_TYPE_XGMI**
= 2, **AMDSMI_IOLINK_TYPE_NUMIOLINKTYPES**,
AMDSMI_IOLINK_TYPE_SIZE = 0xFFFFFFFF }

Types for IO Link.

- enum `AMDSMI_UTILIZATION_COUNTER_TYPE` { **AMDSMI_UTILIZATION_COUNTER_FIRST** = 0, **AMD_↵**
SMI_COARSE_GRAIN GFX_ACTIVITY = **AMDSMI_UTILIZATION_COUNTER_FIRST**, **AMDSMI_COARSE_GRAIN_MEM_A**
AMDSMI_UTILIZATION_COUNTER_LAST = **AMDSMI_COARSE_GRAIN_MEM_ACTIVITY** }

The utilization counter type.

Functions

- `amdsmi_status_t amdsmi_init` (uint64_t init_flags)

Initialize the AMD SMI library.

- `amdsmi_status_t amdsmi_shut_down` (void)

Shutdown the AMD SMI library.

- `amdsmi_status_t amdsmi_get_socket_handles` (uint32_t *socket_count, amdsmi_socket_handle *socket_↵
handles)

Get the list of socket handles in the system.

- `amdsmi_status_t amdsmi_get_socket_info` (amdsmi_socket_handle socket_handle, char *name, size_t len)

Get information about the given socket.

- `amdsmi_status_t amdsmi_get_device_handles` (amdsmi_socket_handle socket_handle, uint32_t *device_↵
count, amdsmi_device_handle *device_handles)

Get the list of the device handles associated to a socket.

- `amdsmi_status_t amdsmi_get_device_type` (amdsmi_device_handle device_handle, device_type_t
*device_type)

Get the device type of the device_handle.

- `amdsmi_status_t amdsmi_get_device_handle_from_bdf` (amdsmi_bdf_t bdf, amdsmi_device_handle
*device_handle)

Get device handle with the matching bdf.

- `amdsmi_status_t amdsmi_dev_get_id` (amdsmi_device_handle device_handle, uint16_t *id)

Get the device id associated with the device with provided device handler.

- `amdsmi_status_t amdsmi_dev_get_vendor_name` (amdsmi_device_handle device_handle, char *name,
size_t len)

Get the name string for a give vendor ID.

- `amdsmi_status_t amdsmi_dev_get_vram_vendor` (amdsmi_device_handle device_handle, char *brand,
uint32_t len)

Get the vram vendor string of a device.

- `amdsmi_status_t amdsmi_dev_get_subsystem_id (amdsmi_device_handle device_handle, uint16_t *id)`

Get the subsystem device id associated with the device with provided device handle.

- `amdsmi_status_t amdsmi_dev_get_subsystem_name (amdsmi_device_handle device_handle, char *name, size_t len)`

Get the name string for the device subsystem.

- `amdsmi_status_t amdsmi_dev_get_drm_render_minor (amdsmi_device_handle device_handle, uint32_t *minor)`

Get the drm minor number associated with this device.

- `amdsmi_status_t amdsmi_dev_get_pci_bandwidth (amdsmi_device_handle device_handle, amdsmi_pcie_bandwidth_t *bandwidth)`

Get the list of possible PCIe bandwidths that are available.

- `amdsmi_status_t amdsmi_dev_get_pci_id (amdsmi_device_handle device_handle, uint64_t *bdfid)`

Get the unique PCI device identifier associated for a device.

- `amdsmi_status_t amdsmi_topo_get_numa_affinity (amdsmi_device_handle device_handle, uint32_t *numa_node)`

Get the NUMA node associated with a device.

- `amdsmi_status_t amdsmi_dev_get_pci_throughput (amdsmi_device_handle device_handle, uint64_t *sent, uint64_t *received, uint64_t *max_pkt_sz)`

Get PCIe traffic information.

- `amdsmi_status_t amdsmi_dev_get_pci_replay_counter (amdsmi_device_handle device_handle, uint64_t *counter)`

Get PCIe replay counter.

- `amdsmi_status_t amdsmi_dev_set_pci_bandwidth (amdsmi_device_handle device_handle, uint64_t bw_bitmask)`

Control the set of allowed PCIe bandwidths that can be used.

- `amdsmi_status_t amdsmi_dev_get_power_ave (amdsmi_device_handle device_handle, uint32_t sensor_ind, uint64_t *power)`

Get the average power consumption of a device.

- `amdsmi_status_t amdsmi_dev_get_energy_count (amdsmi_device_handle device_handle, uint64_t *power, float *counter_resolution, uint64_t *timestamp)`

Get the energy accumulator counter of the device with provided device handle.

- `amdsmi_status_t amdsmi_dev_set_power_cap (amdsmi_device_handle device_handle, uint32_t sensor_ind, uint64_t cap)`

Set the maximum gpu power cap value.

- `amdsmi_status_t amdsmi_dev_set_power_profile (amdsmi_device_handle device_handle, uint32_t reserved, amdsmi_power_profile_preset_masks_t profile)`

Set the power performance profile.

- `amdsmi_status_t amdsmi_dev_get_memory_total (amdsmi_device_handle device_handle, amdsmi_memory_type_t mem_type, uint64_t *total)`

Get the total amount of memory that exists.

- `amdsmi_status_t amdsmi_dev_get_memory_usage (amdsmi_device_handle device_handle, amdsmi_memory_type_t mem_type, uint64_t *used)`

Get the current memory usage.

- `amdsmi_status_t amdsmi_get_bad_page_info (amdsmi_device_handle device_handle, uint32_t *num_pages, amdsmi_retired_page_record_t *info)`

The first call to this API returns the number of bad pages which should be used to allocate the buffer that should contain the bad page records.

- `amdsmi_status_t amdsmi_get_ras_block_features_enabled (amdsmi_device_handle device_handle, amdsmi_gpu_block_t block, amdsmi_ras_err_state_t *state)`

Returns if RAS features are enabled or disabled for given block.

- `amdsmi_status_t amdsmi_dev_get_memory_busy_percent (amdsmi_device_handle device_handle, uint32_t *busy_percent)`

Get percentage of time any device memory is being used.

- `amdsmi_status_t amdsmi_dev_get_memory_reserved_pages` (`amdsmi_device_handle` device_handle, `uint32_t` *num_pages, `amdsmi_retired_page_record_t` *records)

Get information about reserved ("retired") memory pages.

- `amdsmi_status_t amdsmi_dev_get_fan_rpms` (`amdsmi_device_handle` device_handle, `uint32_t` sensor_ind, `int64_t` *speed)

Get the fan speed in RPMs of the device with the specified device handle and 0-based sensor index.

- `amdsmi_status_t amdsmi_dev_get_fan_speed` (`amdsmi_device_handle` device_handle, `uint32_t` sensor_ind, `int64_t` *speed)

Get the fan speed for the specified device as a value relative to `AMDSMI_MAX_FAN_SPEED`.

- `amdsmi_status_t amdsmi_dev_get_fan_speed_max` (`amdsmi_device_handle` device_handle, `uint32_t` sensor_ind, `uint64_t` *max_speed)

Get the max. fan speed of the device with provided device handle.

- `amdsmi_status_t amdsmi_dev_get_temp_metric` (`amdsmi_device_handle` device_handle, `amdsmi_temperature_type_t` sensor_type, `amdsmi_temperature_metric_t` metric, `int64_t` *temperature)

Get the temperature metric value for the specified metric, from the specified temperature sensor on the specified device.

- `amdsmi_status_t amdsmi_dev_get_volt_metric` (`amdsmi_device_handle` device_handle, `amdsmi_voltage_type_t` sensor_type, `amdsmi_voltage_metric_t` metric, `int64_t` *voltage)

Get the voltage metric value for the specified metric, from the specified voltage sensor on the specified device.

- `amdsmi_status_t amdsmi_dev_reset_fan` (`amdsmi_device_handle` device_handle, `uint32_t` sensor_ind)

Reset the fan to automatic driver control.

- `amdsmi_status_t amdsmi_dev_set_fan_speed` (`amdsmi_device_handle` device_handle, `uint32_t` sensor_ind, `uint64_t` speed)

Set the fan speed for the specified device with the provided speed, in RPMs.

- `amdsmi_status_t amdsmi_dev_get_busy_percent` (`amdsmi_device_handle` device_handle, `uint32_t` *busy_percent)

Get percentage of time device is busy doing any processing.

- `amdsmi_status_t amdsmi_get_utilization_count` (`amdsmi_device_handle` device_handle, `amdsmi_utilization_counter_t` utilization_counters[], `uint32_t` count, `uint64_t` *timestamp)

Get coarse grain utilization counter of the specified device.

- `amdsmi_status_t amdsmi_get_pcie_link_status` (`amdsmi_device_handle` device_handle, `amdsmi_pcie_info_t` *info)

Get current PCIe info of the device with provided device handle.

- `amdsmi_status_t amdsmi_get_pcie_link_caps` (`amdsmi_device_handle` device_handle, `amdsmi_pcie_info_t` *info)

Get max PCIe capabilities of the device with provided device handle.

- `amdsmi_status_t amdsmi_dev_get_perf_level` (`amdsmi_device_handle` device_handle, `amdsmi_dev_perf_level_t` *perf)

Get the performance level of the device.

- `amdsmi_status_t amdsmi_set_perf_determinism_mode` (`amdsmi_device_handle` device_handle, `uint64_t` clkvalue)

Enter performance determinism mode with provided device handle.

- `amdsmi_status_t amdsmi_dev_get_overdrive_level` (`amdsmi_device_handle` device_handle, `uint32_t` *od)

Get the overdrive percent associated with the device with provided device handle.

- `amdsmi_status_t amdsmi_dev_get_gpu_clk_freq` (`amdsmi_device_handle` device_handle, `amdsmi_clk_type_t` clk_type, `amdsmi_frequencies_t` *f)

Get the list of possible system clock speeds of device for a specified clock type.

- `amdsmi_status_t amdsmi_dev_reset_gpu` (`amdsmi_device_handle` device_handle)

Reset the gpu associated with the device with provided device handle.

- `amdsmi_status_t amdsmi_dev_get_od_volt_info` (`amdsmi_device_handle` device_handle, `amdsmi_od_volt_freq_data_t` *odv)

This function retrieves the voltage/frequency curve information.

- [amdsmi_status_t amdsmi_dev_get_gpu_metrics_info](#) ([amdsmi_device_handle](#) device_handle, [amdsmi_gpu_metrics_t](#) *pgpu_metrics)
This function retrieves the gpu metrics information.
- [amdsmi_status_t amdsmi_dev_set_clk_range](#) ([amdsmi_device_handle](#) device_handle, [uint64_t](#) minclkvalue, [uint64_t](#) maxclkvalue, [amdsmi_clk_type_t](#) clkType)
This function sets the clock range information.
- [amdsmi_status_t amdsmi_dev_set_od_clk_info](#) ([amdsmi_device_handle](#) device_handle, [amdsmi_freq_ind_t](#) level, [uint64_t](#) clkvalue, [amdsmi_clk_type_t](#) clkType)
This function sets the clock frequency information.
- [amdsmi_status_t amdsmi_dev_set_od_volt_info](#) ([amdsmi_device_handle](#) device_handle, [uint32_t](#) vpoint, [uint64_t](#) clkvalue, [uint64_t](#) voltvalue)
This function sets 1 of the 3 voltage curve points.
- [amdsmi_status_t amdsmi_dev_get_od_volt_curve_regions](#) ([amdsmi_device_handle](#) device_handle, [uint32_t](#) *num_regions, [amdsmi_freq_volt_region_t](#) *buffer)
This function will retrieve the current valid regions in the frequency/voltage space.
- [amdsmi_status_t amdsmi_dev_get_power_profile_presets](#) ([amdsmi_device_handle](#) device_handle, [uint32_t](#) sensor_ind, [amdsmi_power_profile_status_t](#) *status)
Get the list of available preset power profiles and an indication of which profile is currently active.
- [amdsmi_status_t amdsmi_dev_set_perf_level](#) ([amdsmi_device_handle](#) device_handle, [amdsmi_dev_perf_level_t](#) perf_lv)
Set the PowerPlay performance level associated with the device with provided device handle with the provided value.
- [amdsmi_status_t amdsmi_dev_set_perf_level_v1](#) ([amdsmi_device_handle](#) device_handle, [amdsmi_dev_perf_level_t](#) perf_lv)
Set the PowerPlay performance level associated with the device with provided device handle with the provided value.
- [amdsmi_status_t amdsmi_dev_set_overdrive_level](#) ([amdsmi_device_handle](#) device_handle, [uint32_t](#) od)
Set the overdrive percent associated with the device with provided device handle with the provided value. See details for WARNING.
- [amdsmi_status_t amdsmi_dev_set_overdrive_level_v1](#) ([amdsmi_device_handle](#) device_handle, [uint32_t](#) od)
Set the overdrive percent associated with the device with provided device handle with the provided value. See details for WARNING.
- [amdsmi_status_t amdsmi_dev_set_clk_freq](#) ([amdsmi_device_handle](#) device_handle, [amdsmi_clk_type_t](#) clk_type, [uint64_t](#) freq_bitmask)
Control the set of allowed frequencies that can be used for the specified clock.
- [amdsmi_status_t amdsmi_get_version](#) ([amdsmi_version_t](#) *version)
Get the build version information for the currently running build of AMDSMI.
- [amdsmi_status_t amdsmi_get_version_str](#) ([amdsmi_sw_component_t](#) component, [char](#) *ver_str, [uint32_t](#) len)
Get the driver version string for the current system.
- [amdsmi_status_t amdsmi_dev_get_ecc_count](#) ([amdsmi_device_handle](#) device_handle, [amdsmi_gpu_block_t](#) block, [amdsmi_error_count_t](#) *ec)
Retrieve the error counts for a GPU block.
- [amdsmi_status_t amdsmi_dev_get_ecc_enabled](#) ([amdsmi_device_handle](#) device_handle, [uint64_t](#) *enabled_blocks)
Retrieve the enabled ECC bit-mask.
- [amdsmi_status_t amdsmi_dev_get_ecc_status](#) ([amdsmi_device_handle](#) device_handle, [amdsmi_gpu_block_t](#) block, [amdsmi_ras_err_state_t](#) *state)
Retrieve the ECC status for a GPU block.
- [amdsmi_status_t amdsmi_status_string](#) ([amdsmi_status_t](#) status, [const char](#) **status_string)
Get a description of a provided AMDSMI error status.
- [amdsmi_status_t amdsmi_dev_counter_group_supported](#) ([amdsmi_device_handle](#) device_handle, [amdsmi_event_group_t](#) group)
Tell if an event group is supported by a given device.

- `amdsmi_status_t amdsmi_dev_create_counter (amdsmi_device_handle device_handle, amdsmi_event_type_t type, amdsmi_event_handle_t *evnt_handle)`
Create a performance counter object.
- `amdsmi_status_t amdsmi_dev_destroy_counter (amdsmi_event_handle_t evnt_handle)`
Deallocate a performance counter object.
- `amdsmi_status_t amdsmi_control_counter (amdsmi_event_handle_t evt_handle, amdsmi_counter_command_t cmd, void *cmd_args)`
Issue performance counter control commands.
- `amdsmi_status_t amdsmi_read_counter (amdsmi_event_handle_t evt_handle, amdsmi_counter_value_t *value)`
Read the current value of a performance counter.
- `amdsmi_status_t amdsmi_counter_get_available_counters (amdsmi_device_handle device_handle, amdsmi_event_group_t grp, uint32_t *available)`
Get the number of currently available counters.
- `amdsmi_status_t amdsmi_get_compute_process_info (amdsmi_process_info_t *procs, uint32_t *num_items)`
Get process information about processes currently using GPU.
- `amdsmi_status_t amdsmi_get_compute_process_info_by_pid (uint32_t pid, amdsmi_process_info_t *proc)`
Get process information about a specific process.
- `amdsmi_status_t amdsmi_get_compute_process_gpus (uint32_t pid, uint32_t *dv_indices, uint32_t *num_devices)`
Get the device indices currently being used by a process.
- `amdsmi_status_t amdsmi_dev_xgmi_error_status (amdsmi_device_handle device_handle, amdsmi_xgmi_status_t *status)`
Retrieve the XGMI error status for a device.
- `amdsmi_status_t amdsmi_dev_reset_xgmi_error (amdsmi_device_handle device_handle)`
Reset the XGMI error status for a device.
- `amdsmi_status_t amdsmi_topo_get_numa_node_number (amdsmi_device_handle device_handle, uint32_t *numa_node)`
Retrieve the NUMA CPU node number for a device.
- `amdsmi_status_t amdsmi_topo_get_link_weight (amdsmi_device_handle device_handle_src, amdsmi_device_handle device_handle_dst, uint64_t *weight)`
Retrieve the weight for a connection between 2 GPUs.
- `amdsmi_status_t amdsmi_get_minmax_bandwidth (amdsmi_device_handle device_handle_src, amdsmi_device_handle device_handle_dst, uint64_t *min_bandwidth, uint64_t *max_bandwidth)`
Retrieve minimal and maximal io link bandwidth between 2 GPUs.
- `amdsmi_status_t amdsmi_topo_get_link_type (amdsmi_device_handle device_handle_src, amdsmi_device_handle device_handle_dst, uint64_t *hops, AMDSMI_IO_LINK_TYPE *type)`
Retrieve the hops and the connection type between 2 GPUs.
- `amdsmi_status_t amdsmi_is_P2P_accessible (amdsmi_device_handle device_handle_src, amdsmi_device_handle device_handle_dst, bool *accessible)`
Return P2P availability status between 2 GPUs.
- `amdsmi_status_t amdsmi_dev_open_supported_func_iterator (amdsmi_device_handle device_handle, amdsmi_func_id_iter_handle_t *handle)`
Get a function name iterator of supported AMDSMI functions for a device.
- `amdsmi_status_t amdsmi_dev_open_supported_variant_iterator (amdsmi_func_id_iter_handle_t obj_h, amdsmi_func_id_iter_handle_t *var_iter)`
Get a variant iterator for a given handle.
- `amdsmi_status_t amdsmi_next_func_iter (amdsmi_func_id_iter_handle_t handle)`
Advance a function identifier iterator.
- `amdsmi_status_t amdsmi_dev_close_supported_func_iterator (amdsmi_func_id_iter_handle_t *handle)`
Close a variant iterator handle.

- [amdsmi_status_t amdsmi_get_func_iter_value](#) ([amdsmi_func_id_iter_handle_t](#) handle, [amdsmi_func_id_value_t](#) *value)
Get the value associated with a function/variant iterator.
- [amdsmi_status_t amdsmi_init_event_notification](#) ([amdsmi_device_handle](#) device_handle)
Prepare to collect event notifications for a GPU.
- [amdsmi_status_t amdsmi_set_event_notification_mask](#) ([amdsmi_device_handle](#) device_handle, [uint64_t](#) mask)
Specify which events to collect for a device.
- [amdsmi_status_t amdsmi_get_event_notification](#) ([int](#) timeout_ms, [uint32_t](#) *num_elem, [amdsmi_evt_notification_data_t](#) *data)
Collect event notifications, waiting a specified amount of time.
- [amdsmi_status_t amdsmi_stop_event_notification](#) ([amdsmi_device_handle](#) device_handle)
Close any file handles and free any resources used by event notification for a GPU.
- [amdsmi_status_t amdsmi_get_device_bdf](#) ([amdsmi_device_handle](#) device_handle, [amdsmi_bdf_t](#) *bdf)
Returns BDF of the given device.
- [amdsmi_status_t amdsmi_get_device_uuid](#) ([amdsmi_device_handle](#) device_handle, [unsigned int](#) *uuid, [char](#) *uuid)
Returns the UUID of the device.
- [amdsmi_status_t amdsmi_get_driver_version](#) ([amdsmi_device_handle](#) device_handle, [int](#) *length, [char](#) *version)
Returns the driver version information.
- [amdsmi_status_t amdsmi_get_asic_info](#) ([amdsmi_device_handle](#) device_handle, [amdsmi_asic_info_t](#) *info)
Returns the ASIC information for the device.
- [amdsmi_status_t amdsmi_get_board_info](#) ([amdsmi_device_handle](#) device_handle, [amdsmi_board_info_t](#) *info)
Returns the board part number and board information for the requested device.
- [amdsmi_status_t amdsmi_get_power_cap_info](#) ([amdsmi_device_handle](#) device_handle, [uint32_t](#) sensor_ind, [amdsmi_power_cap_info_t](#) *info)
Returns the power caps as currently configured in the system.
- [amdsmi_status_t amdsmi_get_xgmi_info](#) ([amdsmi_device_handle](#) device_handle, [amdsmi_xgmi_info_t](#) *info)
Returns XGMI information for the GPU.
- [amdsmi_status_t amdsmi_get_caps_info](#) ([amdsmi_device_handle](#) device_handle, [amdsmi_gpu_caps_t](#) *info)
Returns the device capabilities as currently configured in the system.
- [amdsmi_status_t amdsmi_get_fw_info](#) ([amdsmi_device_handle](#) device_handle, [amdsmi_fw_info_t](#) *info)
Returns the firmware versions running on the device.
- [amdsmi_status_t amdsmi_get_vbios_info](#) ([amdsmi_device_handle](#) device_handle, [amdsmi_vbios_info_t](#) *info)
Returns the static information for the vBIOS on the device.
- [amdsmi_status_t amdsmi_get_gpu_activity](#) ([amdsmi_device_handle](#) device_handle, [amdsmi_engine_usage_t](#) *info)
Returns the current usage of the GPU engines (GFX, MM and MEM). Each usage is reported as a percentage from 0-100%.
- [amdsmi_status_t amdsmi_get_power_measure](#) ([amdsmi_device_handle](#) device_handle, [amdsmi_power_measure_t](#) *info)
Returns the current power and voltage of the GPU. The voltage is in units of mV and the power in units of W.
- [amdsmi_status_t amdsmi_get_clock_measure](#) ([amdsmi_device_handle](#) device_handle, [amdsmi_clk_type_t](#) clk_type, [amdsmi_clk_measure_t](#) *info)
Returns the measurements of the clocks in the GPU for the GFX and multimedia engines and Memory. This call reports the averages over 1s in MHz.
- [amdsmi_status_t amdsmi_get_vram_usage](#) ([amdsmi_device_handle](#) device_handle, [amdsmi_vram_info_t](#) *info)

Returns the VRAM usage (both total and used memory) in MegaBytes.

- `amdsmi_status_t amdsmi_get_target_frequency_range (amdsmi_device_handle device_handle, amdsmi_clk_type_t clk_type, amdsmi_frequency_range_t *range)`

Returns current and supported frequency range for the specified clock type.

- `amdsmi_status_t amdsmi_get_process_list (amdsmi_device_handle device_handle, amdsmi_process_handle *list, uint32_t *max_processes)`

Returns the list of processes running on a given GPU including itself.

- `amdsmi_status_t amdsmi_get_process_info (amdsmi_device_handle device_handle, amdsmi_process_handle process, amdsmi_proc_info_t *info)`

Returns the process information of a given process. Engine usage show how much time the process spend using these engines in ns.

- `amdsmi_status_t amdsmi_get_ecc_error_count (amdsmi_device_handle device_handle, amdsmi_error_count_t *ec)`

Returns the number of ECC errors (correctable and uncorrectable) in the given GPU.

8.1.1 Detailed Description

AMD System Management Interface API.

8.1.2 Macro Definition Documentation

8.1.2.1 AMDSMI_MAX_DATE_LENGTH

```
#define AMDSMI_MAX_DATE_LENGTH 32
```

YYYY-MM-DD:HH:MM:SS.MSC

8.1.2.2 AMDSMI_MAX_FAN_SPEED

```
#define AMDSMI_MAX_FAN_SPEED 255
```

Maximum possible value for fan speed. Should be used as the denominator when determining fan speed percentage.

8.1.2.3 AMDSMI_EVENT_MASK_FROM_INDEX

```
#define AMDSMI_EVENT_MASK_FROM_INDEX(  
    i ) (1ULL << ((i) - 1))
```

Macro to generate event bitmask from event id

8.1.2.4 AMDSMI_DEFAULT_VARIANT

```
#define AMDSMI_DEFAULT_VARIANT 0xFFFFFFFFFFFFFFFF
```

Place-holder "variant" for functions that have don't have any variants, but do have monitors or sensors.

8.1.3 Typedef Documentation

8.1.3.1 amdsmi_event_handle_t

```
typedef uintptr_t amdsmi_event_handle_t
```

Handle to performance event counter.

Event counter types

8.1.4 Enumeration Type Documentation

8.1.4.1 amdsmi_init_flags_t

```
enum amdsmi_init_flags_t
```

Initialization flags.

Initialization flags may be OR'd together and passed to [amdsmi_init\(\)](#).

8.1.4.2 amdsmi_status_t

```
enum amdsmi_status_t
```

Error codes returned by amdsmi functions.

Enumerator

AMDSMI_STATUS_SUCCESS	Call succeeded.
AMDSMI_STATUS_INVALID	Invalid parameters.
AMDSMI_STATUS_NOT_SUPPORTED	Command not supported.
AMDSMI_STATUS_NOT_YET_IMPLEMENTED	Not implemented yet.
AMDSMI_STATUS_FAIL_LOAD_MODULE	Fail to load lib.
AMDSMI_STATUS_FAIL_LOAD_SYMBOL	Fail to load symbol.
AMDSMI_STATUS_DRM_ERROR	Error when call libdrm.
AMDSMI_STATUS_API_FAILED	API call failed.
AMDSMI_STATUS_TIMEOUT	Timeout in API call.
AMDSMI_STATUS_RETRY	Retry operation.
AMDSMI_STATUS_NO_PERM	Permission Denied.
AMDSMI_STATUS_INTERRUPT	An interrupt occurred during execution of function.
AMDSMI_STATUS_IO	I/O Error.
AMDSMI_STATUS_ADDRESS_FAULT	Bad address.
AMDSMI_STATUS_FILE_ERROR	Problem accessing a file.
AMDSMI_STATUS_OUT_OF_RESOURCES	Not enough memory.

Enumerator

AMDSMI_STATUS_INTERNAL_EXCEPTION	An internal exception was caught.
AMDSMI_STATUS_INPUT_OUT_OF_BOUNDS	The provided input is out of allowable or safe range.
AMDSMI_STATUS_INIT_ERROR	An error occurred when initializing internal data structures.
AMDSMI_STATUS_REFCOUNT_OVERFLOW	An internal reference counter exceeded INT32_MAX.
AMDSMI_STATUS_BUSY	Device busy.
AMDSMI_STATUS_NOT_FOUND	Device Not found.
AMDSMI_STATUS_NOT_INIT	Device not initialized.
AMDSMI_STATUS_NO_SLOT	No more free slot.
AMDSMI_STATUS_NO_DATA	No data was found for a given input.
AMDSMI_STATUS_INSUFFICIENT_SIZE	Not enough resources were available for the operation.
AMDSMI_STATUS_UNEXPECTED_SIZE	An unexpected amount of data was read.
AMDSMI_STATUS_UNEXPECTED_DATA	The data read or provided to function is not what was expected.
AMDSMI_STATUS_MAP_ERROR	The internal library error did not map to a status code.
AMDSMI_STATUS_UNKNOWN_ERROR	An unknown error occurred.

8.1.4.3 amdsmi_clk_type_t

```
enum amdsmi_clk_type_t
```

Clock types

Enumerator

CLK_TYPE_SYS	System clock.
CLK_TYPE_DF	running on a separate clock) Data Fabric clock (for ASICs
CLK_TYPE_DCEF	Display Controller Engine clock.

8.1.4.4 amdsmi_dev_perf_level_t

```
enum amdsmi_dev_perf_level_t
```

PowerPlay performance levels.

Enumerator

AMDSMI_DEV_PERF_LEVEL_AUTO	Performance level is "auto".
AMDSMI_DEV_PERF_LEVEL_LOW	regardless of workload Keep PowerPlay levels "low",
AMDSMI_DEV_PERF_LEVEL_HIGH	regardless of workload Keep PowerPlay levels "high",
AMDSMI_DEV_PERF_LEVEL_MANUAL	setting the AMDSMI_CLK_TYPE_SYS speed Only use values defined by manually
AMDSMI_DEV_PERF_LEVEL_STABLE_STD	clocks Stable power state with profiling

Enumerator

AMDSMI_DEV_PERF_LEVEL_STABLE_PEAK	Stable power state with peak clocks.
AMDSMI_DEV_PERF_LEVEL_STABLE_MIN_MCLK	memory clock Stable power state with minimum
AMDSMI_DEV_PERF_LEVEL_STABLE_MIN_SCLK	system clock Stable power state with minimum
AMDSMI_DEV_PERF_LEVEL_DETERMINISM	Performance determinism state.
AMDSMI_DEV_PERF_LEVEL_UNKNOWN	Unknown performance level.

8.1.4.5 amdsmi_sw_component_t

enum [amdsmi_sw_component_t](#)

Available clock types.

Software components

Enumerator

AMDSMI_SW_COMP_DRIVER	Driver.
-----------------------	---------

8.1.4.6 amdsmi_event_group_t

enum [amdsmi_event_group_t](#)

Enum denoting an event group. The value of the enum is the base value for all the event enums in the group.

Event Groups

Enumerator

AMDSMI_EVNT_GRP_XGMI	Data Fabric (XGMI) related events.
AMDSMI_EVNT_GRP_XGMI_DATA_OUT	XGMI Outbound data.

8.1.4.7 amdsmi_event_type_t

enum [amdsmi_event_type_t](#)

Event type enum. Events belonging to a particular event group [amdsmi_event_group_t](#) should begin enumerating at the [amdsmi_event_group_t](#) value for that group.

Event types

Enumerator

AMDSMI_EVT_XGMI_0_NOP_TX	NOPs sent to neighbor 0.
AMDSMI_EVT_XGMI_0_REQUEST_TX	neighbor 0 Outgoing requests to
AMDSMI_EVT_XGMI_0_RESPONSE_TX	neighbor 0 Outgoing responses to
AMDSMI_EVT_XGMI_0_BEATS_TX	<p>Data beats sent to neighbor 0; Each beat represents 32 bytes.</p> <p>XGMI throughput can be calculated by multiplying a BEATS event such as AMDSMI_EVT_XGMI_0_BEATS_TX by 32 and dividing by the time for which event collection occurred, amdsmi_counter_value_t.time_running (which is in nanoseconds). To get bytes per second, multiply this value by 10^9.</p> <p>Throughput = BEATS/time_running * 10^9 (bytes/second)</p>
AMDSMI_EVT_XGMI_1_NOP_TX	NOPs sent to neighbor 1.
AMDSMI_EVT_XGMI_1_REQUEST_TX	neighbor 1 Outgoing requests to
AMDSMI_EVT_XGMI_1_RESPONSE_TX	neighbor 1 Outgoing responses to
AMDSMI_EVT_XGMI_1_BEATS_TX	Data beats sent to neighbor 1; Each beat represents 32 bytes
AMDSMI_EVT_XGMI_DATA_OUT_1	Outbound beats to neighbor 1.
AMDSMI_EVT_XGMI_DATA_OUT_2	Outbound beats to neighbor 2.
AMDSMI_EVT_XGMI_DATA_OUT_3	Outbound beats to neighbor 3.
AMDSMI_EVT_XGMI_DATA_OUT_4	Outbound beats to neighbor 4.
AMDSMI_EVT_XGMI_DATA_OUT_5	Outbound beats to neighbor 5.

8.1.4.8 `amdsmi_counter_command_t`

```
enum amdsmi\_counter\_command\_t
```

Event counter commands

Enumerator

AMDSMI_CNTR_CMD_START	Start the counter.
AMDSMI_CNTR_CMD_STOP	be used before reading. Stop the counter; note that this should not

8.1.4.9 `amdsmi_evt_notification_type_t`

```
enum amdsmi\_evt\_notification\_type\_t
```

Event notification event types

Enumerator

AMDSMI_EVT_NOTIF_VMFAULT	VM page fault.
--------------------------	----------------

8.1.4.10 amdsmi_temperature_metric_t

```
enum amdsmi_temperature_metric_t
```

Temperature Metrics. This enum is used to identify various temperature metrics. Corresponding values will be in millidegrees Celsius.

Enumerator

AMDSMI_TEMP_CURRENT	Temperature current value.
AMDSMI_TEMP_MAX	Temperature max value.
AMDSMI_TEMP_MIN	Temperature min value.
AMDSMI_TEMP_MAX_HYST	Temperature hysteresis value for max limit. (This is an absolute temperature, not a delta).
AMDSMI_TEMP_MIN_HYST	Temperature hysteresis value for min limit. (This is an absolute temperature, not a delta).
AMDSMI_TEMP_CRITICAL	greater than corresponding temp_max values. Temperature critical max value, typically
AMDSMI_TEMP_CRITICAL_HYST	Temperature hysteresis value for critical limit. (This is an absolute temperature, not a delta).
AMDSMI_TEMP_EMERGENCY	Temperature emergency max value, for chips supporting more than two upper temperature limits. Must be equal or greater than corresponding temp_crit values.
AMDSMI_TEMP_EMERGENCY_HYST	Temperature hysteresis value for emergency limit. (This is an absolute temperature, not a delta).
AMDSMI_TEMP_CRIT_MIN	Temperature critical min value, typically lower than corresponding temperature minimum values.
AMDSMI_TEMP_CRIT_MIN_HYST	Temperature hysteresis value for critical minimum limit. (This is an absolute temperature, not a delta).
AMDSMI_TEMP_OFFSET	Temperature offset which is added to the
AMDSMI_TEMP_LOWEST	temperature reading by the chip. Historical minimum temperature.
AMDSMI_TEMP_HIGHEST	Historical maximum temperature.

8.1.4.11 amdsmi_voltage_metric_t

```
enum amdsmi_voltage_metric_t
```

Voltage Metrics. This enum is used to identify various Voltage metrics. Corresponding values will be in millivolt.

Enumerator

AMDSMI_VOLT_CURRENT	Voltage current value.
AMDSMI_VOLT_MAX	Voltage max value.
AMDSMI_VOLT_MIN_CRIT	Voltage critical min value.
AMDSMI_VOLT_MIN	Voltage min value.

Enumerator

AMDSMI_VOLT_MAX_CRIT	Voltage critical max value.
AMDSMI_VOLT_AVERAGE	Average voltage.
AMDSMI_VOLT_LOWEST	Historical minimum voltage.
AMDSMI_VOLT_HIGHEST	Historical maximum voltage.

8.1.4.12 amdsmi_voltage_type_t

```
enum amdsmi_voltage_type_t
```

This enumeration is used to indicate which type of voltage reading should be obtained.

Enumerator

AMDSMI_VOLT_TYPE_VDDGFX	voltage Vddgfx GPU
AMDSMI_VOLT_TYPE_INVALID	Invalid type.

8.1.4.13 amdsmi_power_profile_preset_masks_t

```
enum amdsmi_power_profile_preset_masks_t
```

Pre-set Profile Selections. These bitmasks can be AND'd with the [amdsmi_power_profile_status_t.available_profiles](#) returned from :: amdsmi_dev_get_power_profile_presets to determine which power profiles are supported by the system.

Enumerator

AMDSMI_PWR_PROF_PRST_CUSTOM_MASK	Custom Power Profile.
AMDSMI_PWR_PROF_PRST_VIDEO_MASK	Video Power Profile.
AMDSMI_PWR_PROF_PRST_POWER_SAVING_MASK	Power Saving Profile.
AMDSMI_PWR_PROF_PRST_COMPUTE_MASK	Compute Saving Profile.
AMDSMI_PWR_PROF_PRST_VR_MASK	VR Power Profile. 3D Full Screen Power Profile
AMDSMI_PWR_PROF_PRST_BOOTUP_DEFAULT	Default Boot Up Profile.
AMDSMI_PWR_PROF_PRST_LAST	Invalid power profile.

8.1.4.14 amdsmi_gpu_block_t

```
enum amdsmi_gpu_block_t
```

This enum is used to identify different GPU blocks.

Enumerator

AMDSMI_GPU_BLOCK_INVALID	invalid block Used to indicate an
AMDSMI_GPU_BLOCK_UMC	UMC block.
AMDSMI_GPU_BLOCK_SDMA	SDMA block.
AMDSMI_GPU_BLOCK_GFX	GFX block.
AMDSMI_GPU_BLOCK_MMHUB	MMHUB block.
AMDSMI_GPU_BLOCK_ATHUB	ATHUB block.
AMDSMI_GPU_BLOCK_PCIE_BIF	PCIE_BIF block.
AMDSMI_GPU_BLOCK_HDP	HDP block.
AMDSMI_GPU_BLOCK_XGMI_WAFL	XGMI block.
AMDSMI_GPU_BLOCK_DF	DF block.
AMDSMI_GPU_BLOCK_SMN	SMN block.
AMDSMI_GPU_BLOCK_SEM	SEM block.
AMDSMI_GPU_BLOCK_MP0	MP0 block.
AMDSMI_GPU_BLOCK_MP1	MP1 block.
AMDSMI_GPU_BLOCK_FUSE	Fuse block.
AMDSMI_GPU_BLOCK_LAST	for supported blocks The highest bit position

8.1.4.15 amdsmi_ras_err_state_t

```
enum amdsmi_ras_err_state_t
```

The current ECC state.

Enumerator

AMDSMI_RAS_ERR_STATE_NONE	No current errors.
AMDSMI_RAS_ERR_STATE_DISABLED	ECC is disabled.
AMDSMI_RAS_ERR_STATE_PARITY	ECC errors present, but type unknown.
AMDSMI_RAS_ERR_STATE_SING_C	Single correctable error.
AMDSMI_RAS_ERR_STATE_MULT_UC	Multiple uncorrectable errors.
AMDSMI_RAS_ERR_STATE_POISON	page. Treat as uncorrectable. Firmware detected error and isolated
AMDSMI_RAS_ERR_STATE_ENABLED	ECC is enabled.

8.1.4.16 amdsmi_memory_type_t

```
enum amdsmi_memory_type_t
```

Types of memory.

Enumerator

AMDSMI_MEM_TYPE_VRAM	VRAM memory.
AMDSMI_MEM_TYPE_VIS_VRAM	VRAM memory that is visible.
AMDSMI_MEM_TYPE_GTT	GTT memory.

8.1.4.17 amdsmi_freq_ind_t

enum `amdsmi_freq_ind_t`

The values of this enum are used as frequency identifiers.

Enumerator

AMDSMI_FREQ_IND_MIN	Index used for the minimum frequency value.
AMDSMI_FREQ_IND_MAX	Index used for the maximum frequency value.
AMDSMI_FREQ_IND_INVALID	An invalid frequency index.

8.1.4.18 amdsmi_memory_page_status_t

enum `amdsmi_memory_page_status_t`

Reserved Memory Page States.

Enumerator

AMDSMI_MEM_PAGE_STATUS_RESERVED	and not available for use Reserved. This gpu page is reserved
AMDSMI_MEM_PAGE_STATUS_PENDING	Pending. This gpu page is marked as bad and will be marked reserved at the next window.
AMDSMI_MEM_PAGE_STATUS_UNRESERVABLE	Unable to reserve this page.

8.1.4.19 AMDSMI_IO_LINK_TYPE

enum `AMDSMI_IO_LINK_TYPE`

Types for IO Link.

Enumerator

AMDSMI_IOLINK_TYPE_UNDEFINED	unknown type.
AMDSMI_IOLINK_TYPE_PCIEEXPRESS	PCI Express.
AMDSMI_IOLINK_TYPE_XGMI	XGMI.
AMDSMI_IOLINK_TYPE_NUMIOLINKTYPES	Number of IO Link types.
AMDSMI_IOLINK_TYPE_SIZE	Max of IO Link types.

8.1.4.20 AMDSMI_UTILIZATION_COUNTER_TYPE

enum [AMDSMI_UTILIZATION_COUNTER_TYPE](#)

The utilization counter type.

Enumerator

AMDSMI_UTILIZATION_COUNTER_FIRST	GFX Activity.
AMDSMI_COARSE_GRAIN_MEM_ACTIVITY	Memory Activity.

8.1.5 Function Documentation

8.1.5.1 amdsmi_get_device_bdf()

```
amdsmi_status_t amdsmi_get_device_bdf (
    amdsmi_device_handle device_handle,
    amdsmi_bdf_t * bdf )
```

Returns BDF of the given device.

Parameters

in	<i>device_handle</i>	Device which to query
out	<i>bdf</i>	Reference to BDF. Must be allocated by user.

Returns

[amdsmi_status_t](#) | [AMDSMI_STATUS_SUCCESS](#) on success, non-zero on fail

8.1.5.2 amdsmi_get_device_uuid()

```
amdsmi_status_t amdsmi_get_device_uuid (
    amdsmi_device_handle device_handle,
    unsigned int * uuid_length,
    char * uuid )
```

Returns the UUID of the device.

Parameters

in	<i>device_handle</i>	Device which to query
in, out	<i>uuid_length</i>	Length of the uuid string. As input, must be equal or greater than SMI_GPU_UUID_SIZE and be allocated by user. As output it is the length of the uuid string.
Generated by Doxygen	<i>uuid</i>	Pointer to string to store the UUID. Must be allocated by user.

Returns

[amdsmi_status_t](#) | [AMDSMI_STATUS_SUCCESS](#) on success, non-zero on fail

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