

# TCG TSS 2.0 System Level API (SAPI) Specification

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## Normative-Informative Language

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## Revision History

Version 1.1 rev 01	12/05/16	<ul style="list-style-type: none"> <li>Addressed TC comments</li> <li>Removed header information – moved to hdr document</li> <li>Added new namespace (and chapter) for marshalling/unmarshalling.</li> </ul>
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# 1 General Information on the TCG TSS 2.0 Specification Library

## 1.1 Scope of this Specification

This TCG TSS 2.0 SAPI Specification provides the lowest level programmatic interface for users creating applications for TPM 2.0. It provides the smallest footprint and uses the least resources of the three user-facing APIs of the TSS 2.0 stack (note: The three user-facing TSS 2.0 APIs are SAPI, ESAPI and FAPI). The intended audience for this specification includes software developers and designers implementing applications for TPM 2.0 and TCG TSS 2.0.

## 1.2 Acronyms

For definitions of the acronyms used in the TSS 2.0 specifications please see the TCG TSS 2.0 Overview and Common Structures Specification [22].

## 1.3 TCG Software Stack 2.0 (TSS 2.0) Specification Library Structure

At the time of writing, the documents that are part of the specification of the TSS 2.0 are:

- [1] TCG TSS 2.0 Overview and Common Structures Specification
- [2] TCG TSS 2.0 TPM Command Transmission Interface (TCTI) API Specification
- [3] TCG TSS 2.0 Marshaling/Unmarshaling API Specification
- [4] TCG TSS 2.0 System API (SAPI) Specification
- [5] TCG TSS 2.0 Enhanced System API (ESAPI) Specification
- [6] TCG TSS 2.0 Feature API (FAPI) Specification
- [7] TCG TSS 2.0 TAB and Resource Manager Specification
- [8] TCG TSS 2.0 TAB Response Code API Specification

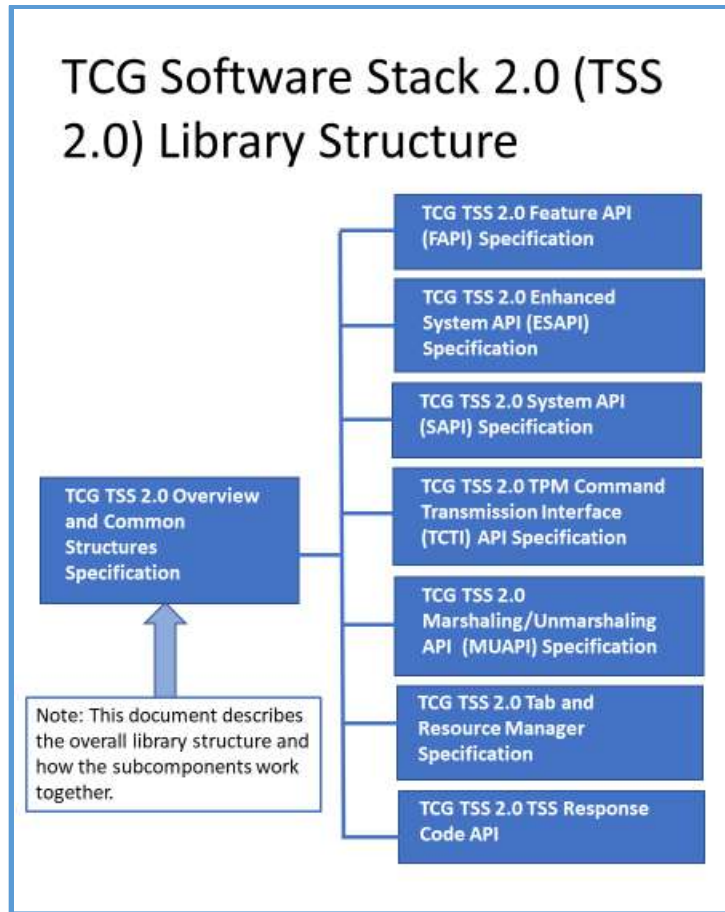


Figure 1: TSS 2.0 Specification Library

## 1.4 References

All references for the TSS 2.0 specifications are provided in the TCG TSS 2.0 Overview and Common Structures Specification [22].

## 2 TSS 2.0 SAPI Introduction

### 2.1 Architecture

Use of the SAPI requires expert knowledge of the underlying TPM 2.0 commands and architecture. The purpose of the SAPI is to enable applications to perform TPM2.0 specification Part 3 commands using all possible variations of inputs to those commands and receiving all possible variations of outputs. The System API may use the MU API to marshal inputs from C structures to command byte streams and unmarshal responses from response byte stream format to C structures. It uses the TCTI to communicate with the TPM.

### 2.2 SAPI High Level Design Requirements:

The SAPI has the following overarching (high-level) design requirements:

- Multiple TPMs shall be supported both on the same platform and on remote platforms.
- A single application can talk to multiple TPMs.
- The APIs shall neither inhibit the use of multi-thread synchronization of accesses to the TPM nor require it.
- The SAPI architecture should be able to support all operating systems as well as embedded, non-OS systems.
- SAPI implementations should support ANSI C compilers.
- SAPI implementations shall not be required to maintain state in the global or thread local scope. All state shall be maintained in their respective context structures.
- The SAPI context structure is opaque and provides functions for:
  - Getting and setting all necessary fields.
  - Returning the size of the context structures.
  - Isolating the application from changes in the size and structure of the context structures.
- The SAPI shall return system API-specific error codes in a way that differentiates it from other TSS layers' error codes.
- All SAPI data structures shall be allocated by the caller and not by the SAPI implementations.

#### 2.2.1 Threading Model

The SAPI shall follow the same design model as a non-blocking and thread-aware library. This allows the implementation and usage of the presented APIs even in highly embedded devices and/or main loop driven applications that may not provide threading at all or with specific thread isolation mechanisms.

This means that unless otherwise stated, every function is a non-blocking operation. This specification does not give exact deadlines for function executions, but they are expected to require the typical number of cycles required by non-blocking operations.

For multi-threaded applications, this means that any SAPI context may only be called from one thread at a given time. The application may implement a means to synchronize concurrent access to the same SAPI context if desired. It is recommended to instantiate one context per thread that needs to communicate with the TPM.

If a multi-threaded application is calling in to a single SAPI context from multiple threads then the application must implement its own mutual exclusion mechanism. This approach is not recommended because it requires synchronization between threads which may be error prone.

Instead, the recommended method is to initialize multiple SAPI-contexts, one for each thread that needs access to the TPM. The concurrent access of different threads to distinct contexts is safe and may be supported by a system that includes a TAB.

### 3 SAPI

The System API is the layer of the overall TSS architecture that provides access to all the functionality of the TPM.

#### 3.1 Overall functionality

SAPI is designed to be used wherever low level calls to the TPM functions are made: firmware, BIOS, applications, OS, etc. It sits at the application interface layer in a manner similar to the TSP in a TSS 1.2, but also comprises much of the functionality incorporated into the TCS in the TSS 1.2, such as the TPM parameter block generator.

The System API, as a low level interface, is targeted towards expert applications. Its purpose is to provide access to the full range of the TPM 2.0 capabilities and to do this in a way that makes the caller's job as easy as possible. It is designed to be used in a wide range of computing devices, from very low end, i.e. highly embedded, systems to high end servers.

#### 3.2 Design requirements

The requirements for the SAPI are:

1. The SAPI SHALL provide access to all capabilities of all TPM 2.0 functions as defined in part 3 of the TPM 2.0 specification.
2. The SAPI implementation SHALL NOT require crypto and session management functionality. Its main purpose is to provide access to TPM 2.0 commands: it only supports those plus a minimal set of required management functions. All other functionality is out of scope for the SAPI.
3. The SAPI SHALL NOT unnecessarily limit any system architectures that may want to use the System API and its implementation. Some specifics:
  - a. The SAPI SHALL NOT preclude systems which don't need HMACs or cpHash pre-calculations nor SHALL it burden such systems with unnecessary overhead related to HMACs or cpHash calculations.
  - b. The SAPI SHALL be configurable with respect to the handling of return data required by applications. For instance, many commands return values that the caller may not want or need and some of these are code intensive to return in unmarshalled form. NULL buffer pointers passed in for particular parameters can be used by the SAPI to signal the implementation that these return values aren't needed.
4. An implementation of the SAPI SHALL support either asynchronous or synchronous calls for all TPM 2.0 commands.
5. An implementation of the SAPI MAY support asynchronous and synchronous calls to TPM 2.0 commands.
6. For each TPM 2.0 command, an implementation of the SAPI MAY support a command-specific Tss2\_Sys\_<COMMAND\_NAME1>\_Prepare function call that provides calling applications with the information needed to calculate a cpHash for the command. This cpHash is used by the application

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<sup>1</sup> <COMMAND\_NAME> is derived from the name of the TPM function from library specification part3 without the leading "TPM2\_" (e.g. TPM2\_GenRandom produces Tss2\_Sys\_GenRandom\_Prepare)

for calculating HMAC authorizations and pre-calculating policy hashes which will be used in creating objects that will use policy authorizations.

7. The API SHALL NOT require the SAPI implementation to allocate memory for any input or output data structures. It is the calling application's responsibility to allocate any memory needed.
8. All SAPI data SHALL be in native-endian format. This means that the SAPI implementation will do any endian conversion required for both inputs and outputs.
9. The SAPI implementation SHALL perform formatting, marshalling, and unmarshalling tasks so that the caller needs as little knowledge of the inner workings of TPM 2.0 as possible. Marshalling of input and unmarshalling of output data is performed by the SAPI.
10. The SAPI implementation SHALL return all "unhandled" error codes from lower layers in the TSS stack to the SAPI caller without alteration.

**NOTE:** An example of a handled error is the case where the SAPI calls `tss2_tcti_receive` and `TSS2_RC_TCTI_TRY_AGAIN` is returned. In this case the SAPI will call `tss2_tcti_receive` again.

**NOTE:** An example of an unhandled error is the TPM returning `TPM_RC_BAD_VALUE` in response to a command and the SAPI propagating the error to the caller.

### 3.3 Design rules

In order to best achieve the System API requirements, the following design rules for the System API were developed:

1. SAPI functions that execute TPM 2.0 commands typically execute one TPM 2.0 command.
 

**NOTE:** one exception to this is if underlying layers such as the resource manager do TPM 2.0 commands in order to fulfill their role.
2. As much as possible, the System API will mimic the TPM 2.0, Part 3 command schematics and Part 1 command and response layout diagrams. Function input and output parameters are ordered in the way they appear in the Part 3 command schematics and variable names match as much as possible.
 

**NOTE:** This will help programmers understand the code and easily correlate it to the specification.
3. Since memory for input and output parameters is provided by the caller, some design rules result:
  - a. All output parameters will require a pointer to be passed to the SAPI.
  - b. In order to minimize the stack memory requirements, inputs that are not simple data types or bit fields will be passed in as pointers.
  - c. Buffers for the input command byte stream, output response byte stream, `cpBuffer`, and `rpBuffer` are allocated by the caller as part of the context structure to minimize use of function stack space.
4. The System API implementation will do as much work for the caller as possible. Some examples of this:
  - a. The `commandSize` field for all commands is calculated dynamically by the SAPI implementation.
  - b. Output parameters will be unmarshalled into C structures before being returned to the caller so that the caller can read fields out of them in a straightforward manner.
5. The only callbacks used by the SAPI code are to TCTI functions. No callbacks are used to call from the System API implementation to "helper" functions to calculate `cpHash` or HMAC or to perform any other crypto or session management tasks. Instead a layer above the SAPI explicitly makes those calls. This provides the most flexibility possible to the ESAPI or whatever other

layer is directly above the SAPI. For instance, the caller may want to use different HMAC helper functions depending on what actions are being performed.

### 3.4 Architecture

1. Each SAPI function that corresponds to a Part 3 command takes the following inputs:
  - a. A pointer to a SAPI context structure that is used to maintain any state required. This structure is allocated by the caller.
  - b. A group of command and/or response parameters to the TPM:
    - i. Inputs:
      1. Input parameters are in "TSS System API" form to make the caller's job easier. This means that C structures will be used as inputs.
      2. All inputs to the TPM that are data structures are input as pointers to those data structures in the SAPI.
    - ii. Outputs:
      1. A group of pointers to buffers, one for each possible output data item or structure. If any output pointer is NULL, the output is not required by the caller and the implementation will not do any work to provide that output to the caller.
  - c. All commands that aren't restricted to the TPM\_ST\_NO\_SESSIONS command. These commands will be capable of handling between 0 and 3 sessions or authorizations on input and output. Sessions and authorizations are input through a data structure that:
    - i. Identifies the number of sessions or authorizations that are in use
    - ii. Contains all the data for each session/authorization.
2. The SAPI implementation marshals the input parameters before sending them to the TPM. This includes the following:
  - a. Endian conversion if necessary.
  - b. Population of tag, command size (computed by the implementation after marshalling is complete), command code, handles, authorization block size, marshalled authorizations, and command parameters.
3. To send the data to the next lower layer, the SAPI implementation SHOULD invoke the `tss2_tcti_transmit` macro, passing it the `tctiContext` member of the SAPI context structure.
4. To receive the response, the SAPI implementation SHOULD invoke the `tss2_tcti_receive` macro, passing it the `tctiContext` member of the SAPI context structure.
5. The System API implementation checks for errors in the transmission to or reception of the data from the TPM. Handling of these errors is the responsibility of the caller.
6. If an error has occurred, the System API implementation returns this error code to the application. No more processing of the returned data occurs in this case.
7. If the TPM command completed successfully, for all outputs that received a non-null output pointer, the System API implementation:
  - a. Unmarshals the output into a C structure, which includes converting the endianness when necessary.
  - b. Copies the data to the structure pointed to by the output parameter pointer.
8. The SAPI implementation unmarshals the response authorization areas into C structures.
9. TSS SAPI assumes that all required initialization is done before any SAPI functions are called. Specifically:

- a. Underlying TAB instantiations, resource manager(s), and device driver interfaces are initialized.
- b. Applications that call into the SAPI know which TPMs are available and tell the SAPI how to communicate to the particular TPMs that are used by means of the TCTI context structures.
- c. Figure 3 below is a drawing of this. Purple outlined blocks and lines are done at initialization time. The definition of initialization time is implementation specific and out of scope for this specification.
- d. The sequence is as follows:
  - i. Some system process initializes the TSS stack, TAB instantiation(s), including resource manager(s), and TPM 2.0 driver(s). How and when this is done is implementation-specific with the only requirement being that this must be done before SAPI functions are called.
  - ii. Initialization of the TCTI context structure(s) is implementation-specific with the only requirement being that this must be done before SAPI functions are called.
  - iii. Application(s) start.
  - iv. Applications call SAPI functions, initializing the cmdContext structures; part of this initialization includes setting a pointer to point to the TCTI structure which contains the correct send/receive function pointers and interface name.



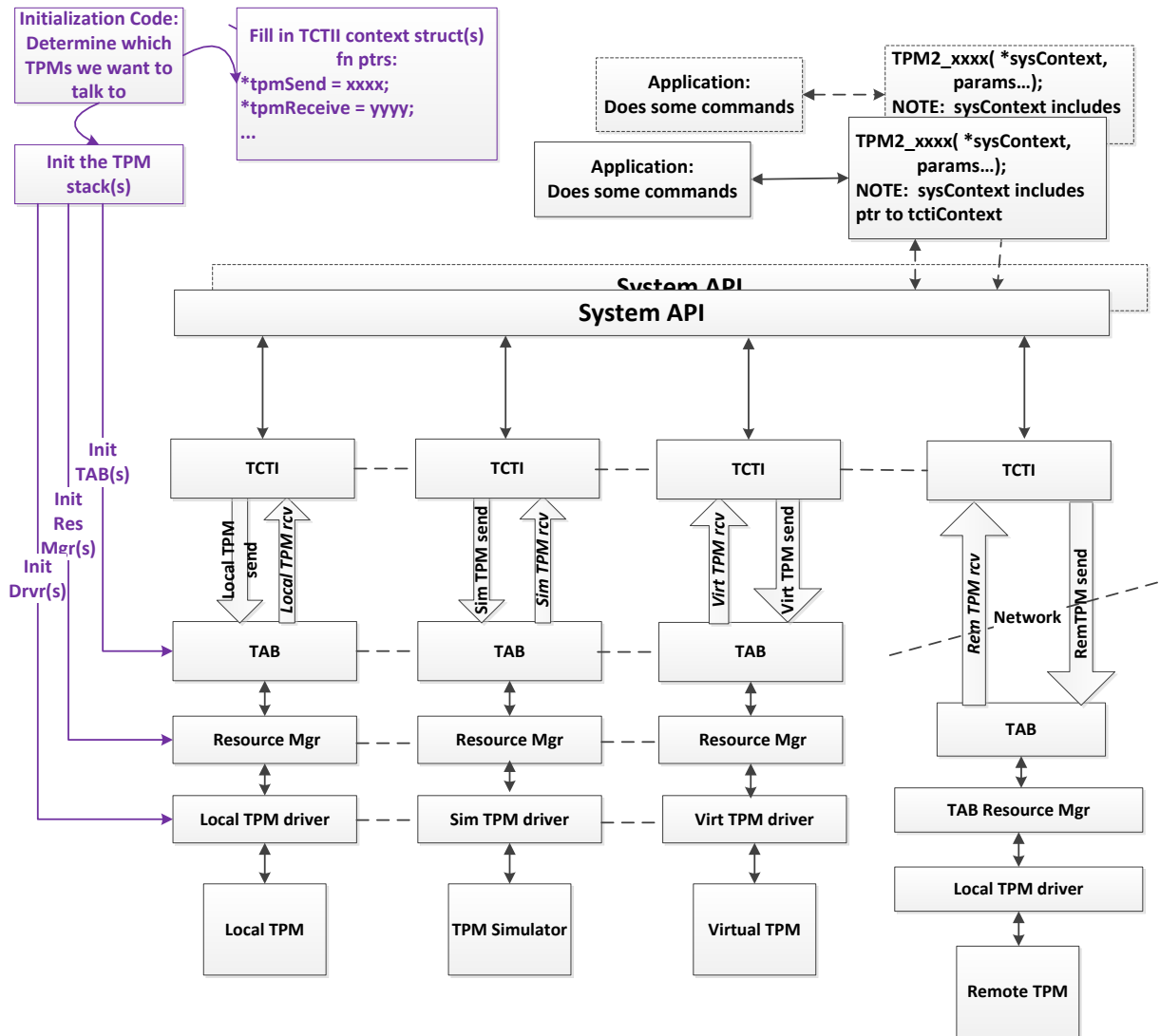


Figure 2 — Low level stack details

### 3.5 SAPI data structures

All SAPI data structures are defined in the `tss2_sys.h` header file. The contents of `tss2_sys.h` are specified in the “TSS 2.0 Header File Specification”.

### 3.6 Application Binary Interface (ABI) Negotiation

The wide applicability of this specification and the library-nature of the TPM specification make it very likely that multiple variations of the TSS APIs will exist. In order to be able to differentiate them at runtime, an ABI negotiation shall take place inside each “initialize” call. The TCTI layer provides ABI negotiation through a version field. The following ABI negotiation scheme is used by the SAPI and higher layers of the TSS.

The `TSS2_ABI_VERSION` structure is defined to hold the relevant information about the ABI of a specific TSS implementation. A `tssCreator` value of `0x1` identifies the structure sizes defined by the TSS WG

believed to be generally appropriate for “typical” systems. If the value for `tssCreator` is 1 then the data definitions of the TSS 2.0 header file specification must be used.

For vendor-specific implementations that use different structure sizes, the `tssCreator` field must be set to a value larger than 0x20000000 and hold a TPM capabilities vendor ID (CAP\_VID) from the TCG Vendor ID Registry. The family, level and version field can be used by the vendor for their own purposes.

```
typedef struct {
    UINT32 tssCreator; /* If == 1, this equals TSSWG-Interop */
                    /* IF > 0x20000000 , this equals TCG TPM capabilities Vendor-ID */
    UINT32 tssFamily; /* Free-to-use for creator > TCG_VENDOR_FIRST */
    UINT32 tssLevel;  /* Free-to-use for creator > TCG_VENDOR_FIRST */
    UINT32 tssVersion; /* Free-to-use for creator > TCG_VENDOR_FIRST */
} TSS2_ABI_VERSION;
```

For each layer that uses ABI negotiation, a function will validate that the ABI version requested by the layer is supported by the layer below it. For the SAPI, the function that does this is `Tss2_Sys_Initialize`. If the requested ABI-Version is not supported it will return `TSS2_SYS_RC_ABI_MISMATCH` and set the fields to the values that the implementation supports.

**Note:** A module may support multiple versions of ABI at the same time.

A typical set of TSS header files for a layer should include a definition of the ABI version used throughout the layer.

```
#define TSS2_ABI_CURRENT_VERSION { .tssCreator = 0xXX, .tssFamily = 0xXXXX, tssLevel = xx,
tssVersion = xx }
```

## 3.7 Command Parameters

The parameters for Part 3 command-specific functions, `_Prepare`, `_Complete`, and `one-call`, are the C structures as specified in the Part 2 Data Types section of this specification.

In order to guarantee binary compatibility between applications and SAPI implementations built with different compiler tool chains, wherever the TPM specification Part 2 specifies a bit field, the API expects a 32 bit unsigned integer where bit 0 is the least significant bit.

### 3.7.1 System API Parameter Rules

All parameters in authorization areas and Part 3 specific functions will be passed in as:

1. Simple parameters if they are command inputs or fields in the authorization regions AND they are one of the following base types:
  - Types that evaluate to `UINT8`, `UINT16`, `UINT32` or `UINT64` values and their signed equivalents.
  - Types that alias to base types e.g. `TPM_HANDLE` or `TPMA_SESSION`.
2. Pointers to the parameter types, if they are anything other than base types OR if they are response parameters.

## 3.8 SAPI Function APIs (by Category)

Within the SAPI functions, there are two types of functions:

- TPM 2.0 Part 3 command specific functions

- Generic functions which are not specific to particular Part 3 commands

The SAPI function APIs are split into the following groups, each of which may be Part 3 specific or not:

- Command Context Allocation Functions: all non-specific.
- Command Context Setup Functions: all non-specific.
- Command Preparation Functions: `Tss2_Sys_<COMMAND_NAME>_Prepare` calls are Part 3 specific, all others are not specific (see Section 3.8.2.2).
- Command Execution Functions: `Tss2_Sys_<COMMAND_NAME><COMMAND_NAME>` “one-call” functions are Part 3 specific, all others are not specific (see Section 3.8.3.4).
- Command Completion Functions: `Tss2_Sys_<COMMAND_NAME>_Complete` functions are Part 3 specific, all others are not specific (see Section 3.8.4.3).

The function prototypes for all of these functions are in the `tss2_sys.h` header file. The contents of `tss2_sys.h` are specified in the “TSS 2.0 Header File Specification”.

## 3.8.1 Command Context Allocation Functions

### 3.8.1.1 Tss2\_Sys\_GetContextSize

```
size_t Tss2_Sys_GetContextSize(
    size_t                                maxCommandResponseSize
);
```

This function returns the required size for the opaque SAPI command context. The caller must allocate a context of at least this size.

If `maxCommandResponseSize` is 0, `Tss2_Sys_GetContextSize` returns a size guaranteed to handle any TPM command and response supported by this specification. The caller may specify a non-zero `maxCommandResponseSize` corresponding to the maximum expected command and response size in order to save memory within the `TSS2_SYS_CONTEXT` SAPI context.

**NOTE:** The returned value will be larger than `maxCommandResponseSize`. How much larger depends on the System API implementation. For instance, if an implementation uses two independent buffers for transmit and receive, then the size returned could be twice the passed in size plus whatever extra memory is needed by the System API for context.

**NOTE:** If the caller constrains the size, a subsequent command may then return `TSS2_SYS_RC_INSUFFICIENT_CONTEXT` if the actual size of a command or response exceeds the size specified in this function. For an error while forming the command, the caller may be able to start over with a larger context. For a response, error handling is more complicated because the response may be in transit. It is therefore recommended to use `maxCommandResponseSize` set to 0 for context allocation.

### 3.8.1.2 Tss2\_Sys\_Initialize

```
TSS2_RC Tss2_Sys_Initialize(
    TSS2_SYS_CONTEXT    *sysContext,
    size_t              contextSize,
    TSS2_TCTI_CONTEXT   *tctiContext,
```

```

    TSS2_ABI_VERSION      *abiVersion
);

```

This function must be called once in a newly allocated *sysContext*. It need not be called to reuse a *sysContext*. The SAPI may perform *getCapability* calls or anything else required for enabling workarounds of non-compliant, unspecified or erroneous TPM behaviors. These SHOULD be done during the *Tss2\_Sys\_Initialize* call and these SHOULD NOT be done at other times.

The *contextSize* parameter specifies the size of the memory area reserved for the *sysContext*. It is expected to be the same size returned from a corresponding *tss2\_sys\_getContextSize* call (see above).

The *tctiContext* parameter holds the pointer to an initialized TCTI Context that will be used by subsequent calls to communicate with the TPM. *tctiContext* can be retrieved later using *tss2\_sys\_getTctiContext* but cannot be altered during the lifetime of one systemAPI context. The *Tss2\_Sys\_Initialize* function SHOULD check that the essential TCTI function pointers (transmit and receive) are not NULL and return an error code otherwise.

The *abiVersion* parameter holds information about the version and revision of this specification as used by the application. The SAPI implementation will check whether it is compatible with this version. If not, SAPI will return an error and override *abiVersion* with the ABI version it supports. The corresponding variable that is passed into *abiVersion* can be initialized via the *TSS2\_ABI\_VERSION\_CURRENT* definition (see the TCTI Context section).

Response Codes:

- *TSS2\_SYS\_RC\_ABI\_MISMATCH*: if input ABI doesn't match that of the SAPI implementation.
- *TSS2\_SYS\_RC\_INSUFFICIENT\_CONTEXT*: if the provided context structure is too small for the SAPI function.
- *TSS2\_SYS\_RC\_BAD\_VALUE*: Returned if a bad value for any parameter is detected
- *TSS2\_SYS\_RC\_BAD\_REFERENCE*: if any of *sysContext*, *tctiContext*, or *abiVersion* are NULL pointers.
- *TSS2\_SYS\_RC\_BAD\_TCTI\_STRUCTURE*: if the implementation checks the TCTI function pointers and any of the essential ones (transmit and receive) are set to NULL, or bad magic or other malformed part of the structure
- Any TPM or TCTI errors that could result from *GetCapability* calls that are made to get TPM version info.
- *TSS2\_SYS\_RC\_INCOMPATIBLE\_TCTI*: unknown or unusable TCTI version.
- *TSS2\_RC*s produced by lower layers of the software stack SHALL be returned to the caller unaltered unless handled internally.

### 3.8.1.3 Tss2\_Sys\_Finalize

```

void Tss2_Sys_Finalize(
    TSS2_SYS_CONTEXT      *sysContext
);

```

This function should be called before freeing a *sysContext*.

## 3.8.2 Command Preparation Functions

### 3.8.2.1 Tss2\_Sys\_GetTctiContext

```
TSS2_RC Tss2_Sys_GetTctiContext(
    TSS2_SYS_CONTEXT      *sysContext,
    TSS2_TCTI_CONTEXT     **tctiContext
);
```

This function returns the pointer to the *tctiContext* that was passed in during the *Tss2\_Sys\_Initialize* call. This function can, for example, be used to retrieve the *tctiContext* associated with a given *sysContext* before freeing the *sysContext* in order to either reuse or free the associated *tctiContext*.

Response Codes:

TSS2\_SYS\_RC\_BAD\_REFERENCE: if *sysContext* or *tctiContext* are NULL pointers.

### 3.8.2.2 Tss2\_Sys\_<COMMAND\_NAME>\_Prepare

To construct a SAPI command for each of the TPM 2.0 Specification Part 3 commands, replace the <COMMAND\_NAME> with the appropriate TPM 2.0 Specification Part 3 command with the TPM2\_ prefix removed (e.g. *Tss2\_Sys\_GenRandom\_Prep*).

```
TSS2_RC Tss2_Sys_<COMMAND_NAME>_Prepare(
    TSS2_SYS_CONTEXT      *sysContext,
    inHandles,
    inParams
);
```

This is a template for a *\_Prepare* function. There is one of these per Part 3 TPM command. The number and types of input parameters and handles are defined in Part 3 of the TPM specification.

All passed in information is copied and saved in the *sysContext* for use during subsequent commands.

Since the command doesn't yet know whether authorizations will be sent or not, this function sets the tag to *TPM\_ST\_NO\_SESSIONS*. Later, if *Tss2\_Sys\_SetCmdAuths* is called, the tag will be set to *TPM\_ST\_SESSIONS* if sessions are added.

If any command parameter (after the handles) is a TPM2B:

- If the TPM2B parameter is NULL, the implementation marshals a TPM2B with a size of 0.

NOTE: The TPM often uses this pattern of setting the TPM2B size field to 0 for optional parameters.

- If the TPM2B parameter is not NULL:
  - If the TPM2B is a simple TPM2B (that is, a TPM2B which contains only a size and a byte array, such as *TPM2B\_DIGEST*), the TPM2B size field indicates the used size of the UINT8 array. The implementation marshals the size and buffer into the byte stream. The implementation will not read beyond the used size.

NOTE: The size may be zero.

NOTE: For the first command parameter, the UINT8 array may be encrypted before or after `_Prepare`. To encrypt after `_Prepare`, see `Tss2_Sys_GetDecryptParam`.

If the TPM2B is a complex TPM2B (that is, a TPM2B that is not simple, such as a TPM2B\_PUBLIC which contains a size and a TPMT\_PUBLIC), the TPM2B size field will be ignored.

#### NOTES:

1. The implementation will calculate the size and marshal the TPM2B second parameter based on its data type.
2. Ignoring the size field permits the application to use a response parameter unmodified as an input to a subsequent command. Since the size is ignored, if the caller wants a complex TPM2B to be marshaled with a size of 0, it should be passed in as NULL.
3. For the first command parameter that is a TPM2B, the following also apply:
  - If the first command parameter is non-NULL, the implementation will marshal it. After `_Prepare`, the parameter may be encrypted. See `Tss2_Sys_GetDecryptParam`.
  - If the first command parameter is NULL, then a zero sized TPM2B is inserted for that command parameter. The caller may (and normally should) add the parameter after the `_Prepare`. See `Tss2_Sys_SetDecryptParam`.

The `_Prepare` command resets the `sysContext` and makes it ready for the next flow of command functions. After any `_Prepare`, previously set authorizations become unavailable and `Tss2_Sys_SetCmdAuths` must be called again.

**NOTE:** As an example of why it is required that `_Prepare` reset the `sysContext`, suppose the following sequence occurs: `_Prepare`, `Tss2_Sys_SetCmdAuths`, `_Prepare`. If the second `_Prepare` is done with different parameters than the first `_Prepare`, the authorizations previously set by `Tss2_Sys_SetCmdAuths` are no longer valid after the second `_Prepare`. To handle this as cleanly as possible and avoid burdening the implementation with the overhead of checking the parameters for changes, after any `_Prepare` (whether the parameters have changed or not), previously set authorizations are made unavailable and `Tss2_Sys_SetCmdAuths` must be called again.

Response Codes:

- `TSS2_SYS_RC_INSUFFICIENT_CONTEXT`: if the provided context structure is too small for the SAPI function.
- `TSS2_SYS_RC_BAD_VALUE`: Returned, if bad values for parameters are detected,
- `TSS2_SYS_RC_BAD_REFERENCE`: if `sysContext` or a parameter that is a pointer and is not a TPM2B is set to NULL.
- `TSS2_SYS_RC_BAD_SEQUENCE`: if called between `Tss2_Sys_ExecuteAsync` and `Tss2_Sys_ExecuteFinish`.
- `TSS2_RC`s produced by lower layers of the software stack SHALL be returned to the caller unaltered unless handled internally.

### 3.8.2.3 Tss2\_Sys\_GetDecryptParam

```
TSS2_RC Tss2_Sys_GetDecryptParam(
    TSS2_SYS_CONTEXT *sysContext,
    size_t            *decryptParamSize,
    const uint8_t     **decryptParamBuffer
```

```
);
```

This function returns the size and pointer to a buffer corresponding to the first marshaled TPM2B command parameter as *decryptParamSize* and *decryptParamBuffer*. If the first command parameter passed to *\_Prepare* was NULL, *decryptParamSize* is 0 and *decryptParamBuffer* is unspecified. For consistency with the TPM terminology a TPM input parameter that is encrypted by the application and decrypted by the TPM is referred to as a *decrypt* parameter and the session controlling the encryption parameters is referred to as the decrypt session and must have its TPMA\_SESSION\_DECRYPT bit set.

This function must be called after *\_Prepare* and before the *Tss2\_Sys\_Execute* or *Tss2\_Sys\_ExecuteAsync*.

The application must not write to the returned *decryptParamBuffer* and this buffer may only be considered readable until the next invocation of any function that uses the same *sysContext*. If any other SAPI call is made to the same *sysContext* a previously retrieved *decryptParamBuffer* contains undefined data and *Tss2\_Sys\_GetDecryptParam* must be called again.

If this function is called after a *Tss2\_Sys\_SetDecryptParam*, the newly set parameter is returned.

The intent of this call is to provide the size and location of the parameter to be encrypted by the caller in a decrypt session after the parameter has been marshaled by *\_Prepare*. After calling this, the encrypted result can be set by calling *Tss2\_Sys\_SetDecryptParam*.

**NOTE:** If encryption is performed, it must be performed after *\_Prepare* and before *Tss2\_Sys\_Execute* or *Tss2\_Sys\_ExecuteAsync*. It should typically be called before *\_GetCpBuffer* is called for the cpHash calculation, since the cpHash must be calculated using encrypted version of this parameter.

Response Codes:

TSS2\_SYS\_RC\_BAD\_SEQUENCE: if not called after *\_Prepare* and before *Tss2\_Sys\_Execute/Tss2\_Sys\_ExecuteAsync*.

TSS2\_SYS\_RC\_NO\_DECRYPT\_PARAM: if called when *sysContext* is set for a command that doesn't have a decrypt parameter.

TSS2\_SYS\_RC\_BAD\_REFERENCE: if any of the inputs is a NULL pointer.

### 3.8.2.4 Tss2\_Sys\_SetDecryptParam

```
TSS2_RC Tss2_Sys_SetDecryptParam(
    TSS2_SYS_CONTEXT    *sysContext,
    size_t              decryptParamSize,
    const uint8_t       *decryptParamBuffer
);
```

If the first command parameter is a TPM2B type, this function sets the size and buffer of the TPM2B. If the first parameter is not a TPM2B, this function returns an error.

If *\_Prepare* received a non-NULL first command parameter TPM2B, this function replaces the TPM2B buffer and the TPM2B size field must match *decryptParamSize*. If the *\_Prepare* received a NULL first command parameter, this function updates the size and inserts the TPM2B buffer.

This function must be called after *\_Prepare* and before *Tss2\_Sys\_Execute* or *Tss2\_Sys\_ExecuteAsync*.

**NOTE:** *Tss2\_Sys\_SetDecryptParam* should typically be called before *Tss2\_Sys\_GetCpBuffer* is called in preparation for cpHash calculation, since the cpHash calculation has to be done using the encrypted version of this parameter.

**NOTE:** The intent of this call is to set the first command TPM2B parameter when the caller has marshaled and encrypted the parameter.

Response Codes:

- TSS2\_SYS\_RC\_BAD\_SEQUENCE: if not called after `_Prepare` and before `Tss2_Sys_Execute/Tss2_Sys_ExecuteAsync`.
- TSS2\_SYS\_RC\_INSUFFICIENT\_CONTEXT: if the provided context structure is too small for the SAPI function.
- TSS2\_SYS\_RC\_BAD\_REFERENCE: if `sysContext` or `decryptParamBuffer` is null.
- TSS2\_SYS\_RC\_BAD\_SIZE: if the first TPM2B parameter was not NULL at `_Prepare` and `decryptParamSize` does not equal the marshaled size.
- TSS2\_SYS\_RC\_NO\_DECRYPT\_PARAM: if called when `sysContext` is set for a command that doesn't have a decrypt parameter.
- TSS2\_RCs produced by lower layers of the software stack SHALL be returned to the caller unaltered unless handled internally.

### 3.8.2.5 Tss2\_Sys\_GetCpBuffer

```
TSS2_RC Tss2_Sys_GetCpBuffer(
    TSS2_SYS_CONTEXT      *sysContext,
    size_t                *cpBufferUsedSize,
    const uint8_t         **cpBuffer
);
```

This function returns the `cpBuffer`, a pointer to the marshaled command parameters, and the number of used bytes in the `cpBuffer`.

This function can only be called after a `_Prepare` and before a `Tss2_Sys_Execute`, `Tss2_Sys_ExecuteAsync`, or one call function.

The application must not write to the returned `cpBuffer` and this buffer may only be considered readable until the next invocation of any function that uses the same `sysContext`. If any other SAPI call is made to the same `sysContext` a previously retrieved `cpBuffer` will contain undefined data and `Tss2_Sys_GetCpBuffer` must be called again.

**NOTE:** `Tss2_Sys_GetCpBuffer` is typically used for calculating the `cpHash` value for command authorization. It is typically called after an optional `Tss2_Sys_SetDecryptParam` call (in conjunction with encryption) and before a `Tss2_Sys_SetCmdAuthorization` call.

Response Codes:

- TSS2\_SYS\_RC\_BAD\_SEQUENCE: if not called after `_Prepare` and before `Tss2_Sys_Execute/Tss2_Sys_ExecuteAsync`.
- TSS2\_SYS\_RC\_BAD\_REFERENCE: if any NULL pointer is passed in.

### 3.8.2.6 Tss2\_Sys\_SetCmdAuths

```
TSS2_RC Tss2_Sys_SetCmdAuths(
    TSS2_SYS_CONTEXT      *sysContext,
    const TSS2L_SYS_AUTH_COMMAND *cmdAuthsArray
);
```



This function copies and saves the authorization data to the `sysContext`.

`cmdAuthsArray->count` indicates the number of authorizations to add. The count must be between 1 and `TSS2_SYS_MAX_SESSIONS`, inclusive.

If this command causes authorizations to be added, the command tag will be set to `TPM_ST_SESSIONS`.

**NOTE:** This command is optional for Part 3 commands that don't require any authorization sessions. If it is not called, the command tag defaults to `TPM_ST_NO_SESSIONS`.

Response Codes:

- `TSS2_SYS_RC_BAD_SEQUENCE`: if not called after `Tss2_Sys_<COMMAND_NAME>_Prepare` and before `Tss2_Sys_Execute/Tss2_Sys_ExecuteAsync`.
- `TSS2_SYS_RC_INSUFFICIENT_CONTEXT`: if the provided context structure is too small for the SAPI function.
- `TSS2_SYS_RC_BAD_REFERENCE`: if `sysContext` or `cmdAuthsArray` are NULL
- `TSS2_SYS_RC_BAD_SIZE`: if `cmdAuthsArray->count` is 0 or larger than `TSS2_SYS_MAX_SESSIONS`.
- `TSS2_SYS_RC_INVALID_SESSIONS`: Returned if the command requires a different number of authorizations.
- `TSS2_RC`s produced by lower layers of the software stack SHALL be returned to the caller unaltered unless handled internally.

### 3.8.3 Command Execution Functions

#### 3.8.3.1 Tss2\_Sys\_ExecuteAsync

```
TSS2_RC Tss2_Sys_ExecuteAsync (
    TSS2_SYS_CONTEXT          *sysContext
);
```

This function calls the TCTI transmit callback to send the TPM command stream. It does not call the receive function. This function is called when all the necessary command data has been set via `_Prepare` and optionally `Tss2_Sys_SetDecryptParam` and `Tss2_Sys_SetCmdAuths`.

This function is blocking but it is expected to return quickly.

This function can only be called once after a `_Prepare` if the TPM command succeeds. If the TPM command does not succeed and `Tss2_Sys_ExecuteFinish` returns a TPM error this function can be called again to resend the same command buffer. After this call, only the `Tss2_Sys_ExecuteFinish` and `Tss2_Sys_GetTctiContext` functions can be called on the same `sysContext`.

Response Codes:

- `TSS2_SYS_RC_INVALID_SESSIONS`: Returned if the command requires a different number of authorizations.
- `TSS2_SYS_RC_INSUFFICIENT_CONTEXT`: if the provided context structure is too small for the SAPI function.

- TSS2\_SYS\_RC\_BAD\_SEQUENCE: if called before `_Prepare` or if, after the most recent `_Prepare`, one of the following functions has been called: `executeAsync`, `Execute`, one call, or `Tss2_Sys_ExecuteFinish`
- TSS2\_SYS\_RC\_BAD\_REFERENCE: if `sysContext` is a NULL pointer.
- TSS2\_RCs produced by lower layers of the software stack SHALL be returned to the caller unaltered unless handled internally.

### 3.8.3.2 Tss2\_Sys\_ExecuteFinish

```
Tss2_Sys_ExecuteFinish(
    TSS2_SYS_CONTEXT    *sysContext,
    int32_t              timeout
);
```

This function calls the receive callback to receive the response stream.

This function can only be called after a `Tss2_Sys_ExecuteAsync`. Additionally, it can be called repeatedly as long as SAPI responds to it with a return code of `TSS2_TCTI_RC_TRY_AGAIN`. When `Tss2_Sys_ExecuteFinish` returns anything other than `TSS2_TCTI_RC_TRY_AGAIN`, subsequent invocations of the function using the same context MUST return `TSS2_SYS_RC_BAD_SEQUENCE` until the context is used to successfully issue another TPM command (via `Tss2_Sys_ExecuteAsync`).

If the timeout (in milliseconds) is:

- positive: return after the timeout, indicating whether the response was received
- 0: return immediately, indicating whether the response was received
- -1: return after the response is received

If this command returns success the response buffer can be manipulated using the `Tss2_Sys_Get/SetEncryptParam` functions, and the contents retrieved using `Tss2_Sys_GetRspAuths` and the appropriate `_Finish` function. If this command returns a TPM error the `Tss2_Sys_ExecuteAsync` or `Tss2_Sys_Execute` functions can be used to reissue the command. If this command returns `TSS2_TCTI_RC_TRY_AGAIN` a timeout occurred and the caller should call this function again later to get the TPM result. On any other error the command is finished and the next call should be to a `_Prepare` function.

Response Codes:

- TSS2\_SYS\_RC\_INSUFFICIENT\_CONTEXT: if the provided context structure is too small for the SAPI function.
- TSS2\_TCTI\_RC\_TRY\_AGAIN: if timeout occurs.
- TSS2\_SYS\_RC\_INSUFFICIENT\_RESPONSE: if the response does not contain at least a tag, response size, and response code.
- TSS2\_SYS\_RC\_MALFORMED\_RESPONSE: if any kind of malformed response is detected.
- TSS2\_SYS\_RC\_BAD\_REFERENCE: if `sysContext` is a NULL pointer.
- TSS2\_SYS\_RC\_BAD\_SEQUENCE: if not called immediately after `Tss2_Sys_ExecuteAsync`. Exception: can be called again if `TSS2_TCTI_RC_TRY_AGAIN` was received

- TSS2\_RCs produced by lower layers of the software stack SHALL be returned to the caller unaltered unless handled internally.

### 3.8.3.3 Tss2\_Sys\_Execute

```
TSS2_RC Tss2_Sys_Execute(
    TSS2_SYS_CONTEXT      *sysContext
);
```

This function is equivalent to Tss2\_Sys\_ExecuteAsync followed by Tss2\_Sys\_ExecuteFinish with a timeout of -1.

Response Codes:

- TSS2\_SYS\_RC\_BAD\_SEQUENCE: Return this anytime there is not a command prepared to be sent and Tss2\_Sys\_Execute is called. Additionally, if a \_Prepare command has been done and a \_Async command is called prior to calling Tss2\_Sys\_Execute, this response code should be returned.
- All error codes that can be returned by Tss2\_Sys\_ExecuteAsync and Tss2\_Sys\_ExecuteFinish excluding TSS2\_TCTI\_RC\_TRY\_AGAIN and all cases of TSS2\_SYS\_RC\_BAD\_SEQUENCE in the Tss2\_Sys\_ExecuteAsync and Tss2\_Sys\_ExecuteFinish functions.

### 3.8.3.4 Tss2\_Sys\_<COMMAND\_NAME>

To construct a SAPI command for each of the TPM 2.0 Specification Part 3 commands, replace the <COMMAND\_NAME> with the appropriate TPM 2.0 Specification Part 3 command with the TPM2\_ prefix removed (e.g. Tss2\_Sys\_GenRandom)

```
TSS2_RC Tss2_Sys_<COMMAND_NAME>(
    TSS2_SYS_CONTEXT      *sysContext,
    inHandles,
    const TSS2L_SYS_AUTH_COMMAND *cmdAuthsArray,
    inParams,
    *outHandles,
    *outParams,
    TSS2L_SYS_AUTH_RESPONSE *rspAuthsArray
);
```

This function is a template for a “one call” function. The number and types of the input handles and parameters, the number and types of the pointers to output handles and parameters, and the presence or absence of the cmdAuthsArray and rspAuthsArray parameters is defined by the commands as described in Part 3 of the TPM specification.

There is one of these one call (or one shot) functions per TPM command. These one call (or one shot) functions can be used irrespective of authorization for:

1. Sending a command that never takes authorizations.
2. Sending optional audit sessions with a command.
3. Sending a command with simple password authorizations.

#### 4. Sending a command with HMAC authorization.

Note use of sessions with the encrypt and/or decrypt flags is not allowed through the one call functions. Parameter encryption is only supported through the longer sequence of commands starting with a `Tss2_Sys_<COMMAND_NAME>_Prepare` function and ending with a `Tss2_Sys_<COMMAND_NAME>_Complete` function.

If any command parameter (after the handles) is a TPM2B:

- If the TPM2B parameter is NULL, the implementation marshals a TPM2B with a size of 0.

**NOTE:** The TPM often uses this pattern of setting the TPM2B size field to 0 for optional parameters.

- If the TPM2B parameter is not NULL:
  - If the TPM2B is a simple TPM2B, the TPM2B size field indicates the size of the UIN8 array. The implementation marshals the size and buffer into the byte stream. The implementation will not read beyond the used size.

**NOTE:** The TPM2B size may be zero.

- If the TPM2B is a complex TPM2B, the TPM2B size field will be ignored.

**NOTE:** The implementation will calculate the TPM2B size and marshal the TPM2B second parameter based on its data type.

If any response parameter is a TPM2B:

- If the response parameter is a simple TPM2B:
  - On the call to the one call function, its size parameter must be either the caller allocated size of the array or 0 to denote the default allocation size for this type.
  - Before returning from the one call function, the implementation will write the used size of the array.

The used size is unmarshalled from the response stream. If the used size is greater than the caller allocated size, this function returns `TSS2_SYS_RC_INSUFFICIENT_BUFFER`.

**NOTE:** If the caller reuses the TPM2B, the size must be set back to the caller allocated before the next call to `_Complete` or the one call function.

- If any parameter is a complex TPM2B:
  - In the call to the one call function, its size parameter **MUST** be zero.
  - Before returning from the one call function, its size parameter will be the unmarshalled version of the size of the TPM2B's UIN8 array as returned from the TPM.

Response Codes:

- `TSS2_SYS_RC_INVALID_SESSIONS`: if command cannot take or return the number of authorizations specified by `cmdAuthsArray->count`.
- `TSS2_SYS_RC_INSUFFICIENT_BUFFER`: if any of the simple TPM2B output parameters do not provide enough buffer space.
- `TSS2_SYS_RC_INSUFFICIENT_CONTEXT`: if the provided context structure is too small for the SAPI function.
- `TSS2_SYS_RC_INSUFFICIENT_RESPONSE`: if the response does not contain at least a tag, response size, and response code.
- `TSS2_SYS_RC_MALFORMED_RESPONSE`: if any kind of malformed response is detected

- TSS2\_SYS\_RC\_BAD\_SEQUENCE: if called between Tss2\_Sys\_ExecuteAsync and Finish.
- TSS2\_SYS\_RC\_BAD\_REFERENCE: if sysContext is NULL or one of input parameters that is not a TPM2B is a NULL pointer.
- TSS2\_SYS\_RC\_BAD\_VALUE: SHALL be returned if bad values for parameters are detected.
- TSS2\_SYS\_RC\_NO\_DECRYPT\_PARAM: if any session has its TPMA\_OBJECT\_DECRYPT bit set.
- TSS2\_SYS\_RC\_NO\_ENCRYPT\_PARAM: if any session has its TPMA\_OBJECT\_ENCRYPT bit set.
- TSS2\_RCs produced by lower layers (e.g. the TPM, TCTI etc) of the software stack SHALL be returned to the caller unaltered unless handled internally.

### 3.8.4 Command Completion

#### 3.8.4.1 Tss2\_Sys\_GetCommandCode

```
TSS2_RC Tss2_Sys_GetCommandCode (
    TSS2_SYS_CONTEXT      *sysContext,
    UINT8                 *commandCode
);
```

This function gets the command code for the command. The command code is returned as an array of bytes in big endian order. This array can be used for calculating the cpHash for a command or rpHash for a response.

The command code returned is valid from one \_Prepare or one one-call function call to the next \_Prepare or one-call function call.

Response Codes:

- TSS2\_SYS\_RC\_BAD\_SEQUENCE: if called before first \_Prepare or first one-call function is called on a given sysContext.
- TSS2\_SYS\_RC\_BAD\_REFERENCE: If *sysContext* or *commandCode* are NULL.

#### 3.8.4.2 Tss2\_Sys\_GetRspAuths

```
TSS2_RC Tss2_Sys_GetRspAuths (
    TSS2_SYS_CONTEXT      *sysContext,
    TSS2L_SYS_AUTH_RESPONSE *rspAuthsArray
);
```

This function gets the response authorization data from the sysContext.

This function can only be called after Tss2\_Sys\_Execute/Tss2\_Sys\_ExecuteFinish and before the next \_Prepare.

Response Codes:

- TSS2\_SYS\_RC\_INVALID\_SESSIONS: This RC MUST be returned if the TPM response does not return the same number of authorizations as were sent in the command.
- TSS2\_SYS\_RC\_INSUFFICIENT\_CONTEXT: if the provided context structure is too small for the SAPI function.
- TSS2\_SYS\_RC\_BAD\_SEQUENCE: if one of the following is true:
  - Tss2\_Sys\_Execute or Tss2\_Sys\_ExecuteFinish returned anything other than TPM\_RC\_SUCCESS
  - If not called after Tss2\_Sys\_Execute/Tss2\_Sys\_ExecuteFinish and before the next \_Prepare
  - If called for a command that can never take authorizations
- TSS2\_SYS\_RC\_MALFORMED\_RESPONSE: if any kind of malformed response is detected.
- TSS2\_SYS\_RC\_BAD\_REFERENCE: if *sysContext* or *rspAuthsArray* are NULL
- TSS2\_RCs produced by lower layers (e.g. the TPM, TCTI etc) of the software stack SHALL be returned to the caller unaltered unless handled internally.

### 3.8.4.3 Tss2\_Sys\_<COMMAND\_NAME>\_Complete

To construct a SAPI command for each of the TPM 2.0 Specification Part 3 commands, replace the <COMMAND\_NAME> with the appropriate TPM 2.0 Specification Part 3 command with the TPM2\_ prefix removed.

```
TSS2_RC Tss2_Sys_<COMMAND_NAME>_Complete(
    TSS2_SYS_CONTEXT      *sysContext,
                        *outHandles,
                        *outParams
);
```

This is a template for a complete function. There is one \_Complete function per Part 3 TPM command. The number and types of pointers to output parameters and of the handles are defined in Part 3 of the TPM specification.

This function unmarshals the response parameters and response handles from a previously executed TPM command.

If the caller does not require a certain parameter or handle to be returned, it may pass in NULL for any of the response handles or parameters and these values will not be returned.

This function must only be called after Tss2\_Sys\_Execute or Tss2\_Sys\_ExecuteAsync and before the next \_Prepare call.

If any parameter is a simple TPM2B:

- On the call to \_Complete, its size parameter must be either the caller allocated size of the array or 0 to denote the default allocation size for this type.
- On the return from \_Complete, the implementation will write the used size of the array.

The used size is unmarshaled from the response stream. If the used size is greater than the caller allocated size, returns TSS2\_SYS\_RC\_INSUFFICIENT\_BUFFER.

NOTE: If the caller reuses the TPM2B, the size must be set back to the caller allocated size before the next call to `_Complete` or one call function.

If any parameter is a complex TPM2B:

- In the call to `_Complete`, its size parameter MUST be zero.
- On the return from `_Complete`, its size parameter will be the unmarshalled version of the size of the TPM2B's UINT8 array as returned from the TPM.

If the first response output parameter is a complex TPM2B, and the second parameter of the TPM2B is encrypted, then the caller has two options:

- The caller can decrypt the parameter before `_Complete` is called with the first parameter non-NULL. See `Tss2_Sys_GetEncryptParam` and `Tss2_Sys_SetEncryptParam`.
- The caller can call `Tss2_Sys_Complete` with the first parameter NULL. The implementation will not unmarshal it. The caller must decrypt and unmarshal the parameter. See `Tss2_Sys_GetEncryptParam`.

Response Codes:

- `TSS2_SYS_RC_INSUFFICIENT_CONTEXT`: if the provided context structure is too small for the SAPI function.
- `TSS2_SYS_RC_INSUFFICIENT_BUFFER`: if any of the simple TPM2B output parameters do not provide enough buffer space.
- `TSS2_SYS_RC_BAD_SEQUENCE`: if one of the following is true:
  - `Tss2_Sys_Execute` or `Tss2_Sys_ExecuteFinish` returned anything other than `TSS2_RC_SUCCESS`
  - If not called after `Tss2_Sys_Execute` or `Tss2_Sys_ExecuteFinish` and before subsequent `Tss2_Sys_<COMMAND_NAME>_Prepare`.
- `TSS2_SYS_RC_MALFORMED_RESPONSE`:
  - MUST be returned if response is larger than the maximum sized response the TSS can receive, meaning the recommended size from `Tss2_Sys_GetContextSize` function which is returned when 0 is passed in as the requested size.
  - Returned if any kind of malformed response is detected
- `TSS2_SYS_RC_BAD_REFERENCE`: if `sysContext` is NULL
- `TSS2_RC`s produced by lower layers (e.g. the TPM, TCTI etc) of the software stack SHALL be returned to the caller unaltered unless handled internally.

### 3.8.4.4 `Tss2_Sys_GetEncryptParam`

```
TSS2_RC Tss2_Sys_GetEncryptParam(
    TSS2_SYS_CONTEXT      *sysContext,
    size_t                *encryptParamSize,
    const uint8_t         **encryptParamBuffer
);
```

If the first response parameter is a TPM2B type, this function returns the size of the buffer and a pointer to the buffer of the marshaled TPM2B. If the first parameter is not a TPM2B, this function returns `TSS2_SYS_RC_NO_ENCRYPT_PARAM`. For consistency with the TPM terminology a TPM output

parameter that is encrypted by the TPM and decrypted by the application is referred to as an *encrypt* parameter and the session controlling the encryption parameters is referred to as the encrypt session and must have its TPMA\_SESSION\_ENCRYPT attribute bit set.

This function is only called after Tss2\_Sys\_Execute or Tss2\_Sys\_ExecuteFinish function and before the next Tss2\_Sys\_XXX\_Prepare or one-call Tss2\_Sys\_XXX. Typically, this function will be called between Tss2\_Sys\_GetRpBuffer and \_Complete, since the rpHash must contain the encrypted value before \_Complete is called. If \_Complete is called without having decrypted the parameter, \_Complete may fail with an unmarshalling error.

The application must not write to the returned *encryptParamBuffer* and this buffer may only be read until the next invocation of any function that uses the same sysContext. If any other SAPI call is made to the same *sysContext* a previously retrieved *encryptParamBuffer* contains undefined data and Tss2\_Sys\_GetEncryptParam must be called again.

The intent of Tss2\_Sys\_GetEncryptParam is to provide the size and readable buffer of the parameter to be decrypted by the caller in an encrypted session.

After calling Tss2\_Sys\_GetEncryptParam, the decrypted result can be set by calling Tss2\_Sys\_SetEncryptParam; this allows the \_Complete call to properly unmarshal the result.

Response Codes:

- TSS2\_SYS\_RC\_BAD\_SEQUENCE: if not called in the correct order, or if Tss2\_Sys\_Execute or, Tss2\_Sys\_ExecuteFinish returned anything other than TPM\_RC\_SUCCESS
- TSS2\_SYS\_RC\_NO\_ENCRYPT\_PARAM: if called when sysContext is set for a command that doesn't have an encrypt response parameter.
- TSS2\_SYS\_RC\_MALFORMED\_RESPONSE: Returned if any kind of malformed response is detected.
- TSS2\_SYS\_RC\_BAD\_REFERENCES: if any of the inputs are NULL.

### 3.8.4.5 Tss2\_Sys\_SetEncryptParam

```
TSS2_RC Tss2_Sys_SetEncryptParam(
    TSS2_SYS_CONTEXT      *sysContext,
    size_t                encryptParamSize,
    const uint8_t         *encryptParamBuffer
);
```

If the first response parameter is a TPM2B type, this function sets the size and buffer of the TPM2B. The TPM2B size field must match *encryptParamSize*.

This function must only be called after Tss2\_Sys\_Execute / Tss2\_Sys\_ExecuteFinish and before the next \_Prepare or one call.

The intent of this function is to set the first response TPM2B parameter's UINT8 array to the decrypted value after the caller has decrypted the parameter and before the response parameter is unmarshaled using \_Complete.

It is typically called after the rpHash calculation, since the rpHash calculation uses the encrypted version of this parameter.

Response Codes:

- TSS2\_SYS\_RC\_BAD\_SEQUENCE: if not called after Tss2\_Sys\_Execute/Tss2\_Sys\_ExecuteAsync and before \_Complete.



- TSS2\_SYS\_RC\_INSUFFICIENT\_CONTEXT: if the provided context structure is too small for the SAPI function.
- TSS2\_SYS\_RC\_BAD\_REFERENCE: if *sysContext* or *encryptParambuffer* is null.
- TSS2\_SYS\_RC\_BAD\_SIZE: if the first TPM2B parameter size field does not equal *encryptParamSize*.
- TSS2\_SYS\_RC\_NO\_ENCRYPT\_PARAM: if called when *sysContext* is set for a response that doesn't have an encrypt response parameter.
- TSS2\_RCs produced by lower layers (e.g. the TPM, TCTI etc) of the software stack SHALL be returned to the caller unaltered unless handled internally.

### 3.8.4.6 Tss2\_Sys\_GetRpBuffer

```
TSS2_RC Tss2_Sys_GetRpBuffer(
    TSS2_SYS_CONTEXT      *sysContext,
    size_t                *rpBufferUsedSize,
    const uint8_t         **rpBuffer
);
```

This function returns a pointer to the *rpBuffer*, a pointer to the marshaled response parameters, and the used *rpBuffer* bytes after command execution.

This function is only called after *Tss2\_Sys\_Execute*, or *Tss2\_Sys\_ExecuteFinish()*, or one call function and before the next *\_Prepare*.

The caller must not write to the returned *rpBuffer* and this buffer may only be read until the next invocation of any function that uses the same *sysContext*. If any other SAPI call is being made to the same *sysContext* a previously retrieved *rpBuffer* contains undefined data and *Tss2\_Sys\_GetRpBuffer* must be called again.

The *rpBuffer* is used in the calculation of the *rpHash* value for response authorization. *Tss2\_Sys\_GetRpBuffer* is typically called before an optional *Tss2\_Sys\_GetEncryptParam* / *Tss2\_Sys\_SetEncryptParam* and before a *Tss2\_Sys\_XXX\_Complete*.

If *Tss2\_Sys\_GetRpBuffer* is called for a command that doesn't return any parameters, *rpBufferUsedSize* should be set to 0 and TSS2\_RC\_SUCCESS returned.

Response Codes:

- TSS2\_SYS\_RC\_BAD\_SEQUENCE:
  - If *Tss2\_Sys\_Execute*, *Tss2\_Sys\_ExecuteFinish*, or one-call function returned anything other than TPM\_RC\_SUCCESS.
  - If not called after *Tss2\_Sys\_Execute*, *Tss2\_Sys\_ExecuteFinish*, or one-call function and before subsequent *Tss2\_Sys\_<COMMAND\_NAME>\_Prepare*.
- TSS2\_SYS\_RC\_MALFORMED\_RESPONSE: Returned if any kind of malformed response is detected.
- TSS2\_SYS\_RC\_BAD\_REFERENCE: if any of the inputs are NULL.

## 4 SYS Header File

tss2\_sys.h

### 4.1 tss2\_sys.h Prelude

```
#ifndef TSS2_SYS_H
#define TSS2_SYS_H

#include <stdlib.h>
#include "tss2_common.h"
#include "tss2_tpm2_types.h"
#include "tss2_tcti.h"

#ifndef TSS2_API_VERSION_1_2_1_108
#error Version mismatch among TSS2 header files.
#endif

#ifdef __cplusplus
extern "C" {
#endif
```

### 4.2 tss2\_sys.h sysContext Structure

```
/*
 * System API Structures
 */

/* Opaque context structure */
typedef struct TSS2_SYS_OPAQUE_CONTEXT_BLOB TSS2_SYS_CONTEXT;
```

### 4.3 tss2\_sys.h Command and Response Session Structures

This structure is used to set the session data that is passed to and returned from the SAPI Part 3 functions. Input structure for command authorization area(s).

```
/* Maximum number of sessions supported in a command */
#define TSS2_SYS_MAX_SESSIONS 3
```

```

/* Structures to hold authorization data to and from the TPM */
typedef struct {
    uint16_t          count;
    TPMS_AUTH_COMMAND auths[TSS2_SYS_MAX_SESSIONS];
} TSS2L_SYS_AUTH_COMMAND;

typedef struct {
    uint16_t          count;
    TPMS_AUTH_RESPONSE auths[TSS2_SYS_MAX_SESSIONS];
} TSS2L_SYS_AUTH_RESPONSE;

```

#### 4.4 tss2\_sys.h Command Context Management Functions

```

/*
 * System API Context Management Functions
 */
TSS2_DLL_EXPORT size_t Tss2_Sys_GetContextSize(
    size_t maxCommandReponseSize);

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_Initialize(
    TSS2_SYS_CONTEXT *sysContext,
    size_t           contextSize,
    TSS2_TCTI_CONTEXT *tctiContext,
    TSS2_ABI_VERSION *abiVersion);

TSS2_DLL_EXPORT void Tss2_Sys_Finalize(
    TSS2_SYS_CONTEXT *sysContext);

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_GetTctiContext(
    TSS2_SYS_CONTEXT *sysContext,
    TSS2_TCTI_CONTEXT **tctiContext);

```

#### 4.5 tss2\_sys.h Command Preparation Functions

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_GetDecryptParam(

```

```
TSS2_SYS_CONTEXT *sysContext,
size_t          *decryptParamSize,
uint8_t  const **decryptParamBuffer);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_SetDecryptParam(
TSS2_SYS_CONTEXT *sysContext,
size_t          decryptParamSize,
uint8_t  const *decryptParamBuffer);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_GetCpBuffer(
TSS2_SYS_CONTEXT *sysContext,
size_t          *cpBufferUsedSize,
uint8_t  const **cpBuffer);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_SetCmdAuths(
TSS2_SYS_CONTEXT          *sysContext,
TSS2L_SYS_AUTH_COMMAND const *cmdAuths);
```

#### 4.6 tss2\_sys.h Command Execution Functions

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_ExecuteAsync(
TSS2_SYS_CONTEXT *sysContext);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_ExecuteFinish(
TSS2_SYS_CONTEXT *sysContext,
int32_t          timeout);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_Execute(
TSS2_SYS_CONTEXT *sysContext);
```

#### 4.7 tss2\_sys.h Command Completion Functions

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_GetCommandCode(
TSS2_SYS_CONTEXT *sysContext,
UINT8           *commandCode);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_GetRspAuths(
```

```
TSS2_SYS_CONTEXT      *sysContext,
TSS2L_SYS_AUTH_RESPONSE *rspAuths);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_GetEncryptParam(
    TSS2_SYS_CONTEXT *sysContext,
    size_t           *encryptParamSize,
    uint8_t  const **encryptParamBuffer);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_SetEncryptParam(
    TSS2_SYS_CONTEXT *sysContext,
    size_t           encryptParamSize,
    uint8_t  const *encryptParamBuffer);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_GetRpBuffer(
    TSS2_SYS_CONTEXT *sysContext,
    size_t           *rpBufferUsedSize,
    uint8_t  const **rpBuffer);
```

## 4.8 tss2\_sys.h Functions for Invoking TPM Commands

```
/*
 * The following functions are the Prepare, Complete, and One-Shot
 * functions corresponding to each command in part 3 of the TPM
 * specification.
 */
```

### 4.8.1 TPM Tss2\_Sys\_Startup Commands

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_Startup_Prepare(
    TSS2_SYS_CONTEXT *sysContext,
    TPM2_SU          startupType);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_Startup_Complete(
    TSS2_SYS_CONTEXT *sysContext);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_Startup(
    TSS2_SYS_CONTEXT *sysContext,
```

```
TPM2_SU          startupType);
```

#### 4.8.2 TPM Tss2\_Sys\_Shutdown Commands

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_Shutdown_Prepare(
    TSS2_SYS_CONTEXT *sysContext,
    TPM2_SU          shutdownType);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_Shutdown_Complete(
    TSS2_SYS_CONTEXT *sysContext);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_Shutdown(
    TSS2_SYS_CONTEXT          *sysContext,
    TSS2L_SYS_AUTH_COMMAND const *cmdAuths,
    TPM2_SU                   shutdownType,
    TSS2L_SYS_AUTH_RESPONSE   *rspAuths);
```

#### 4.8.3 TPM Tss2\_Sys\_SelfTest Commands

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_SelfTest_Prepare(
    TSS2_SYS_CONTEXT *sysContext,
    TPMT_YES_NO     fullTest);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_SelfTest_Complete(
    TSS2_SYS_CONTEXT *sysContext);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_SelfTest(
    TSS2_SYS_CONTEXT          *sysContext,
    TSS2L_SYS_AUTH_COMMAND const *cmdAuths,
    TPMT_YES_NO              fullTest,
    TSS2L_SYS_AUTH_RESPONSE   *rspAuths);
```

#### 4.8.4 TPM Tss2\_Sys\_IncrementalSelfTest Commands

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_IncrementalSelfTest_Prepare(
    TSS2_SYS_CONTEXT *sysContext,
    TPML_ALG const *toTest);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_IncrementalSelfTest_Complete(
    TSS2_SYS_CONTEXT *sysContext,
    TPML_ALG *todoList);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_IncrementalSelfTest(
    TSS2_SYS_CONTEXT *sysContext,
    TSS2L_SYS_AUTH_COMMAND const *cmdAuths,
    TPML_ALG const *toTest,
    TPML_ALG *todoList,
    TSS2L_SYS_AUTH_RESPONSE *rspAuths);
```

#### 4.8.5 TPM Tss2\_Sys\_GetTestResult Commands

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_GetTestResult_Prepare(
    TSS2_SYS_CONTEXT *sysContext);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_GetTestResult_Complete(
    TSS2_SYS_CONTEXT *sysContext,
    TPM2B_MAX_BUFFER *outData,
    TPM2_RC *testResult);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_GetTestResult(
    TSS2_SYS_CONTEXT *sysContext,
    TSS2L_SYS_AUTH_COMMAND const *cmdAuths,
    TPM2B_MAX_BUFFER *outData,
    TPM2_RC *testResult,
    TSS2L_SYS_AUTH_RESPONSE *rspAuths);
```

#### 4.8.6 TPM Tss2\_Sys\_StartAuthSession Commands

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_StartAuthSession_Prepare(
    TSS2_SYS_CONTEXT          *sysContext,
    TPMT_DH_OBJECT            tpmKey,
    TPMT_DH_ENTITY            bind,
    TPM2B_NONCE                const *nonceCaller,
    TPM2B_ENCRYPTED_SECRET     const *encryptedSalt,
    TPM2_SE                    sessionType,
    TPMT_SYM_DEF               const *symmetric,
    TPMT_ALG_HASH              authHash);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_StartAuthSession_Complete(
    TSS2_SYS_CONTEXT          *sysContext,
    TPMT_SH_AUTH_SESSION     *sessionHandle,
    TPM2B_NONCE                *nonceTPM);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_StartAuthSession(
    TSS2_SYS_CONTEXT          *sysContext,
    TPMT_DH_OBJECT            tpmKey,
    TPMT_DH_ENTITY            bind,
    TSS2L_SYS_AUTH_COMMAND    const *cmdAuths,
    TPM2B_NONCE                const *nonceCaller,
    TPM2B_ENCRYPTED_SECRET     const *encryptedSalt,
    TPM2_SE                    sessionType,
    TPMT_SYM_DEF               const *symmetric,
    TPMT_ALG_HASH              authHash,
    TPMT_SH_AUTH_SESSION     *sessionHandle,
    TPM2B_NONCE                *nonceTPM,
    TSS2L_SYS_AUTH_RESPONSE    *rspAuths);
```

#### 4.8.7 TPM Tss2\_Sys\_PolicyRestart Commands

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PolicyRestart_Prepare(
    TSS2_SYS_CONTEXT *sysContext,
    TPMT_SH_POLICY   sessionHandle);
```



```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PolicyRestart_Complete(
    TSS2_SYS_CONTEXT *sysContext);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PolicyRestart(
    TSS2_SYS_CONTEXT          *sysContext,
    TPML_SH_POLICY           sessionHandle,
    TSS2L_SYS_AUTH_COMMAND  const *cmdAuths,
    TSS2L_SYS_AUTH_RESPONSE *rspAuths);
```

#### 4.8.8 TPM Tss2\_Sys\_Create Commands

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_Create_Prepare(
    TSS2_SYS_CONTEXT          *sysContext,
    TPML_DH_OBJECT           parentHandle,
    TPM2B_SENSITIVE_CREATE  const *inSensitive,
    TPM2B_PUBLIC             const *inPublic,
    TPM2B_DATA               const *outsideInfo,
    TPML_PCR_SELECTION      const *creationPCR);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_Create_Complete(
    TSS2_SYS_CONTEXT *sysContext,
    TPM2B_PRIVATE    *outPrivate,
    TPM2B_PUBLIC     *outPublic,
    TPM2B_CREATION_DATA *creationData,
    TPM2B_DIGEST     *creationHash,
    TPMT_TK_CREATION *creationTicket);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_Create(
    TSS2_SYS_CONTEXT          *sysContext,
    TPML_DH_OBJECT           parentHandle,
    TSS2L_SYS_AUTH_COMMAND  const *cmdAuths,
    TPM2B_SENSITIVE_CREATE  const *inSensitive,
    TPM2B_PUBLIC             const *inPublic,
    TPM2B_DATA               const *outsideInfo,
    TPML_PCR_SELECTION      const *creationPCR,
```

```

TPM2B_PRIVATE          *outPrivate,
TPM2B_PUBLIC           *outPublic,
TPM2B_CREATION_DATA    *creationData,
TPM2B_DIGEST           *creationHash,
TPMT_TK_CREATION       *creationTicket,
TSS2L_SYS_AUTH_RESPONSE *rspAuths);

```

#### 4.8.9 TPM Tss2\_Sys\_Load Commands

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_Load_Prepare(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_DH_OBJECT   parentHandle,
    TPM2B_PRIVATE    const *inPrivate,
    TPM2B_PUBLIC     const *inPublic);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_Load_Complete(
    TSS2_SYS_CONTEXT *sysContext,
    TPM2_HANDLE      *objectHandle,
    TPM2B_NAME       *name);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_Load(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_DH_OBJECT   parentHandle,
    TSS2L_SYS_AUTH_COMMAND const *cmdAuths,
    TPM2B_PRIVATE    const *inPrivate,
    TPM2B_PUBLIC     const *inPublic,
    TPM2_HANDLE      *objectHandle,
    TPM2B_NAME       *name,
    TSS2L_SYS_AUTH_RESPONSE *rspAuths);

```

#### 4.8.10 TPM Tss2\_Sys\_LoadExternal Commands

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_LoadExternal_Prepare(
    TSS2_SYS_CONTEXT *sysContext,
    TPM2B_SENSITIVE const *inPrivate,

```

```

TPM2B_PUBLIC    const *inPublic,
TPMI_RH_HIERARCHY    hierarchy);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_LoadExternal_Complete(
    TSS2_SYS_CONTEXT *sysContext,
    TPM2_HANDLE      *objectHandle,
    TPM2B_NAME       *name);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_LoadExternal(
    TSS2_SYS_CONTEXT      *sysContext,
    TSS2L_SYS_AUTH_COMMAND const *cmdAuths,
    TPM2B_SENSITIVE       const *inPrivate,
    TPM2B_PUBLIC          const *inPublic,
    TPMI_RH_HIERARCHY     hierarchy,
    TPM2_HANDLE           *objectHandle,
    TPM2B_NAME            *name,
    TSS2L_SYS_AUTH_RESPONSE *rspAuths);

```

#### 4.8.11 TPM Tss2\_Sys\_ReadPublic Commands

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_ReadPublic_Prepare(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_DH_OBJECT   objectHandle);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_ReadPublic_Complete(
    TSS2_SYS_CONTEXT *sysContext,
    TPM2B_PUBLIC     *outPublic,
    TPM2B_NAME       *name,
    TPM2B_NAME       *qualifiedName);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_ReadPublic(
    TSS2_SYS_CONTEXT      *sysContext,
    TPMI_DH_OBJECT        objectHandle,
    TSS2L_SYS_AUTH_COMMAND const *cmdAuths,
    TPM2B_PUBLIC          *outPublic,
    TPM2B_NAME            *name,

```

```

TPM2B_NAME                *qualifiedName,
TSS2L_SYS_AUTH_RESPONSE   *rspAuths);

```

#### 4.8.12 TPM Tss2\_Sys\_ActivateCredential Commands

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_ActivateCredential_Prepare(
    TSS2_SYS_CONTEXT          *sysContext,
    TPMI_DH_OBJECT            activateHandle,
    TPMI_DH_OBJECT            keyHandle,
    TPM2B_ID_OBJECT           const *credentialBlob,
    TPM2B_ENCRYPTED_SECRET     const *secret);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_ActivateCredential_Complete(
    TSS2_SYS_CONTEXT *sysContext,
    TPM2B_DIGEST     *certInfo);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_ActivateCredential(
    TSS2_SYS_CONTEXT          *sysContext,
    TPMI_DH_OBJECT            activateHandle,
    TPMI_DH_OBJECT            keyHandle,
    TSS2L_SYS_AUTH_COMMAND    const *cmdAuths,
    TPM2B_ID_OBJECT           const *credentialBlob,
    TPM2B_ENCRYPTED_SECRET     const *secret,
    TPM2B_DIGEST              *certInfo,
    TSS2L_SYS_AUTH_RESPONSE   *rspAuths);

```

#### 4.8.13 TPM Tss2\_Sys\_MakeCredential Commands

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_MakeCredential_Prepare(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_DH_OBJECT   handle,
    TPM2B_DIGEST     const *credential,
    TPM2B_NAME       const *objectName);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_MakeCredential_Complete(

```

```

TSS2_SYS_CONTEXT      *sysContext,
TPM2B_ID_OBJECT       *credentialBlob,
TPM2B_ENCRYPTED_SECRET *secret);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_MakeCredential(
    TSS2_SYS_CONTEXT      *sysContext,
    TPMI_DH_OBJECT        handle,
    TSS2L_SYS_AUTH_COMMAND const *cmdAuths,
    TPM2B_DIGEST          const *credential,
    TPM2B_NAME            const *objectName,
    TPM2B_ID_OBJECT       *credentialBlob,
    TPM2B_ENCRYPTED_SECRET *secret,
    TSS2L_SYS_AUTH_RESPONSE *rspAuths);

```

#### 4.8.14 TPM Tss2\_Sys\_Unseal Commands

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_Unseal_Prepare(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_DH_OBJECT  itemHandle);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_Unseal_Complete(
    TSS2_SYS_CONTEXT *sysContext,
    TPM2B_SENSITIVE_DATA *outData);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_Unseal(
    TSS2_SYS_CONTEXT      *sysContext,
    TPMI_DH_OBJECT        itemHandle,
    TSS2L_SYS_AUTH_COMMAND const *cmdAuths,
    TPM2B_SENSITIVE_DATA  *outData,
    TSS2L_SYS_AUTH_RESPONSE *rspAuths);

```

#### 4.8.15 TPM Tss2\_Sys\_ObjectChangeAuth Commands

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_ObjectChangeAuth_Prepare(
    TSS2_SYS_CONTEXT *sysContext,

```

```

TPMI_DH_OBJECT    objectHandle,
TPMI_DH_OBJECT    parentHandle,
TPM2B_AUTH const *newAuth);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_ObjectChangeAuth_Complete(
    TSS2_SYS_CONTEXT *sysContext,
    TPM2B_PRIVATE    *outPrivate);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_ObjectChangeAuth(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_DH_OBJECT  objectHandle,
    TPMI_DH_OBJECT  parentHandle,
    TSS2L_SYS_AUTH_COMMAND const *cmdAuths,
    TPM2B_AUTH       const *newAuth,
    TPM2B_PRIVATE    *outPrivate,
    TSS2L_SYS_AUTH_RESPONSE *rspAuths);

```

#### 4.8.16 TPM Tss2\_Sys\_CreateLoaded Commands

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_CreateLoaded_Prepare(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_DH_PARENT   parentHandle,
    TPM2B_SENSITIVE_CREATE const *inSensitive,
    TPM2B_TEMPLATE    const *inPublic);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_CreateLoaded_Complete(
    TSS2_SYS_CONTEXT *sysContext,
    TPM2_HANDLE      *objectHandle,
    TPM2B_PRIVATE    *outPrivate,
    TPM2B_PUBLIC     *outPublic,
    TPM2B_NAME       *name);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_CreateLoaded(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_DH_PARENT   parentHandle,
    TSS2L_SYS_AUTH_COMMAND const *cmdAuths,

```

```

TPM2B_SENSITIVE_CREATE const *inSensitive,
TPM2B_TEMPLATE          const *inPublic,
TPM2_HANDLE             *objectHandle,
TPM2B_PRIVATE           *outPrivate,
TPM2B_PUBLIC            *outPublic,
TPM2B_NAME              *name,
TSS2L_SYS_AUTH_RESPONSE *rspAuths);

```

#### 4.8.17 TPM Tss2\_Sys\_Duplicate Commands

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_Duplicate_Prepare(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_DH_OBJECT  objectHandle,
    TPMI_DH_OBJECT  newParentHandle,
    TPM2B_DATA      const *encryptionKeyIn,
    TPMT_SYM_DEF_OBJECT const *symmetricAlg);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_Duplicate_Complete(
    TSS2_SYS_CONTEXT *sysContext,
    TPM2B_DATA      *encryptionKeyOut,
    TPM2B_PRIVATE   *duplicate,
    TPM2B_ENCRYPTED_SECRET *outSymSeed);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_Duplicate(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_DH_OBJECT  objectHandle,
    TPMI_DH_OBJECT  newParentHandle,
    TSS2L_SYS_AUTH_COMMAND const *cmdAuths,
    TPM2B_DATA      const *encryptionKeyIn,
    TPMT_SYM_DEF_OBJECT const *symmetricAlg,
    TPM2B_DATA      *encryptionKeyOut,
    TPM2B_PRIVATE   *duplicate,
    TPM2B_ENCRYPTED_SECRET *outSymSeed,
    TSS2L_SYS_AUTH_RESPONSE *rspAuths);

```

#### 4.8.18 TPM Tss2\_Sys\_Rewrap Commands

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_Rewrap_Prepare(
    TSS2_SYS_CONTEXT          *sysContext,
    TPMI_DH_OBJECT            oldParent,
    TPMI_DH_OBJECT            newParent,
    TPM2B_PRIVATE              const *inDuplicate,
    TPM2B_NAME                 const *name,
    TPM2B_ENCRYPTED_SECRET     const *inSymSeed);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_Rewrap_Complete(
    TSS2_SYS_CONTEXT          *sysContext,
    TPM2B_PRIVATE              *outDuplicate,
    TPM2B_ENCRYPTED_SECRET     *outSymSeed);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_Rewrap(
    TSS2_SYS_CONTEXT          *sysContext,
    TPMI_DH_OBJECT            oldParent,
    TPMI_DH_OBJECT            newParent,
    TSS2L_SYS_AUTH_COMMAND    const *cmdAuths,
    TPM2B_PRIVATE              const *inDuplicate,
    TPM2B_NAME                 const *name,
    TPM2B_ENCRYPTED_SECRET     const *inSymSeed,
    TPM2B_PRIVATE              *outDuplicate,
    TPM2B_ENCRYPTED_SECRET     *outSymSeed,
    TSS2L_SYS_AUTH_RESPONSE    *rspAuths);
```

#### 4.8.19 TPM Tss2\_Sys\_Import Commands

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_Import_Prepare(
    TSS2_SYS_CONTEXT          *sysContext,
    TPMI_DH_OBJECT            parentHandle,
    TPM2B_DATA                 const *encryptionKey,
    TPM2B_PUBLIC                const *objectPublic,
    TPM2B_PRIVATE              const *duplicate,
    TPM2B_ENCRYPTED_SECRET     const *inSymSeed,
    TPMT_SYM_DEF_OBJECT        const *symmetricAlg);
```



```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_Import_Complete(
    TSS2_SYS_CONTEXT *sysContext,
    TPM2B_PRIVATE    *outPrivate);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_Import(
    TSS2_SYS_CONTEXT          *sysContext,
    TPMT_DH_OBJECT            parentHandle,
    TSS2L_SYS_AUTH_COMMAND    const *cmdAuths,
    TPM2B_DATA                 const *encryptionKey,
    TPM2B_PUBLIC               const *objectPublic,
    TPM2B_PRIVATE              const *duplicate,
    TPM2B_ENCRYPTED_SECRET     const *inSymSeed,
    TPMT_SYM_DEF_OBJECT        const *symmetricAlg,
    TPM2B_PRIVATE              *outPrivate,
    TSS2L_SYS_AUTH_RESPONSE    *rspAuths);
```

#### 4.8.20 TPM Tss2\_Sys\_RSA\_Encrypt Commands

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_RSA_Encrypt_Prepare(
    TSS2_SYS_CONTEXT          *sysContext,
    TPMT_DH_OBJECT            keyHandle,
    TPM2B_PUBLIC_KEY_RSA      const *message,
    TPMT_RSA_DECRYPT           const *inScheme,
    TPM2B_DATA                 const *label);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_RSA_Encrypt_Complete(
    TSS2_SYS_CONTEXT          *sysContext,
    TPM2B_PUBLIC_KEY_RSA      *outData);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_RSA_Encrypt(
    TSS2_SYS_CONTEXT          *sysContext,
    TPMT_DH_OBJECT            keyHandle,
    TSS2L_SYS_AUTH_COMMAND    const *cmdAuths,
    TPM2B_PUBLIC_KEY_RSA      const *message,
    TPMT_RSA_DECRYPT           const *inScheme,
```

```

TPM2B_DATA          const *label,
TPM2B_PUBLIC_KEY_RSA      *outData,
TSS2L_SYS_AUTH_RESPONSE  *rspAuths);

```

#### 4.8.21 TPM Tss2\_Sys\_RSA\_Decrypt Commands

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_RSA_Decrypt_Prepare(
    TSS2_SYS_CONTEXT      *sysContext,
    TPMT_DH_OBJECT        keyHandle,
    TPM2B_PUBLIC_KEY_RSA  const *cipherText,
    TPMT_RSA_DECRYPT       const *inScheme,
    TPM2B_DATA            const *label);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_RSA_Decrypt_Complete(
    TSS2_SYS_CONTEXT      *sysContext,
    TPM2B_PUBLIC_KEY_RSA *message);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_RSA_Decrypt(
    TSS2_SYS_CONTEXT      *sysContext,
    TPMT_DH_OBJECT        keyHandle,
    TSS2L_SYS_AUTH_COMMAND const *cmdAuths,
    TPM2B_PUBLIC_KEY_RSA  const *cipherText,
    TPMT_RSA_DECRYPT       const *inScheme,
    TPM2B_DATA            const *label,
    TPM2B_PUBLIC_KEY_RSA  *message,
    TSS2L_SYS_AUTH_RESPONSE *rspAuths);

```

#### 4.8.22 TPM Tss2\_Sys\_ECDH\_Keygen Commands

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_ECDH_KeyGen_Prepare(
    TSS2_SYS_CONTEXT *sysContext,
    TPMT_DH_OBJECT  keyHandle);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_ECDH_KeyGen_Complete(
    TSS2_SYS_CONTEXT *sysContext,

```

```

TPM2B_ECC_POINT *zPoint,
TPM2B_ECC_POINT *pubPoint);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_ECDH_KeyGen(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_DH_OBJECT keyHandle,
    TSS2L_SYS_AUTH_COMMAND const *cmdAuths,
    TPM2B_ECC_POINT *zPoint,
    TPM2B_ECC_POINT *pubPoint,
    TSS2L_SYS_AUTH_RESPONSE *rspAuths);

```

#### 4.8.23 TPM Tss2\_Sys\_ECDH\_ZGen Commands

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_ECDH_ZGen_Prepare(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_DH_OBJECT keyHandle,
    TPM2B_ECC_POINT const *inPoint);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_ECDH_ZGen_Complete(
    TSS2_SYS_CONTEXT *sysContext,
    TPM2B_ECC_POINT *outPoint);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_ECDH_ZGen(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_DH_OBJECT keyHandle,
    TSS2L_SYS_AUTH_COMMAND const *cmdAuths,
    TPM2B_ECC_POINT const *inPoint,
    TPM2B_ECC_POINT *outPoint,
    TSS2L_SYS_AUTH_RESPONSE *rspAuths);

```

#### 4.8.24 TPM Tss2\_Sys\_ECC\_Parameters Commands

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_ECC_Parameters_Prepare(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_ECC_CURVE curveID);

```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_ECC_Parameters_Complete(
    TSS2_SYS_CONTEXT          *sysContext,
    TPMS_ALGORITHM_DETAIL_ECC *parameters);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_ECC_Parameters(
    TSS2_SYS_CONTEXT          *sysContext,
    TSS2L_SYS_AUTH_COMMAND   const *cmdAuths,
    TPMI_ECC_CURVE           curveID,
    TPMS_ALGORITHM_DETAIL_ECC *parameters,
    TSS2L_SYS_AUTH_RESPONSE  *rspAuths);
```

#### 4.8.25 TPM Tss2\_Sys\_ZGen\_2Phase Commands

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_ZGen_2Phase_Prepare(
    TSS2_SYS_CONTEXT          *sysContext,
    TPMI_DH_OBJECT           keyA,
    TPM2B_ECC_POINT          const *inQsB,
    TPM2B_ECC_POINT          const *inQeB,
    TPMI_ECC_KEY_EXCHANGE    inScheme,
    UINT16                   counter);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_ZGen_2Phase_Complete(
    TSS2_SYS_CONTEXT *sysContext,
    TPM2B_ECC_POINT  *outZ1,
    TPM2B_ECC_POINT  *outZ2);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_ZGen_2Phase(
    TSS2_SYS_CONTEXT          *sysContext,
    TPMI_DH_OBJECT           keyA,
    TSS2L_SYS_AUTH_COMMAND   const *cmdAuths,
    TPM2B_ECC_POINT          const *inQsB,
    TPM2B_ECC_POINT          const *inQeB,
    TPMI_ECC_KEY_EXCHANGE    inScheme,
    UINT16                   counter,
    TPM2B_ECC_POINT          *outZ1,
```

```

TPM2B_ECC_POINT          *outZ2,
TSS2L_SYS_AUTH_RESPONSE  *rspAuths);

```

#### 4.8.26 TPM Tss2\_Sys\_EncryptDecrypt Commands

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_EncryptDecrypt_Prepare (
    TSS2_SYS_CONTEXT      *sysContext,
    TPMI_DH_OBJECT        keyHandle,
    TPMI_YES_NO           decrypt,
    TPMI_ALG_CIPHER_MODE  mode,
    TPM2B_IV              const *ivIn,
    TPM2B_MAX_BUFFER      const *inData);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_EncryptDecrypt_Complete (
    TSS2_SYS_CONTEXT *sysContext,
    TPM2B_MAX_BUFFER *outData,
    TPM2B_IV         *ivOut);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_EncryptDecrypt (
    TSS2_SYS_CONTEXT      *sysContext,
    TPMI_DH_OBJECT        keyHandle,
    TSS2L_SYS_AUTH_COMMAND const *cmdAuths,
    TPMI_YES_NO           decrypt,
    TPMI_ALG_SYM_MODE     mode,
    TPM2B_IV              const *ivIn,
    TPM2B_MAX_BUFFER      const *inData,
    TPM2B_MAX_BUFFER      *outData,
    TPM2B_IV              *ivOut,
    TSS2L_SYS_AUTH_RESPONSE *rspAuths);

```

#### 4.8.27 TPM Tss2\_Sys\_EncryptDecrypt2 Commands

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_EncryptDecrypt2_Prepare (
    TSS2_SYS_CONTEXT      *sysContext,
    TPMI_DH_OBJECT        keyHandle,

```

```

TPM2B_MAX_BUFFER const *inData,
TPMI_YES_NO          decrypt,
TPMI_ALG_CIPHER_MODE mode,
TPM2B_IV             const *ivIn);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_EncryptDecrypt2_Complete(
    TSS2_SYS_CONTEXT *sysContext,
    TPM2B_MAX_BUFFER *outData,
    TPM2B_IV         *ivOut);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_EncryptDecrypt2(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_DH_OBJECT   keyHandle,
    TSS2L_SYS_AUTH_COMMAND const *cmdAuths,
    TPM2B_MAX_BUFFER  const *inData,
    TPMI_YES_NO       decrypt,
    TPMI_ALG_SYM_MODE mode,
    TPM2B_IV          const *ivIn,
    TPM2B_MAX_BUFFER  *outData,
    TPM2B_IV          *ivOut,
    TSS2L_SYS_AUTH_RESPONSE *rspAuths);

```

#### 4.8.28 TPM Tss2\_Sys\_Hash Commands

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_Hash_Prepare(
    TSS2_SYS_CONTEXT *sysContext,
    TPM2B_MAX_BUFFER const *data,
    TPMI_ALG_HASH     hashAlg,
    TPMI_RH_HIERARCHY hierarchy);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_Hash_Complete(
    TSS2_SYS_CONTEXT *sysContext,
    TPM2B_DIGEST     *outHash,
    TPMT_TK_HASHCHECK *validation);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_Hash(

```

```

TSS2_SYS_CONTEXT          *sysContext,
TSS2L_SYS_AUTH_COMMAND  const *cmdAuths,
TPM2B_MAX_BUFFER        const *data,
TPMI_ALG_HASH           hashAlg,
TPMI_RH_HIERARCHY       hierarchy,
TPM2B_DIGEST            *outHash,
TPMT_TK_HASHCHECK       *validation,
TSS2L_SYS_AUTH_RESPONSE *rspAuths);

```

#### 4.8.29 TPM Tss2\_Sys\_HMAC Commands

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_HMAC_Prepare(
    TSS2_SYS_CONTEXT          *sysContext,
    TPMI_DH_OBJECT           handle,
    TPM2B_MAX_BUFFER const *buffer,
    TPMI_ALG_HASH           hashAlg);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_HMAC_Complete(
    TSS2_SYS_CONTEXT *sysContext,
    TPM2B_DIGEST     *outHMAC);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_HMAC(
    TSS2_SYS_CONTEXT          *sysContext,
    TPMI_DH_OBJECT           handle,
    TSS2L_SYS_AUTH_COMMAND  const *cmdAuths,
    TPM2B_MAX_BUFFER        const *buffer,
    TPMI_ALG_HASH           hashAlg,
    TPM2B_DIGEST            *outHMAC,
    TSS2L_SYS_AUTH_RESPONSE *rspAuths);

```

#### 4.8.30 TPM Tss2\_Sys\_MAC Commands

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_MAC_Prepare(
    TSS2_SYS_CONTEXT          *sysContext,
    TPMI_DH_OBJECT           handle,
    TPM2B_MAX_BUFFER const *buffer,

```

```
TPMI_ALG_MAC_SCHEME    inScheme);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_MAC_Complete(
    TSS2_SYS_CONTEXT *sysContext,
    TPM2B_DIGEST     *outMAC);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_MAC(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_DH_OBJECT   handle,
    TSS2L_SYS_AUTH_COMMAND const *cmdAuths,
    TPM2B_MAX_BUFFER const *buffer,
    TPMI_ALG_MAC_SCHEME    inScheme,
    TPM2B_DIGEST           *outMAC,
    TSS2L_SYS_AUTH_RESPONSE *rspAuths);
```

#### 4.8.31 TPM Tss2\_Sys\_GetRandom Commands

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_GetRandom_Prepare(
    TSS2_SYS_CONTEXT *sysContext,
    UINT16           bytesRequested);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_GetRandom_Complete(
    TSS2_SYS_CONTEXT *sysContext,
    TPM2B_DIGEST     *randomBytes);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_GetRandom(
    TSS2_SYS_CONTEXT *sysContext,
    TSS2L_SYS_AUTH_COMMAND const *cmdAuths,
    UINT16           bytesRequested,
    TPM2B_DIGEST     *randomBytes,
    TSS2L_SYS_AUTH_RESPONSE *rspAuths);
```

#### 4.8.32 TPM Tss2\_Sys\_StirRandom Commands

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_StirRandom_Prepare(
    TSS2_SYS_CONTEXT *sysContext,
    TPM2B_SENSITIVE_DATA const *inData);
```



```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_StirRandom_Complete(
    TSS2_SYS_CONTEXT *sysContext);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_StirRandom(
    TSS2_SYS_CONTEXT *sysContext,
    TSS2L_SYS_AUTH_COMMAND const *cmdAuths,
    TPM2B_SENSITIVE_DATA const *inData,
    TSS2L_SYS_AUTH_RESPONSE *rspAuths);
```

#### 4.8.33 TPM Tss2\_Sys\_HMAC\_Start Commands

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_HMAC_Start_Prepare(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_DH_OBJECT handle,
    TPM2B_AUTH const *auth,
    TPMI_ALG_HASH hashAlg);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_HMAC_Start_Complete(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_DH_OBJECT *sequenceHandle);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_HMAC_Start(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_DH_OBJECT handle,
    TSS2L_SYS_AUTH_COMMAND const *cmdAuths,
    TPM2B_AUTH const *auth,
    TPMI_ALG_HASH hashAlg,
    TPMI_DH_OBJECT *sequenceHandle,
    TSS2L_SYS_AUTH_RESPONSE *rspAuths);
```

#### 4.8.34 TPM Tss2\_Sys\_MAC\_Start Commands

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_MAC_Start_Prepare(
    TSS2_SYS_CONTEXT *sysContext,
```

```

TPMI_DH_OBJECT      handle,
TPM2B_AUTH const    *auth,
TPMI_ALG_MAC_SCHEME inScheme);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_MAC_Start_Complete(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_DH_OBJECT *sequenceHandle);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_MAC_Start(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_DH_OBJECT handle,
    TSS2L_SYS_AUTH_COMMAND const *cmdAuths,
    TPM2B_AUTH const *auth,
    TPMI_ALG_MAC_SCHEME inScheme,
    TPMI_DH_OBJECT *sequenceHandle,
    TSS2L_SYS_AUTH_RESPONSE *rspAuths);

```

#### 4.8.35 TPM Tss2\_Sys\_HashSequenceStart Commands

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_HashSequenceStart_Prepare(
    TSS2_SYS_CONTEXT *sysContext,
    TPM2B_AUTH const *auth,
    TPMI_ALG_HASH hashAlg);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_HashSequenceStart_Complete(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_DH_OBJECT *sequenceHandle);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_HashSequenceStart(
    TSS2_SYS_CONTEXT *sysContext,
    TSS2L_SYS_AUTH_COMMAND const *cmdAuths,
    TPM2B_AUTH const *auth,
    TPMI_ALG_HASH hashAlg,
    TPMI_DH_OBJECT *sequenceHandle,
    TSS2L_SYS_AUTH_RESPONSE *rspAuths);

```

#### 4.8.36 TPM Tss2\_Sys\_SequenceUpdate Commands

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_SequenceUpdate_Prepare(
    TSS2_SYS_CONTEXT      *sysContext,
    TPMT_DH_OBJECT        sequenceHandle,
    TPM2B_MAX_BUFFER const *buffer);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_SequenceUpdate_Complete(
    TSS2_SYS_CONTEXT *sysContext);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_SequenceUpdate(
    TSS2_SYS_CONTEXT      *sysContext,
    TPMT_DH_OBJECT        sequenceHandle,
    TSS2L_SYS_AUTH_COMMAND const *cmdAuths,
    TPM2B_MAX_BUFFER      const *buffer,
    TSS2L_SYS_AUTH_RESPONSE *rspAuths);
```

#### 4.8.37 TPM Tss2\_Sys\_SequenceComplete Commands

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_SequenceComplete_Prepare(
    TSS2_SYS_CONTEXT      *sysContext,
    TPMT_DH_OBJECT        sequenceHandle,
    TPM2B_MAX_BUFFER const *buffer,
    TPMT_RH_HIERARCHY     hierarchy);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_SequenceComplete_Complete(
    TSS2_SYS_CONTEXT *sysContext,
    TPM2B_DIGEST      *result,
    TPMT_TK_HASHCHECK *validation);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_SequenceComplete(
    TSS2_SYS_CONTEXT      *sysContext,
    TPMT_DH_OBJECT        sequenceHandle,
    TSS2L_SYS_AUTH_COMMAND const *cmdAuths,
```

```

TPM2B_MAX_BUFFER      const *buffer,
TPMI_DH_HIERARCHY     hierarchy,
TPM2B_DIGEST          *result,
TPMT_TK_HASHCHECK     *validation,
TSS2L_SYS_AUTH_RESPONSE *rspAuths);

```

#### 4.8.38 TPM Tss2\_Sys\_EventSequenceComplete Commands

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_EventSequenceComplete_Prepare(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_DH_PCR      pcrHandle,
    TPMI_DH_OBJECT   sequenceHandle,
    TPM2B_MAX_BUFFER const *buffer);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_EventSequenceComplete_Complete(
    TSS2_SYS_CONTEXT *sysContext,
    TPML_DIGEST_VALUES *results);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_EventSequenceComplete(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_DH_PCR      pcrHandle,
    TPMI_DH_OBJECT   sequenceHandle,
    TSS2L_SYS_AUTH_COMMAND const *cmdAuths,
    TPM2B_MAX_BUFFER  const *buffer,
    TPML_DIGEST_VALUES *results,
    TSS2L_SYS_AUTH_RESPONSE *rspAuths);

```

#### 4.8.39 TPM Tss2\_Sys\_Certify Commands

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_Certify_Prepare(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_DH_OBJECT   objectHandle,
    TPMI_DH_OBJECT   signHandle,
    TPM2B_DATA        const *qualifyingData,
    TPMT_SIG_SCHEME  const *inScheme);

```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_Certify_Complete(
    TSS2_SYS_CONTEXT *sysContext,
    TPM2B_ATTEST *certifyInfo,
    TPMT_SIGNATURE *signature);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_Certify(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_DH_OBJECT objectHandle,
    TPMI_DH_OBJECT signHandle,
    TSS2L_SYS_AUTH_COMMAND const *cmdAuths,
    TPM2B_DATA const *qualifyingData,
    TPMT_SIG_SCHEME const *inScheme,
    TPM2B_ATTEST *certifyInfo,
    TPMT_SIGNATURE *signature,
    TSS2L_SYS_AUTH_RESPONSE *rspAuths);
```

#### 4.8.40 TPM Tss2\_Sys\_CertifyCreation Commands

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_CertifyCreation_Prepare(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_DH_OBJECT signHandle,
    TPMI_DH_OBJECT objectHandle,
    TPM2B_DATA const *qualifyingData,
    TPM2B_DIGEST const *creationHash,
    TPMT_SIG_SCHEME const *inScheme,
    TPMT_TK_CREATION const *creationTicket);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_CertifyCreation_Complete(
    TSS2_SYS_CONTEXT *sysContext,
    TPM2B_ATTEST *certifyInfo,
    TPMT_SIGNATURE *signature);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_CertifyCreation(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_DH_OBJECT signHandle,
```

```

TPMI_DH_OBJECT          objectHandle,
TSS2L_SYS_AUTH_COMMAND const *cmdAuths,
TPM2B_DATA              const *qualifyingData,
TPM2B_DIGEST            const *creationHash,
TPMT_SIG_SCHEME         const *inScheme,
TPMT_TK_CREATION        const *creationTicket,
TPM2B_ATTEST            *certifyInfo,
TPMT_SIGNATURE          *signature,
TSS2L_SYS_AUTH_RESPONSE *rspAuths);

```

#### 4.8.41 TPM Tss2\_Sys\_CertifyX509 Commands

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_CertifyX509_Prepare(
    TSS2_SYS_CONTEXT          *sysContext,
    TPMI_DH_OBJECT           objectHandle,
    TPMI_DH_OBJECT           signHandle,
    TPM2B_DATA               const *reserved,
    TPMT_SIG_SCHEME          const *inScheme,
    TPM2B_MAX_BUFFER         const *partialCertificate);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_CertifyX509_Complete(
    TSS2_SYS_CONTEXT          *sysContext,
    TPM2B_MAX_BUFFER         *addedToCertificate,
    TPM2B_DIGEST             *tbsDigest,
    TPMT_SIGNATURE           *signature);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_CertifyX509(
    TSS2_SYS_CONTEXT          *sysContext,
    TPMI_DH_OBJECT           objectHandle,
    TPMI_DH_OBJECT           signHandle,
    TSS2L_SYS_AUTH_COMMAND   const *cmdAuths,
    TPM2B_DATA               const *reserved,
    TPMT_SIG_SCHEME          const *inScheme,
    TPM2B_MAX_BUFFER         const *partialCertificate,
    TPM2B_MAX_BUFFER         *addedToCertificate,
    TPM2B_DIGEST             *tbsDigest,
    TPMT_SIGNATURE           *signature,

```

```
TSS2L_SYS_AUTH_RESPONSE      *rspAuths);
```

#### 4.8.42 TPM Tss2\_Sys\_Quote Commands

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_Quote_Prepare(
    TSS2_SYS_CONTEXT          *sysContext,
    TPMT_DH_OBJECT            signHandle,
    TPM2B_DATA                 const *qualifyingData,
    TPMT_SIG_SCHEME           const *inScheme,
    TPML_PCR_SELECTION        const *PCRselect);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_Quote_Complete(
    TSS2_SYS_CONTEXT *sysContext,
    TPM2B_ATTEST     *quoted,
    TPMT_SIGNATURE   *signature);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_Quote(
    TSS2_SYS_CONTEXT          *sysContext,
    TPMT_DH_OBJECT            signHandle,
    TSS2L_SYS_AUTH_COMMAND   const *cmdAuths,
    TPM2B_DATA                 const *qualifyingData,
    TPMT_SIG_SCHEME           const *inScheme,
    TPML_PCR_SELECTION        const *PCRselect,
    TPM2B_ATTEST              *quoted,
    TPMT_SIGNATURE            *signature,
    TSS2L_SYS_AUTH_RESPONSE   *rspAuths);
```

#### 4.8.43 TPM Tss2\_Sys\_GetSessionAuditDigest Commands

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_GetSessionAuditDigest_Prepare(
    TSS2_SYS_CONTEXT          *sysContext,
    TPMT_RH_ENDORSEMENT      privacyAdminHandle,
    TPMT_DH_OBJECT            signHandle,
    TPMT_SH_HMAC              sessionHandle,
    TPM2B_DATA                 const *qualifyingData,
    TPMT_SIG_SCHEME           const *inScheme);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_GetSessionAuditDigest_Complete(
    TSS2_SYS_CONTEXT *sysContext,
    TPM2B_ATTEST *auditInfo,
    TPMT_SIGNATURE *signature);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_GetSessionAuditDigest(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_RH_ENDORSEMENT privacyAdminHandle,
    TPMI_DH_OBJECT signHandle,
    TPMI_SH_HMAC sessionHandle,
    TSS2L_SYS_AUTH_COMMAND const *cmdAuths,
    TPM2B_DATA const *qualifyingData,
    TPMT_SIG_SCHEME const *inScheme,
    TPM2B_ATTEST *auditInfo,
    TPMT_SIGNATURE *signature,
    TSS2L_SYS_AUTH_RESPONSE *rspAuths);
```

#### 4.8.44 TPM Tss2\_Sys\_GetCommandAuditDigest Commands

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_GetCommandAuditDigest_Prepare(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_RH_ENDORSEMENT privacyHandle,
    TPMI_DH_OBJECT signHandle,
    TPM2B_DATA const *qualifyingData,
    TPMT_SIG_SCHEME const *inScheme);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_GetCommandAuditDigest_Complete(
    TSS2_SYS_CONTEXT *sysContext,
    TPM2B_ATTEST *auditInfo,
    TPMT_SIGNATURE *signature);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_GetCommandAuditDigest(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_RH_ENDORSEMENT privacyHandle,
    TPMI_DH_OBJECT signHandle,
    TSS2L_SYS_AUTH_COMMAND const *cmdAuths,
```



```

TPM2B_DATA          const *qualifyingData,
TPMT_SIG_SCHEME     const *inScheme,
TPM2B_ATTEST        *auditInfo,
TPMT_SIGNATURE      *signature,
TSS2L_SYS_AUTH_RESPONSE *rspAuths);

```

#### 4.8.45 TPM Tss2\_Sys\_GetTime Commands

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_GetTime_Prepare(
    TSS2_SYS_CONTEXT *sysContext,
    TPMT_RH_ENDORSEMENT privacyAdminHandle,
    TPMT_DH_OBJECT signHandle,
    TPM2B_DATA const *qualifyingData,
    TPMT_SIG_SCHEME const *inScheme);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_GetTime_Complete(
    TSS2_SYS_CONTEXT *sysContext,
    TPM2B_ATTEST *timeInfo,
    TPMT_SIGNATURE *signature);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_GetTime(
    TSS2_SYS_CONTEXT *sysContext,
    TPMT_RH_ENDORSEMENT privacyAdminHandle,
    TPMT_DH_OBJECT signHandle,
    TSS2L_SYS_AUTH_COMMAND const *cmdAuths,
    TPM2B_DATA const *qualifyingData,
    TPMT_SIG_SCHEME const *inScheme,
    TPM2B_ATTEST *timeInfo,
    TPMT_SIGNATURE *signature,
    TSS2L_SYS_AUTH_RESPONSE *rspAuths);

```

#### 4.8.46 TPM Tss2\_Sys\_Commit Commands

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_Commit_Prepare(
    TSS2_SYS_CONTEXT *sysContext,

```

```

TPMI_DH_OBJECT          signHandle,
TPM2B_ECC_POINT         const *P1,
TPM2B_SENSITIVE_DATA    const *s2,
TPM2B_ECC_PARAMETER     const *y2);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_Commit_Complete(
    TSS2_SYS_CONTEXT *sysContext,
    TPM2B_ECC_POINT *K,
    TPM2B_ECC_POINT *L,
    TPM2B_ECC_POINT *E,
    UINT16          *counter);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_Commit(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_DH_OBJECT   signHandle,
    TSS2L_SYS_AUTH_COMMAND const *cmdAuths,
    TPM2B_ECC_POINT   const *P1,
    TPM2B_SENSITIVE_DATA const *s2,
    TPM2B_ECC_PARAMETER const *y2,
    TPM2B_ECC_POINT   *K,
    TPM2B_ECC_POINT   *L,
    TPM2B_ECC_POINT   *E,
    UINT16            *counter,
    TSS2L_SYS_AUTH_RESPONSE *rspAuths);

```

#### 4.8.47 TPM Tss2\_Sys\_EC\_Ephemeral Commands

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_EC_Ephemeral_Prepare(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_ECC_CURVE   curveID);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_EC_Ephemeral_Complete(
    TSS2_SYS_CONTEXT *sysContext,
    TPM2B_ECC_POINT *Q,
    UINT16          *counter);

```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_EC_Ephemeral(
    TSS2_SYS_CONTEXT          *sysContext,
    TSS2L_SYS_AUTH_COMMAND  const *cmdAuths,
    TPMI_ECC_CURVE          curveID,
    TPM2B_ECC_POINT         *Q,
    UINT16                  *counter,
    TSS2L_SYS_AUTH_RESPONSE  *rspAuths);
```

#### 4.8.48 TPM Tss2\_Sys\_VerifySignature Commands

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_VerifySignature_Prepare(
    TSS2_SYS_CONTEXT          *sysContext,
    TPMI_DH_OBJECT           keyHandle,
    TPM2B_DIGEST             const *digest,
    TPMT_SIGNATURE           const *signature);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_VerifySignature_Complete(
    TSS2_SYS_CONTEXT *sysContext,
    TPMT_TK_VERIFIED *validation);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_VerifySignature(
    TSS2_SYS_CONTEXT          *sysContext,
    TPMI_DH_OBJECT           keyHandle,
    TSS2L_SYS_AUTH_COMMAND  const *cmdAuths,
    TPM2B_DIGEST             const *digest,
    TPMT_SIGNATURE           const *signature,
    TPMT_TK_VERIFIED         *validation,
    TSS2L_SYS_AUTH_RESPONSE  *rspAuths);
```

#### 4.8.49 TPM Tss2\_Sys\_Sign Commands

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_Sign_Prepare(
    TSS2_SYS_CONTEXT          *sysContext,
    TPMI_DH_OBJECT           keyHandle,
    TPM2B_DIGEST             const *digest,
```

```

TPMT_SIG_SCHEME    const *inScheme,
TPMT_TK_HASHCHECK  const *validation);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_Sign_Complete(
    TSS2_SYS_CONTEXT *sysContext,
    TPMT_SIGNATURE  *signature);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_Sign(
    TSS2_SYS_CONTEXT          *sysContext,
    TPMI_DH_OBJECT           keyHandle,
    TSS2L_SYS_AUTH_COMMAND  const *cmdAuths,
    TPM2B_DIGEST             const *digest,
    TPMT_SIG_SCHEME         const *inScheme,
    TPMT_TK_HASHCHECK       const *validation,
    TPMT_SIGNATURE          *signature,
    TSS2L_SYS_AUTH_RESPONSE *rspAuths);

```

#### 4.8.50 TPM Tss2\_Sys\_SetCommandCodeAuditStatus Commands

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_SetCommandCodeAuditStatus_Prepare(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_RH_PROVISION auth,
    TPMI_ALG_HASH    auditAlg,
    TPML_CC          const *setList,
    TPML_CC          const *clearList);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_SetCommandCodeAuditStatus_Complete(
    TSS2_SYS_CONTEXT *sysContext);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_SetCommandCodeAuditStatus(
    TSS2_SYS_CONTEXT          *sysContext,
    TPMI_RH_PROVISION        auth,
    TSS2L_SYS_AUTH_COMMAND  const *cmdAuths,
    TPMI_ALG_HASH           auditAlg,
    TPML_CC                  const *setList,
    TPML_CC                  const *clearList,

```

```
TSS2L_SYS_AUTH_RESPONSE      *rspAuths);
```

#### 4.8.51 TPM Tss2\_Sys\_PCR\_Extend Commands

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PCR_Extend_Prepare(
    TSS2_SYS_CONTEXT      *sysContext,
    TPML_DH_PCR           pcrHandle,
    TPML_DIGEST_VALUES   const *digests);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PCR_Extend_Complete(
    TSS2_SYS_CONTEXT *sysContext);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PCR_Extend(
    TSS2_SYS_CONTEXT      *sysContext,
    TPML_DH_PCR           pcrHandle,
    TSS2L_SYS_AUTH_COMMAND const *cmdAuths,
    TPML_DIGEST_VALUES   const *digests,
    TSS2L_SYS_AUTH_RESPONSE *rspAuths);
```

#### 4.8.52 TPM Tss2\_Sys\_PCR\_Event Commands

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PCR_Event_Prepare(
    TSS2_SYS_CONTEXT *sysContext,
    TPML_DH_PCR      pcrHandle,
    TPM2B_EVENT      const *eventData);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PCR_Event_Complete(
    TSS2_SYS_CONTEXT *sysContext,
    TPML_DIGEST_VALUES *digests);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PCR_Event(
    TSS2_SYS_CONTEXT      *sysContext,
    TPML_DH_PCR           pcrHandle,
    TSS2L_SYS_AUTH_COMMAND const *cmdAuths,
    TPM2B_EVENT           const *eventData,
```

```

TPML_DIGEST_VALUES          *digests,
TSS2L_SYS_AUTH_RESPONSE     *rspAuths);

```

#### 4.8.53 TPM Tss2\_Sys\_PCR\_Read Commands

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PCR_Read_Prepare(
    TSS2_SYS_CONTEXT          *sysContext,
    TPML_PCR_SELECTION const *pcrSelectionIn);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PCR_Read_Complete(
    TSS2_SYS_CONTEXT          *sysContext,
    UINT32                   *pcrUpdateCounter,
    TPML_PCR_SELECTION *pcrSelectionOut,
    TPML_DIGEST              *pcrValues);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PCR_Read(
    TSS2_SYS_CONTEXT          *sysContext,
    TSS2L_SYS_AUTH_COMMAND const *cmdAuths,
    TPML_PCR_SELECTION      const *pcrSelectionIn,
    UINT32                   *pcrUpdateCounter,
    TPML_PCR_SELECTION      *pcrSelectionOut,
    TPML_DIGEST              *pcrValues,
    TSS2L_SYS_AUTH_RESPONSE  *rspAuths);

```

#### 4.8.54 TPM Tss2\_Sys\_Allocate Commands

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PCR_Allocate_Prepare(
    TSS2_SYS_CONTEXT          *sysContext,
    TPMI_RH_PLATFORM         authHandle,
    TPML_PCR_SELECTION const *pcrAllocation);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PCR_Allocate_Complete(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_YES_NO      *allocationSuccess,
    UINT32           *maxPCR,

```

```

UINT32          *sizeNeeded,
UINT32          *sizeAvailable);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PCR_Allocate(
    TSS2_SYS_CONTEXT          *sysContext,
    TPMI_RH_PLATFORM          authHandle,
    TSS2L_SYS_AUTH_COMMAND const *cmdAuths,
    TPMI_PCR_SELECTION        const *pcrAllocation,
    TPMI_YES_NO                *allocationSuccess,
    UINT32                     *maxPCR,
    UINT32                     *sizeNeeded,
    UINT32                     *sizeAvailable,
    TSS2L_SYS_AUTH_RESPONSE    *rspAuths);

```

#### 4.8.55 TPM Tss2\_Sys\_SetAuthPolicy Commands

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PCR_SetAuthPolicy_Prepare(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_RH_PLATFORM authHandle,
    TPM2B_DIGEST const *authPolicy,
    TPMI_ALG_HASH      hashAlg,
    TPMI_DH_PCR        pcrNum);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PCR_SetAuthPolicy_Complete(
    TSS2_SYS_CONTEXT *sysContext);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PCR_SetAuthPolicy(
    TSS2_SYS_CONTEXT          *sysContext,
    TPMI_RH_PLATFORM          authHandle,
    TSS2L_SYS_AUTH_COMMAND const *cmdAuths,
    TPM2B_DIGEST              const *authPolicy,
    TPMI_ALG_HASH             hashAlg,
    TPMI_DH_PCR               pcrNum,
    TSS2L_SYS_AUTH_RESPONSE    *rspAuths);

```

**4.8.56 TPM Tss2\_Sys\_SetAuthValue Commands**

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PCR_SetAuthValue_Prepare(
    TSS2_SYS_CONTEXT *sysContext,
    TPMT_DH_PCR      pcrHandle,
    TPM2B_DIGEST     const *auth);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PCR_SetAuthValue_Complete(
    TSS2_SYS_CONTEXT *sysContext);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PCR_SetAuthValue(
    TSS2_SYS_CONTEXT *sysContext,
    TPMT_DH_PCR      pcrHandle,
    TSS2L_SYS_AUTH_COMMAND const *cmdAuths,
    TPM2B_DIGEST     const *auth,
    TSS2L_SYS_AUTH_RESPONSE *rspAuths);
```

**4.8.57 TPM Tss2\_PCR\_Reset Commands**

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PCR_Reset_Prepare(
    TSS2_SYS_CONTEXT *sysContext,
    TPMT_DH_PCR      pcrHandle);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PCR_Reset_Complete(
    TSS2_SYS_CONTEXT *sysContext);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PCR_Reset(
    TSS2_SYS_CONTEXT *sysContext,
    TPMT_DH_PCR      pcrHandle,
    TSS2L_SYS_AUTH_COMMAND const *cmdAuths,
    TSS2L_SYS_AUTH_RESPONSE *rspAuths);
```

**4.8.58 TPM Tss2\_Sys\_PolicySigned Commands**

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PolicySigned_Prepare(
```



```

TSS2_SYS_CONTEXT      *sysContext,
TPMI_DH_OBJECT        authObject,
TPMI_SH_POLICY        policySession,
TPM2B_NONCE           const *nonceTPM,
TPM2B_DIGEST           const *cpHashA,
TPM2B_NONCE           const *policyRef,
INT32                  expiration,
TPMT_SIGNATURE const *auth);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PolicySigned_Complete(
    TSS2_SYS_CONTEXT *sysContext,
    TPM2B_TIMEOUT    *timeout,
    TPMT_TK_AUTH     *policyTicket);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PolicySigned(
    TSS2_SYS_CONTEXT      *sysContext,
    TPMI_DH_OBJECT        authObject,
    TPMI_SH_POLICY        policySession,
    TSS2L_SYS_AUTH_COMMAND const *cmdAuths,
    TPM2B_NONCE           const *nonceTPM,
    TPM2B_DIGEST           const *cpHashA,
    TPM2B_NONCE           const *policyRef,
    INT32                  expiration,
    TPMT_SIGNATURE        const *auth,
    TPM2B_TIMEOUT          *timeout,
    TPMT_TK_AUTH          *policyTicket,
    TSS2L_SYS_AUTH_RESPONSE *rspAuths);

```

#### 4.8.59 TPM Tss2\_Sys\_PolicySecret Commands

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PolicySecret_Prepare(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_DH_ENTITY   authHandle,
    TPMI_SH_POLICY   policySession,
    TPM2B_NONCE      const *nonceTPM,
    TPM2B_DIGEST      const *cpHashA,

```

```
TPM2B_NONCE  const *policyRef,
INT32          expiration);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PolicySecret_Complete(
    TSS2_SYS_CONTEXT *sysContext,
    TPM2B_TIMEOUT    *timeout,
    TPMT_TK_AUTH     *policyTicket);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PolicySecret(
    TSS2_SYS_CONTEXT *sysContext,
    TPMT_DH_ENTITY   authHandle,
    TPMT_SH_POLICY   policySession,
    TSS2L_SYS_AUTH_COMMAND const *cmdAuths,
    TPM2B_NONCE      const *nonceTPM,
    TPM2B_DIGEST     const *cpHashA,
    TPM2B_NONCE      const *policyRef,
    INT32             expiration,
    TPM2B_TIMEOUT    *timeout,
    TPMT_TK_AUTH     *policyTicket,
    TSS2L_SYS_AUTH_RESPONSE *rspAuths);
```

#### 4.8.60 TPM Tss2\_Sys\_PolicyTicket Commands

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PolicyTicket_Prepare(
    TSS2_SYS_CONTEXT *sysContext,
    TPMT_SH_POLICY   policySession,
    TPM2B_TIMEOUT    const *timeout,
    TPM2B_DIGEST     const *cpHashA,
    TPM2B_NONCE      const *policyRef,
    TPM2B_NAME       const *authName,
    TPMT_TK_AUTH     const *ticket);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PolicyTicket_Complete(
    TSS2_SYS_CONTEXT *sysContext);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PolicyTicket(
```

```

TSS2_SYS_CONTEXT          *sysContext,
TPMI_SH_POLICY            policySession,
TSS2L_SYS_AUTH_COMMAND  const *cmdAuths,
TPM2B_TIMEOUT            const *timeout,
TPM2B_DIGEST             const *cpHashA,
TPM2B_NONCE              const *policyRef,
TPM2B_NAME               const *authName,
TPMT_TK_AUTH             const *ticket,
TSS2L_SYS_AUTH_RESPONSE  *rspAuths);

```

#### 4.8.61 TPM Tss2\_Sys\_PolicyOR Commands

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PolicyOR_Prepare(
    TSS2_SYS_CONTEXT  *sysContext,
    TPMI_SH_POLICY    policySession,
    TPML_DIGEST const *pHashList);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PolicyOR_Complete(
    TSS2_SYS_CONTEXT *sysContext);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PolicyOR(
    TSS2_SYS_CONTEXT          *sysContext,
    TPMI_SH_POLICY            policySession,
    TSS2L_SYS_AUTH_COMMAND  const *cmdAuths,
    TPML_DIGEST              const *pHashList,
    TSS2L_SYS_AUTH_RESPONSE  *rspAuths);

```

#### 4.8.62 TPM Tss2\_Sys\_PolicyPCR Commands

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PolicyPCR_Prepare(
    TSS2_SYS_CONTEXT          *sysContext,
    TPMI_SH_POLICY            policySession,
    TPM2B_DIGEST             const *pcrDigest,
    TPML_PCR_SELECTION const *pcrs);

```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PolicyPCR_Complete(
    TSS2_SYS_CONTEXT *sysContext);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PolicyPCR(
    TSS2_SYS_CONTEXT          *sysContext,
    TPMI_SH_POLICY           policySession,
    TSS2L_SYS_AUTH_COMMAND  const *cmdAuths,
    TPM2B_DIGEST             const *pcrDigest,
    TPML_PCR_SELECTION      const *pcrs,
    TSS2L_SYS_AUTH_RESPONSE  *rspAuths);
```

#### 4.8.63 TPM Tss2\_Sys\_PolicyLocality Commands

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PolicyLocality_Prepare(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_SH_POLICY  policySession,
    TPMA_LOCALITY   locality);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PolicyLocality_Complete(
    TSS2_SYS_CONTEXT *sysContext);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PolicyLocality(
    TSS2_SYS_CONTEXT          *sysContext,
    TPMI_SH_POLICY           policySession,
    TSS2L_SYS_AUTH_COMMAND  const *cmdAuths,
    TPMA_LOCALITY            locality,
    TSS2L_SYS_AUTH_RESPONSE  *rspAuths);
```

#### 4.8.64 TPM Tss2\_Sys\_PolicyNV Commands

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PolicyNV_Prepare(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_RH_NV_AUTH  authHandle,
    TPMI_RH_NV_INDEX nvIndex,
    TPMI_SH_POLICY   policySession,
```

```

TPM2B_OPERAND const *operandB,
UINT16           offset,
TPM2_EO         operation);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PolicyNV_Complete(
    TSS2_SYS_CONTEXT *sysContext);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PolicyNV(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_RH_NV_AUTH  authHandle,
    TPMI_RH_NV_INDEX nvIndex,
    TPMI_SH_POLICY   policySession,
    TSS2L_SYS_AUTH_COMMAND const *cmdAuths,
    TPM2B_OPERAND     const *operandB,
    UINT16            offset,
    TPM2_EO           operation,
    TSS2L_SYS_AUTH_RESPONSE *rspAuths);

```

#### 4.8.65 TPM Tss2\_Sys\_PolicyCounterTimer Commands

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PolicyCounterTimer_Prepare(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_SH_POLICY   policySession,
    TPM2B_OPERAND const *operandB,
    UINT16           offset,
    TPM2_EO         operation);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PolicyCounterTimer_Complete(
    TSS2_SYS_CONTEXT *sysContext);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PolicyCounterTimer(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_SH_POLICY   policySession,
    TSS2L_SYS_AUTH_COMMAND const *cmdAuths,
    TPM2B_OPERAND     const *operandB,
    UINT16            offset,

```

```

TPM2_EO                operation,
TSS2L_SYS_AUTH_RESPONSE *rspAuths);

```

#### 4.8.66 TPM Tss2\_Sys\_PolicyCommandCode Commands

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PolicyCommandCode_Prepare(
    TSS2_SYS_CONTEXT *sysContext,
    TPMT_SH_POLICY   policySession,
    TPM2_CC          code);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PolicyCommandCode_Complete(
    TSS2_SYS_CONTEXT *sysContext);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PolicyCommandCode(
    TSS2_SYS_CONTEXT *sysContext,
    TPMT_SH_POLICY   policySession,
    TSS2L_SYS_AUTH_COMMAND const *cmdAuths,
    TPM2_CC          code,
    TSS2L_SYS_AUTH_RESPONSE *rspAuths);

```

#### 4.8.67 TPM Tss2\_Sys\_PolicyPhysicalPresence Commands

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PolicyPhysicalPresence_Prepare(
    TSS2_SYS_CONTEXT *sysContext,
    TPMT_SH_POLICY   policySession);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PolicyPhysicalPresence_Complete(
    TSS2_SYS_CONTEXT *sysContext);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PolicyPhysicalPresence(
    TSS2_SYS_CONTEXT *sysContext,
    TPMT_SH_POLICY   policySession,
    TSS2L_SYS_AUTH_COMMAND const *cmdAuths,
    TSS2L_SYS_AUTH_RESPONSE *rspAuths);

```

#### 4.8.68 TPM Tss2\_Sys\_PolicyCpHash Commands

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PolicyCpHash_Prepare(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_SH_POLICY   policySession,
    TPM2B_DIGEST     const *cpHashA);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PolicyCpHash_Complete(
    TSS2_SYS_CONTEXT *sysContext);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PolicyCpHash(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_SH_POLICY   policySession,
    TSS2L_SYS_AUTH_COMMAND const *cmdAuths,
    TPM2B_DIGEST     const *cpHashA,
    TSS2L_SYS_AUTH_RESPONSE *rspAuths);
```

#### 4.8.69 TPM Tss2\_Sys\_PolicyNameHash Commands

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PolicyNameHash_Prepare(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_SH_POLICY   policySession,
    TPM2B_DIGEST     const *nameHash);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PolicyNameHash_Complete(
    TSS2_SYS_CONTEXT *sysContext);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PolicyNameHash(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_SH_POLICY   policySession,
    TSS2L_SYS_AUTH_COMMAND const *cmdAuths,
    TPM2B_DIGEST     const *nameHash,
    TSS2L_SYS_AUTH_RESPONSE *rspAuths);
```

#### 4.8.70 TPM Tss2\_Sys\_PolicyDuplicationSelect Commands

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PolicyDuplicationSelect_Prepare(
    TSS2_SYS_CONTEXT *sysContext,
    TPMT_SH_POLICY    policySession,
    TPM2B_NAME const *objectName,
    TPM2B_NAME const *newParentName,
    TPMT_YES_NO      includeObject);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PolicyDuplicationSelect_Complete(
    TSS2_SYS_CONTEXT *sysContext);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PolicyDuplicationSelect(
    TSS2_SYS_CONTEXT          *sysContext,
    TPMT_SH_POLICY            policySession,
    TSS2L_SYS_AUTH_COMMAND const *cmdAuths,
    TPM2B_NAME                const *objectName,
    TPM2B_NAME                const *newParentName,
    TPMT_YES_NO              includeObject,
    TSS2L_SYS_AUTH_RESPONSE  *rspAuths);
```

#### 4.8.71 TPM Tss2\_Sys\_PolicyAuthorize Commands

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PolicyAuthorize_Prepare(
    TSS2_SYS_CONTEXT          *sysContext,
    TPMT_SH_POLICY            policySession,
    TPM2B_DIGEST              const *approvedPolicy,
    TPM2B_NONCE               const *policyRef,
    TPM2B_NAME                const *keySign,
    TPMT_TK_VERIFIED const *checkTicket);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PolicyAuthorize_Complete(
    TSS2_SYS_CONTEXT *sysContext);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PolicyAuthorize(
    TSS2_SYS_CONTEXT          *sysContext,
    TPMT_SH_POLICY            policySession,
```



```

TSS2L_SYS_AUTH_COMMAND const *cmdAuths,
TPM2B_DIGEST             const *approvedPolicy,
TPM2B_NONCE              const *policyRef,
TPM2B_NAME               const *keySign,
TPMT_TK_VERIFIED        const *checkTicket,
TSS2L_SYS_AUTH_RESPONSE *rspAuths);

```

#### 4.8.72 TPM Tss2\_Sys\_PolicyAuthValue Commands

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PolicyAuthValue_Prepare(
    TSS2_SYS_CONTEXT *sysContext,
    TPMT_SH_POLICY   policySession);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PolicyAuthValue_Complete(
    TSS2_SYS_CONTEXT *sysContext);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PolicyAuthValue(
    TSS2_SYS_CONTEXT *sysContext,
    TPMT_SH_POLICY   policySession,
    TSS2L_SYS_AUTH_COMMAND const *cmdAuths,
    TSS2L_SYS_AUTH_RESPONSE *rspAuths);

```

#### 4.8.73 TPM Tss2\_Sys\_PolicyPassword Commands

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PolicyPassword_Prepare(
    TSS2_SYS_CONTEXT *sysContext,
    TPMT_SH_POLICY   policySession);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PolicyPassword_Complete(
    TSS2_SYS_CONTEXT *sysContext);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PolicyPassword(
    TSS2_SYS_CONTEXT *sysContext,
    TPMT_SH_POLICY   policySession,
    TSS2L_SYS_AUTH_COMMAND const *cmdAuths,

```

```
TSS2L_SYS_AUTH_RESPONSE      *rspAuths);
```

#### 4.8.74 TPM Tss2\_Sys\_PolicyGetDigest Commands

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PolicyGetDigest_Prepare(
    TSS2_SYS_CONTEXT *sysContext,
    TPML_SH_POLICY   policySession);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PolicyGetDigest_Complete(
    TSS2_SYS_CONTEXT *sysContext,
    TPM2B_DIGEST     *policyDigest);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PolicyGetDigest(
    TSS2_SYS_CONTEXT          *sysContext,
    TPML_SH_POLICY           policySession,
    TSS2L_SYS_AUTH_COMMAND  const *cmdAuths,
    TPM2B_DIGEST             *policyDigest,
    TSS2L_SYS_AUTH_RESPONSE  *rspAuths);
```

#### 4.8.75 TPM Tss2\_Sys\_PolicyNvWritten Commands

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PolicyNvWritten_Prepare(
    TSS2_SYS_CONTEXT *sysContext,
    TPML_SH_POLICY   policySession,
    TPML_YES_NO      writtenSet);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PolicyNvWritten_Complete(
    TSS2_SYS_CONTEXT *sysContext);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PolicyNvWritten(
    TSS2_SYS_CONTEXT          *sysContext,
    TPML_SH_POLICY           policySession,
    TSS2L_SYS_AUTH_COMMAND  const *cmdAuths,
    TPML_YES_NO             writtenSet,
    TSS2L_SYS_AUTH_RESPONSE  *rspAuths);
```

#### 4.8.76 TPM Tss2\_Sys\_PolicyTemplate Commands

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PolicyTemplate_Prepare(
    TSS2_SYS_CONTEXT    *sysContext,
    TPML_SH_POLICY      policySession,
    TPM2B_DIGEST const  *templateHash);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PolicyTemplate_Complete(
    TSS2_SYS_CONTEXT *sysContext);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PolicyTemplate(
    TSS2_SYS_CONTEXT          *sysContext,
    TPML_SH_POLICY            policySession,
    TSS2L_SYS_AUTH_COMMAND const *cmdAuths,
    TPM2B_DIGEST              const *templateHash,
    TSS2L_SYS_AUTH_RESPONSE    *rspAuths);
```

#### 4.8.77 TPM Tss2\_Sys\_PolicyAuthorizeNV Commands

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PolicyAuthorizeNV_Prepare(
    TSS2_SYS_CONTEXT *sysContext,
    TPML_RH_NV_AUTH  authHandle,
    TPML_RH_NV_INDEX nvIndex,
    TPML_SH_POLICY   policySession);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PolicyAuthorizeNV_Complete(
    TSS2_SYS_CONTEXT *sysContext);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PolicyAuthorizeNV(
    TSS2_SYS_CONTEXT          *sysContext,
    TPML_RH_NV_AUTH            authHandle,
    TPML_RH_NV_INDEX            nvIndex,
    TPML_SH_POLICY              policySession,
    TSS2L_SYS_AUTH_COMMAND const *cmdAuths,
```

```
TSS2L_SYS_AUTH_RESPONSE      *rspAuths);
```

#### 4.8.78 TPM Tss2\_Sys\_CreatePrimary Commands

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_CreatePrimary_Prepare(
    TSS2_SYS_CONTEXT          *sysContext,
    TPMI_RH_HIERARCHY        primaryHandle,
    TPM2B_SENSITIVE_CREATE   const *inSensitive,
    TPM2B_PUBLIC              const *inPublic,
    TPM2B_DATA                const *outsideInfo,
    TPML_PCR_SELECTION       const *creationPCR);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_CreatePrimary_Complete(
    TSS2_SYS_CONTEXT          *sysContext,
    TPM2_HANDLE              *objectHandle,
    TPM2B_PUBLIC              *outPublic,
    TPM2B_CREATION_DATA      *creationData,
    TPM2B_DIGEST              *creationHash,
    TPMT_TK_CREATION          *creationTicket,
    TPM2B_NAME                *name);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_CreatePrimary(
    TSS2_SYS_CONTEXT          *sysContext,
    TPMI_RH_HIERARCHY        primaryHandle,
    TSS2L_SYS_AUTH_COMMAND   const *cmdAuths,
    TPM2B_SENSITIVE_CREATE   const *inSensitive,
    TPM2B_PUBLIC              const *inPublic,
    TPM2B_DATA                const *outsideInfo,
    TPML_PCR_SELECTION       const *creationPCR,
    TPM2_HANDLE              *objectHandle,
    TPM2B_PUBLIC              *outPublic,
    TPM2B_CREATION_DATA      *creationData,
    TPM2B_DIGEST              *creationHash,
    TPMT_TK_CREATION          *creationTicket,
    TPM2B_NAME                *name,
    TSS2L_SYS_AUTH_RESPONSE  *rspAuths);
```

#### 4.8.79 TPM Tss2\_Sys\_HierarchyControl Commands

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_HierarchyControl_Prepare(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_RH_HIERARCHY authHandle,
    TPMI_RH_ENABLES enable,
    TPMI_YES_NO state);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_HierarchyControl_Complete(
    TSS2_SYS_CONTEXT *sysContext);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_HierarchyControl(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_RH_HIERARCHY authHandle,
    TSS2L_SYS_AUTH_COMMAND const *cmdAuths,
    TPMI_RH_ENABLES enable,
    TPMI_YES_NO state,
    TSS2L_SYS_AUTH_RESPONSE *rspAuths);
```

#### 4.8.80 TPM Tss2\_Sys\_SetPrimaryPolicy Commands

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_SetPrimaryPolicy_Prepare(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_RH_HIERARCHY_POLICY authHandle,
    TPM2B_DIGEST const *authPolicy,
    TPMI_ALG_HASH hashAlg);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_SetPrimaryPolicy_Complete(
    TSS2_SYS_CONTEXT *sysContext);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_SetPrimaryPolicy(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_RH_HIERARCHY_POLICY authHandle,
    TSS2L_SYS_AUTH_COMMAND const *cmdAuths,
```

```

TPM2B_DIGEST          const *authPolicy,
TPMI_ALG_HASH          hashAlg,
TSS2L_SYS_AUTH_RESPONSE *rspAuths);

```

#### 4.8.81 TPM Tss2\_Sys\_ChangePPS Commands

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_ChangePPS_Prepare(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_RH_PLATFORM authHandle);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_ChangePPS_Complete(
    TSS2_SYS_CONTEXT *sysContext);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_ChangePPS(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_RH_PLATFORM authHandle,
    TSS2L_SYS_AUTH_COMMAND const *cmdAuths,
    TSS2L_SYS_AUTH_RESPONSE *rspAuths);

```

#### 4.8.82 TPM Tss2\_Sys\_ChangeEPS Commands

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_ChangeEPS_Prepare(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_RH_PLATFORM authHandle);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_ChangeEPS_Complete(
    TSS2_SYS_CONTEXT *sysContext);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_ChangeEPS(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_RH_PLATFORM authHandle,
    TSS2L_SYS_AUTH_COMMAND const *cmdAuths,
    TSS2L_SYS_AUTH_RESPONSE *rspAuths);

```

**4.8.83 TPM Tss2\_Sys\_Clear Commands**

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_Clear_Prepare(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_RH_CLEAR    authHandle);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_Clear_Complete(
    TSS2_SYS_CONTEXT *sysContext);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_Clear(
    TSS2_SYS_CONTEXT          *sysContext,
    TPMI_RH_CLEAR            authHandle,
    TSS2L_SYS_AUTH_COMMAND  const *cmdAuths,
    TSS2L_SYS_AUTH_RESPONSE *rspAuths);
```

**4.8.84 TPM Tss2\_Sys\_ClearControl Commands**

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_ClearControl_Prepare(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_RH_CLEAR    auth,
    TPMI_YES_NO      disable);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_ClearControl_Complete(
    TSS2_SYS_CONTEXT *sysContext);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_ClearControl(
    TSS2_SYS_CONTEXT          *sysContext,
    TPMI_RH_CLEAR            auth,
    TSS2L_SYS_AUTH_COMMAND  const *cmdAuths,
    TPMI_YES_NO              disable,
    TSS2L_SYS_AUTH_RESPONSE *rspAuths);
```

**4.8.85 TPM Tss2\_Sys\_HierarchyChangeAuth Commands**

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_HierarchyChangeAuth_Prepare(
```

```
TSS2_SYS_CONTEXT      *sysContext,
TPMI_RH_HIERARCHY_AUTH authHandle,
TPM2B_AUTH            const *newAuth);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_HierarchyChangeAuth_Complete(
    TSS2_SYS_CONTEXT *sysContext);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_HierarchyChangeAuth(
    TSS2_SYS_CONTEXT      *sysContext,
    TPMI_RH_HIERARCHY_AUTH authHandle,
    TSS2L_SYS_AUTH_COMMAND const *cmdAuths,
    TPM2B_AUTH            const *newAuth,
    TSS2L_SYS_AUTH_RESPONSE *rspAuths);
```

#### 4.8.86 TPM Tss2\_Sys\_DictionaryAttackLockReset Commands

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_DictionaryAttackLockReset_Prepare(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_RH_LOCKOUT  lockHandle);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_DictionaryAttackLockReset_Complete(
    TSS2_SYS_CONTEXT *sysContext);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_DictionaryAttackLockReset(
    TSS2_SYS_CONTEXT      *sysContext,
    TPMI_RH_LOCKOUT      lockHandle,
    TSS2L_SYS_AUTH_COMMAND const *cmdAuths,
    TSS2L_SYS_AUTH_RESPONSE *rspAuths);
```

#### 4.8.87 TPM Tss2\_Sys\_DictionaryAttackParameters Commands

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_DictionaryAttackParameters_Prepare(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_RH_LOCKOUT  lockHandle,
    UINT32            newMaxTries,
```



```

UINT32          newRecoveryTime,
UINT32          lockoutRecovery);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_DictionaryAttackParameters_Complete(
    TSS2_SYS_CONTEXT *sysContext);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_DictionaryAttackParameters(
    TSS2_SYS_CONTEXT          *sysContext,
    TPMI_RH_LOCKOUT          lockHandle,
    TSS2L_SYS_AUTH_COMMAND  const *cmdAuths,
    UINT32                    newMaxTries,
    UINT32                    newRecoveryTime,
    UINT32                    lockoutRecovery,
    TSS2L_SYS_AUTH_RESPONSE  *rspAuths);

```

#### 4.8.88 TPM Tss2\_Sys\_PP\_Commands Commands

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PP_Commands_Prepare(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_RH_PLATFORM auth,
    TPML_CC          const *setList,
    TPML_CC          const *clearList);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PP_Commands_Complete(
    TSS2_SYS_CONTEXT *sysContext);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_PP_Commands(
    TSS2_SYS_CONTEXT          *sysContext,
    TPMI_RH_PLATFORM          auth,
    TSS2L_SYS_AUTH_COMMAND  const *cmdAuths,
    TPML_CC                    const *setList,
    TPML_CC                    const *clearList,
    TSS2L_SYS_AUTH_RESPONSE  *rspAuths);

```

**4.8.89 TPM Tss2\_Sys\_SetAlgorithmSet Commands**

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_SetAlgorithmSet_Prepare(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_RH_PLATFORM authHandle,
    UINT32           algorithmSet);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_SetAlgorithmSet_Complete(
    TSS2_SYS_CONTEXT *sysContext);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_SetAlgorithmSet(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_RH_PLATFORM authHandle,
    TSS2L_SYS_AUTH_COMMAND const *cmdAuths,
    UINT32           algorithmSet,
    TSS2L_SYS_AUTH_RESPONSE *rspAuths);
```

**4.8.90 TPM Tss2\_Sys\_FieldUpgradeStart Commands**

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_FieldUpgradeStart_Prepare(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_RH_PLATFORM authorization,
    TPMI_DH_OBJECT  keyHandle,
    TPM2B_DIGEST    const *fuDigest,
    TPMT_SIGNATURE  const *manifestSignature);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_FieldUpgradeStart_Complete(
    TSS2_SYS_CONTEXT *sysContext);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_FieldUpgradeStart(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_RH_PLATFORM authorization,
    TPMI_DH_OBJECT  keyHandle,
    TSS2L_SYS_AUTH_COMMAND const *cmdAuths,
    TPM2B_DIGEST    const *fuDigest,
    TPMT_SIGNATURE  const *manifestSignature,
    TSS2L_SYS_AUTH_RESPONSE *rspAuths);
```

#### 4.8.91 TPM Tss2\_Sys\_FieldUpgradeData Commands

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_FieldUpgradeData_Prepare(
    TSS2_SYS_CONTEXT      *sysContext,
    TPM2B_MAX_BUFFER     const *fuData);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_FieldUpgradeData_Complete(
    TSS2_SYS_CONTEXT *sysContext,
    TPMT_HA          *nextDigest,
    TPMT_HA          *firstDigest);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_FieldUpgradeData(
    TSS2_SYS_CONTEXT      *sysContext,
    TSS2L_SYS_AUTH_COMMAND const *cmdAuths,
    TPM2B_MAX_BUFFER     const *fuData,
    TPMT_HA              *nextDigest,
    TPMT_HA              *firstDigest,
    TSS2L_SYS_AUTH_RESPONSE *rspAuths);
```

#### 4.8.92 TPM Tss2\_Sys\_FirmwareRead Commands

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_FirmwareRead_Prepare(
    TSS2_SYS_CONTEXT *sysContext,
    UINT32           sequenceNumber);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_FirmwareRead_Complete(
    TSS2_SYS_CONTEXT *sysContext,
    TPM2B_MAX_BUFFER *fuData);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_FirmwareRead(
    TSS2_SYS_CONTEXT      *sysContext,
    TSS2L_SYS_AUTH_COMMAND const *cmdAuths,
    UINT32                sequenceNumber,
    TPM2B_MAX_BUFFER     *fuData,
```

```
TSS2L_SYS_AUTH_RESPONSE      *rspAuths);
```

#### 4.8.93 TPM Tss2\_Sys\_ContextSave Commands

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_ContextSave_Prepare(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_DH_CONTEXT  saveHandle);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_ContextSave_Complete(
    TSS2_SYS_CONTEXT *sysContext,
    TPMS_CONTEXT     *context);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_ContextSave(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_DH_CONTEXT  saveHandle,
    TPMS_CONTEXT     *context);
```

#### 4.8.94 TPM Tss2\_Sys\_ContextLoad Commands

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_ContextLoad_Prepare(
    TSS2_SYS_CONTEXT *sysContext,
    TPMS_CONTEXT     const *context);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_ContextLoad_Complete(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_DH_CONTEXT  *loadedHandle);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_ContextLoad(
    TSS2_SYS_CONTEXT *sysContext,
    TPMS_CONTEXT     const *context,
    TPMI_DH_CONTEXT  *loadedHandle);
```

**4.8.95 TPM Tss2\_Sys\_FlushContext Commands**

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_FlushContext_Prepare(
    TSS2_SYS_CONTEXT *sysContext,
    TPMT_DH_CONTEXT flushHandle);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_FlushContext_Complete(
    TSS2_SYS_CONTEXT *sysContext);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_FlushContext(
    TSS2_SYS_CONTEXT *sysContext,
    TPMT_DH_CONTEXT flushHandle);
```

**4.8.96 TPM Tss2\_Sys\_EvictControl Commands**

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_EvictControl_Prepare(
    TSS2_SYS_CONTEXT *sysContext,
    TPMT_RH_PROVISION auth,
    TPMT_DH_OBJECT objectHandle,
    TPMT_DH_PERSISTENT persistentHandle);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_EvictControl_Complete(
    TSS2_SYS_CONTEXT *sysContext);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_EvictControl(
    TSS2_SYS_CONTEXT *sysContext,
    TPMT_RH_PROVISION auth,
    TPMT_DH_OBJECT objectHandle,
    TSS2L_SYS_AUTH_COMMAND const *cmdAuths,
    TPMT_DH_PERSISTENT persistentHandle,
    TSS2L_SYS_AUTH_RESPONSE *rspAuths);
```

**4.8.97 TPM Tss2\_Sys\_ReadClock Commands**

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_ReadClock_Prepare(
```

```
TSS2_SYS_CONTEXT *sysContext);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_ReadClock_Complete(
    TSS2_SYS_CONTEXT *sysContext,
    TPMS_TIME_INFO *currentTime);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_ReadClock(
    TSS2_SYS_CONTEXT *sysContext,
    TSS2L_SYS_AUTH_COMMAND const *cmdAuths,
    TPMS_TIME_INFO *currentTime,
    TSS2L_SYS_AUTH_RESPONSE *rspAuths);
```

#### 4.8.98 TPM Tss2\_Sys\_ClockSet Commands

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_ClockSet_Prepare(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_RH_PROVISION auth,
    UINT64 newTime);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_ClockSet_Complete(
    TSS2_SYS_CONTEXT *sysContext);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_ClockSet(
    TSS2_SYS_CONTEXT *sysContext,
    TSS2L_SYS_AUTH_COMMAND const *cmdAuths,
    TPMI_RH_PROVISION auth,
    UINT64 newTime,
    TSS2L_SYS_AUTH_RESPONSE *rspAuths);
```

#### 4.8.99 TPM Tss2\_Sys\_ClockRateAdjust Commands

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_ClockRateAdjust_Prepare(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_RH_PROVISION auth,
    TPM2_CLOCK_ADJUST rateAdjust);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_ClockRateAdjust_Complete(
    TSS2_SYS_CONTEXT *sysContext);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_ClockRateAdjust(
    TSS2_SYS_CONTEXT          *sysContext,
    TPMT_RH_PROVISION         auth,
    TSS2L_SYS_AUTH_COMMAND    const *cmdAuths,
    TPM2_CLOCK_ADJUST         rateAdjust,
    TSS2L_SYS_AUTH_RESPONSE   *rspAuths);
```

#### 4.8.100 TPM Tss2\_Sys\_GetCapability Commands

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_GetCapability_Prepare(
    TSS2_SYS_CONTEXT *sysContext,
    TPM2_CAP         capability,
    UINT32           property,
    UINT32           propertyCount);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_GetCapability_Complete(
    TSS2_SYS_CONTEXT *sysContext,
    TPMT_YES_NO      *moreData,
    TPMS_CAPABILITY_DATA *capabilityData);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_GetCapability(
    TSS2_SYS_CONTEXT          *sysContext,
    TSS2L_SYS_AUTH_COMMAND    const *cmdAuths,
    TPM2_CAP                 capability,
    UINT32                   property,
    UINT32                   propertyCount,
    TPMT_YES_NO              *moreData,
    TPMS_CAPABILITY_DATA     *capabilityData,
    TSS2L_SYS_AUTH_RESPONSE   *rspAuths);
```

**4.8.101 TPM Tss2\_Sys\_TestParms Commands**

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_TestParms_Prepare(
    TSS2_SYS_CONTEXT          *sysContext,
    TPMT_PUBLIC_PARMS const *parameters);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_TestParms_Complete(
    TSS2_SYS_CONTEXT *sysContext);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_TestParms(
    TSS2_SYS_CONTEXT          *sysContext,
    TSS2L_SYS_AUTH_COMMAND const *cmdAuths,
    TPMT_PUBLIC_PARMS        const *parameters,
    TSS2L_SYS_AUTH_RESPONSE  *rspAuths);
```

**4.8.102 TPM Tss2\_Sys\_NV\_DefineSpace Commands**

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_NV_DefineSpace_Prepare(
    TSS2_SYS_CONTEXT          *sysContext,
    TPMI_RH_PROVISION         authHandle,
    TPM2B_AUTH                const *auth,
    TPM2B_NV_PUBLIC           const *publicInfo);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_NV_DefineSpace_Complete(
    TSS2_SYS_CONTEXT *sysContext);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_NV_DefineSpace(
    TSS2_SYS_CONTEXT          *sysContext,
    TPMI_RH_PROVISION         authHandle,
    TSS2L_SYS_AUTH_COMMAND const *cmdAuths,
    TPM2B_AUTH                const *auth,
    TPM2B_NV_PUBLIC           const *publicInfo,
    TSS2L_SYS_AUTH_RESPONSE  *rspAuths);
```



**4.8.103 TPM Tss2\_Sys\_UndefineSpace Commands**

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_NV_UndefineSpace_Prepare(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_RH_PROVISION authHandle,
    TPMI_RH_NV_INDEX nvIndex);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_NV_UndefineSpace_Complete(
    TSS2_SYS_CONTEXT *sysContext);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_NV_UndefineSpace(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_RH_PROVISION authHandle,
    TPMI_RH_NV_INDEX nvIndex,
    TSS2L_SYS_AUTH_COMMAND const *cmdAuths,
    TSS2L_SYS_AUTH_RESPONSE *rspAuths);
```

**4.8.104 TPM Tss2\_Sys\_UndefineSpaceSpecial Commands**

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_NV_UndefineSpaceSpecial_Prepare(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_RH_NV_INDEX nvIndex,
    TPMI_RH_PLATFORM platform);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_NV_UndefineSpaceSpecial_Complete(
    TSS2_SYS_CONTEXT *sysContext);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_NV_UndefineSpaceSpecial(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_RH_NV_INDEX nvIndex,
    TPMI_RH_PLATFORM platform,
    TSS2L_SYS_AUTH_COMMAND const *cmdAuths,
    TSS2L_SYS_AUTH_RESPONSE *rspAuths);
```

**4.8.105 TPM Tss2\_Sys\_ReadPublic Commands**

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_NV_ReadPublic_Prepare(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_RH_NV_INDEX nvIndex);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_NV_ReadPublic_Complete(
    TSS2_SYS_CONTEXT *sysContext,
    TPM2B_NV_PUBLIC *nvPublic,
    TPM2B_NAME *nvName);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_NV_ReadPublic(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_RH_NV_INDEX nvIndex,
    TSS2L_SYS_AUTH_COMMAND const *cmdAuths,
    TPM2B_NV_PUBLIC *nvPublic,
    TPM2B_NAME *nvName,
    TSS2L_SYS_AUTH_RESPONSE *rspAuths);
```

**4.8.106 TPM Tss2\_Sys\_NV\_Write Commands**

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_NV_Write_Prepare(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_RH_NV_AUTH authHandle,
    TPMI_RH_NV_INDEX nvIndex,
    TPM2B_MAX_NV_BUFFER const *data,
    UINT16 offset);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_NV_Write_Complete(
    TSS2_SYS_CONTEXT *sysContext);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_NV_Write(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_RH_NV_AUTH authHandle,
    TPMI_RH_NV_INDEX nvIndex,
    TSS2L_SYS_AUTH_COMMAND const *cmdAuths,
    TPM2B_MAX_NV_BUFFER const *data,
```

```

UINT16                offset,
TSS2L_SYS_AUTH_RESPONSE *rspAuths);

```

#### 4.8.107 TPM Tss2\_Sys\_NV\_Increment Commands

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_NV_Increment_Prepare(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_RH_NV_AUTH authHandle,
    TPMI_RH_NV_INDEX nvIndex);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_NV_Increment_Complete(
    TSS2_SYS_CONTEXT *sysContext);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_NV_Increment(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_RH_NV_AUTH authHandle,
    TPMI_RH_NV_INDEX nvIndex,
    TSS2L_SYS_AUTH_COMMAND const *cmdAuths,
    TSS2L_SYS_AUTH_RESPONSE *rspAuths);

```

#### 4.8.108 TPM Tss2\_Sys\_NV\_Extend Commands

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_NV_Extend_Prepare(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_RH_NV_AUTH authHandle,
    TPMI_RH_NV_INDEX nvIndex,
    TPM2B_MAX_NV_BUFFER const *data);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_NV_Extend_Complete(
    TSS2_SYS_CONTEXT *sysContext);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_NV_Extend(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_RH_NV_AUTH authHandle,
    TPMI_RH_NV_INDEX nvIndex,

```

```
TSS2L_SYS_AUTH_COMMAND const *cmdAuths,
TPM2B_MAX_NV_BUFFER      const *data,
TSS2L_SYS_AUTH_RESPONSE   *rspAuths);
```

#### 4.8.109 TPM Tss2\_Sys\_NV\_SetBits Commands

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_NV_SetBits_Prepare(
    TSS2_SYS_CONTEXT *sysContext,
    TPML_RH_NV_AUTH  authHandle,
    TPML_RH_NV_INDEX nvIndex,
    UINT64           bits);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_NV_SetBits_Complete(
    TSS2_SYS_CONTEXT *sysContext);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_NV_SetBits(
    TSS2_SYS_CONTEXT *sysContext,
    TPML_RH_NV_AUTH  authHandle,
    TPML_RH_NV_INDEX nvIndex,
    TSS2L_SYS_AUTH_COMMAND const *cmdAuths,
    UINT64           bits,
    TSS2L_SYS_AUTH_RESPONSE *rspAuths);
```

#### 4.8.110 TPM Tss2\_Sys\_WriteLock Commands

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_NV_WriteLock_Prepare(
    TSS2_SYS_CONTEXT *sysContext,
    TPML_RH_NV_AUTH  authHandle,
    TPML_RH_NV_INDEX nvIndex);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_NV_WriteLock_Complete(
    TSS2_SYS_CONTEXT *sysContext);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_NV_WriteLock(
    TSS2_SYS_CONTEXT *sysContext,
```

```

TPMI_RH_NV_AUTH          authHandle,
TPMI_RH_NV_INDEX        nvIndex,
TSS2L_SYS_AUTH_COMMAND  const *cmdAuths,
TSS2L_SYS_AUTH_RESPONSE *rspAuths);

```

#### 4.8.111 TPM Tss2\_Sys\_NV\_GlobalWriteLock Commands

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_NV_GlobalWriteLock_Prepare(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_RH_PROVISION authHandle);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_NV_GlobalWriteLock_Complete(
    TSS2_SYS_CONTEXT *sysContext);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_NV_GlobalWriteLock(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_RH_PROVISION authHandle,
    TSS2L_SYS_AUTH_COMMAND const *cmdAuths,
    TSS2L_SYS_AUTH_RESPONSE *rspAuths);

```

#### 4.8.112 TPM Tss2\_Sys\_NV\_Read Commands

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_NV_Read_Prepare(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_RH_NV_AUTH authHandle,
    TPMI_RH_NV_INDEX nvIndex,
    UINT16 size,
    UINT16 offset);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_NV_Read_Complete(
    TSS2_SYS_CONTEXT *sysContext,
    TPM2B_MAX_NV_BUFFER *data);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_NV_Read(
    TSS2_SYS_CONTEXT *sysContext,

```

```

TPMI_RH_NV_AUTH          authHandle,
TPMI_RH_NV_INDEX        nvIndex,
TSS2L_SYS_AUTH_COMMAND  const *cmdAuths,
UINT16                   size,
UINT16                   offset,
TPM2B_MAX_NV_BUFFER     *data,
TSS2L_SYS_AUTH_RESPONSE *rspAuths);

```

#### 4.8.113 TPM Tss2\_Sys\_NV\_ReadLock Commands

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_NV_ReadLock_Prepare (
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_RH_NV_AUTH  authHandle,
    TPMI_RH_NV_INDEX nvIndex);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_NV_ReadLock_Complete (
    TSS2_SYS_CONTEXT *sysContext);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_NV_ReadLock (
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_RH_NV_AUTH  authHandle,
    TPMI_RH_NV_INDEX nvIndex,
    TSS2L_SYS_AUTH_COMMAND const *cmdAuths,
    TSS2L_SYS_AUTH_RESPONSE *rspAuths);

```

#### 4.8.114 TPM Tss2\_Sys\_NV\_ChangeAuth Commands

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_NV_ChangeAuth_Prepare (
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_RH_NV_INDEX nvIndex,
    TPM2B_AUTH const *newAuth);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_NV_ChangeAuth_Complete (
    TSS2_SYS_CONTEXT *sysContext);

```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_NV_ChangeAuth(
    TSS2_SYS_CONTEXT          *sysContext,
    TPMI_RH_NV_INDEX         nvIndex,
    TSS2L_SYS_AUTH_COMMAND   const *cmdAuths,
    TPM2B_AUTH               const *newAuth,
    TSS2L_SYS_AUTH_RESPONSE  *rspAuths);
```

#### 4.8.115 TPM Tss2\_Sys\_NV\_Certify Commands

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_NV_Certify_Prepare(
    TSS2_SYS_CONTEXT          *sysContext,
    TPMI_DH_OBJECT           signHandle,
    TPMI_RH_NV_AUTH          authHandle,
    TPMI_RH_NV_INDEX         nvIndex,
    TPM2B_DATA               const *qualifyingData,
    TPMT_SIG_SCHEME          const *inScheme,
    UINT16                   size,
    UINT16                   offset);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_NV_Certify_Complete(
    TSS2_SYS_CONTEXT          *sysContext,
    TPM2B_ATTEST             *certifyInfo,
    TPMT_SIGNATURE           *signature);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_NV_Certify(
    TSS2_SYS_CONTEXT          *sysContext,
    TPMI_DH_OBJECT           signHandle,
    TPMI_RH_NV_AUTH          authHandle,
    TPMI_RH_NV_INDEX         nvIndex,
    TSS2L_SYS_AUTH_COMMAND   const *cmdAuths,
    TPM2B_DATA               const *qualifyingData,
    TPMT_SIG_SCHEME          const *inScheme,
    UINT16                   size,
    UINT16                   offset,
    TPM2B_ATTEST             *certifyInfo,
    TPMT_SIGNATURE           *signature,
```

```
TSS2L_SYS_AUTH_RESPONSE      *rspAuths);
```

#### 4.8.116 TPM Tss2\_Sys\_ACT\_SetTimeout Commands

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_ACT_SetTimeout_Prepare(
    TSS2_SYS_CONTEXT          *sysContext,
    TPMI_RH_ACT               actHandle,
    UINT32                    startTimeout);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_ACT_SetTimeout_Complete(
    TSS2_SYS_CONTEXT          *sysContext);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_ACT_SetTimeout(
    TSS2_SYS_CONTEXT          *sysContext,
    TPMI_RH_ACT               actHandle,
    TSS2L_SYS_AUTH_COMMAND const *cmdAuthsArray,
    UINT32                    startTimeout,
    TSS2L_SYS_AUTH_RESPONSE   *rspAuthsArray);
```

#### 4.8.117 TPM Tss2\_Sys\_AC\_GetCapability Commands

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_AC_GetCapability_Prepare(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_RH_AC       ac,
    TPM2_AT          capability,
    UINT32           count);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_AC_GetCapability_Complete(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_YES_NO      *moreData,
    TPML_AC_CAPABILITIES *capabilityData);
```



```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_AC_GetCapability(
    TSS2_SYS_CONTEXT          *sysContext,
    TPMI_RH_AC                ac,
    TSS2L_SYS_AUTH_COMMAND    const *cmdAuthsArray,
    TPM2_AT                   capability,
    UINT32                     count,
    TPMI_YES_NO               *moreData,
    TPML_AC_CAPABILITIES      *capabilityData,
    TSS2L_SYS_AUTH_RESPONSE   *rspAuthsArray);

```

#### 4.8.118 TPM Tss2\_Sys\_AC\_Send Commands

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_AC_Send_Prepare(
    TSS2_SYS_CONTEXT *sysContext,
    TPMI_DH_OBJECT   sendObject,
    TPMI_RH_NV_AUTH   authHandle,
    TPMI_RH_AC        ac,
    TPM2B_MAX_BUFFER *acDataIn);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_AC_Send_Complete(
    TSS2_SYS_CONTEXT *sysContext,
    TPMS_AC_OUTPUT   *acDataOut);

```

```

TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_AC_Send(
    TSS2_SYS_CONTEXT          *sysContext,
    TPMI_DH_OBJECT           sendObject,
    TPMI_RH_NV_AUTH          authHandle,
    TPMI_RH_AC               ac,
    TSS2L_SYS_AUTH_COMMAND    const *cmdAuthsArray,
    TPM2B_MAX_BUFFER          *acDataIn,
    TPMS_AC_OUTPUT           *acDataOut,
    TSS2L_SYS_AUTH_RESPONSE   *rspAuthsArray);

```

**4.8.119 TPM Tss2\_Sys\_Policy\_AC\_SendSelect**

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_Policy_AC_SendSelect_Prepare(
    TSS2_SYS_CONTEXT *sysContext,
    TPML_SH_POLICY   policySession,
    TPM2B_NAME       *objectName,
    TPM2B_NAME       *authHandleName,
    TPM2B_NAME       *acName,
    TPML_YES_NO      includeObject);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_Policy_AC_SendSelect_Complete(
    TSS2_SYS_CONTEXT *sysContext);
```

```
TSS2_DLL_EXPORT TSS2_RC Tss2_Sys_Policy_AC_SendSelect(
    TSS2_SYS_CONTEXT *sysContext,
    TPML_SH_POLICY   policySession,
    TSS2L_SYS_AUTH_COMMAND const *cmdAuthsArray,
    TPM2B_NAME       *objectName,
    TPM2B_NAME       *authHandleName,
    TPM2B_NAME       *acName,
    TPML_YES_NO      includeObject,
    TSS2L_SYS_AUTH_RESPONSE *rspAuthsArray);
```

**4.9 tss2\_sys.h Postlude**

```
#ifdef __cplusplus
} /* end extern "C" */
#endif

#endif /* TSS2_SYS_H */
```

## 5 Appendices

The following are all informative.

### 5.1 SAPI ABI Negotiation Pseudo Code

```
// A pseudo-code example for how to use this */
applicationExample()
{
    /* first initialize the TCTi-Layer (simplified) */
    Tss2_Tcti_DefaultInitialize(tctContext, &tct_size);

    sysContext = alloc(sys_size = tss2_sys_getContextSize(-1));
    // then initialize the SystemAPI; get the
    // values for abi-family and abi-level from
    // the tss2_sysapi.h file
    TSS2_ABI_VERSION currentAbi = TSS2_ABI_CURRENT_VERSION;
    /* Alternatively but not recommended
    TSS2_ABI_VERSION currentAbi =
    {
        .family = TSS2_ABI_FAMILY,
        .level = TSS2_ABI_LEVEL,
        ...
    };
    */
    ret = Tss2_Sys_Initialize(sysContext, sys_size, tctContext,
        &currentAbi);

    if (ret == TSS2_ERROR_SYS_ABI_MISMATCH) {
        fprintf(stderr, "ERROR: Mismatch between application's \
ABI-Version and systemAPI's ABI-Version.\n");
        fprintf(stderr, "SystemAPI supports %d.%d.%d.%d\n",
            currentAbi.creator, currentAbi.family,
            currentAbi.level, currentAbi.version);
        exit (1);
    } else if (ret != TSS2_SUCCESS) {
        //Handle other errors
    }

    //Use the sysContext} etc etc etc...
```