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Red Hat Enterprise Linux Release 9.2 Manual Pages on 'tpm2_rsaencrypt.1' command

\$ man tpm2_rsaencrypt.1

tpm2_rsaencrypt(1) General Commands Manual tpm2_rsaencrypt(1)

NAME

tpm2_rsaencrypt(1) - Performs an RSA encryption operation using the TPM.

SYNOPSIS

tpm2_rsaencrypt [OPTIONS] [ARGUMENT]

DESCRIPTION

tpm2_rsaencrypt(1) - Performs RSA encryption on the contents of file data using the indicated padding scheme according to IETF RFC 3447 (PKCS#1). Input defaults to STDIN if not specified.

The key referenced by key-context is required to be:

1. An RSA key
2. Have the attribute encrypt SET in it?s attributes.

OPTIONS

? -c, --key-context=OBJECT:

Context object pointing to the the public portion of RSA key to use for encryption.

? -o, --output=FILE:

Optional output file path to record the encrypted data to. The default is to print the binary encrypted data to stdout.

? -s, --scheme=FORMAT:

Optional, set the padding scheme (defaults to rsaes).

? null - TPM_ALG_NULL uses the key?s scheme if set.

? rsaes - TPM_ALG_RSAES which is RSAES_PKCSV1.5.

? oaep - TPM_ALG_OAEP which is RSAES_OAEP.

? -l, --label=FILE or STRING:

Optional, set the label data. Can either be a string or file path.

The TPM requires the last byte of the label to be zero, this is handled internally to the tool. No other embedded 0 bytes can exist or the TPM will truncate your label.

? ARGUMENT the command line argument specifies the path of the file with data to be encrypted.

References

Context Object Format

The type of a context object, whether it is a handle or file name, is determined according to the following logic in-order:

? If the argument is a file path, then the file is loaded as a restored TPM transient object.

? If the argument is a prefix match on one of:

? owner: the owner hierarchy

? platform: the platform hierarchy

? endorsement: the endorsement hierarchy

? lockout: the lockout control persistent object

? If the argument can be loaded as a number it will be treated as a handle, e.g. 0x81010013 and used directly._OBJECT_.

Authorization Formatting

Authorization for use of an object in TPM2.0 can come in 3 different forms: 1. Password 2. HMAC 3. Sessions

NOTE: Authorizations default to the EMPTY PASSWORD when not specified?.

Passwords

Passwords are interpreted in the following forms below using prefix identifiers.

Note: By default passwords are assumed to be in the string form when they do not have a prefix.

String

A string password, specified by prefix `?str:?` or its absence (raw string without prefix) is not interpreted, and is directly used for authentication.

Examples

```
foobar
str:foobar
```

Hex-string

A hex-string password, specified by prefix `?hex:?` is converted from a hexadecimal form into a byte array form, thus allowing passwords with non-printable and/or terminal un-friendly characters.

Example

```
hex:0x1122334455667788
```

File

A file based password, specified by prefix `?file:?` should be the path of a file containing the password to be read by the tool or a `?-?` to use stdin. Storing passwords in files prevents information leakage, passwords passed as options can be read from the process list or common shell history features.

Examples

```
# to use stdin and be prompted
file:-

# to use a file from a path
file:path/to/password/file

# to echo a password via stdin:
echo foobar | tpm2_tool -p file:-

# to use a bash here-string via stdin:
tpm2_tool -p file:- <<< foobar
```

Sessions

When using a policy session to authorize the use of an object, prefix the option argument with the session keyword. Then indicate a path to a session file that was created with `tpm2_startauthsession(1)`. Optionally, if the session requires an auth value to be sent with the session handle (eg policy password), then append a `+` and a string as described

in the Passwords section.

Examples

To use a session context file called session.ctx.

```
session:session.ctx
```

To use a session context file called session.ctx AND send the authvalue mypassword.

```
session:session.ctx+mypassword
```

To use a session context file called session.ctx AND send the HEX auth? value 0x11223344.

```
session:session.ctx+hex:11223344
```

PCR Authorizations

You can satisfy a PCR policy using the ?pcr:? prefix and the PCR mini? language. The PCR minilanguage is as follows:

```
<pcr-spec>=<raw-pcr-file>
```

The PCR spec is documented in in the section ?PCR bank specifiers?.

The raw-pcr-file is an optional argument that contains the output of the raw PCR contents as returned by tpm2_pcrread(1).

PCR bank specifiers (pcr.md)

Examples

To satisfy a PCR policy of sha256 on banks 0, 1, 2 and 3 use a specifi? er of:

```
pcr:sha256:0,1,2,3
```

specifying AUTH.

COMMON OPTIONS

This collection of options are common to many programs and provide in? formation that many users may expect.

? -h, --help=[man|no-man]: Display the tools manpage. By default, it attempts to invoke the manpager for the tool, however, on failure will output a short tool summary. This is the same behavior if the ?man? option argument is specified, however if explicit ?man? is re? quested, the tool will provide errors from man on stderr. If the ?no-man? option if specified, or the manpager fails, the short op? tions will be output to stdout.

To successfully use the manpages feature requires the manpages to be installed or on MANPATH, See man(1) for more details.

? -v, --version: Display version information for this tool, supported tctis and exit.

? -V, --verbose: Increase the information that the tool prints to the console during its execution. When using this option the file and line number are printed.

? -Q, --quiet: Silence normal tool output to stdout.

? -Z, --enable-errata: Enable the application of errata fixups. Useful if an errata fixup needs to be applied to commands sent to the TPM. Defining the environment TPM2TOOLS_ENABLE_ERRATA is equivalent. Information many users may expect.

TCTI Configuration

The TCTI or ?Transmission Interface? is the communication mechanism with the TPM. TCTIs can be changed for communication with TPMs across different mediums.

To control the TCTI, the tools respect:

1. The command line option -T or --tcti
2. The environment variable: TPM2TOOLS_TCTI.

Note: The command line option always overrides the environment variable.

The current known TCTIs are:

? tabrmd - The resource manager, called tabrmd (<https://github.com/tpm2-software/tpm2-abrmd>). Note that tabrmd and abrmd as a tcti name are synonymous.

? mssim - Typically used for communicating to the TPM software simulator.

? device - Used when talking directly to a TPM device file.

? none - Do not initialize a connection with the TPM. Some tools allow for off-tpm options and thus support not using a TCTI. Tools that do not support it will error when attempted to be used without a TCTI connection. Does not support ANY options and MUST BE presented as the exact text of ?none?.

The arguments to either the command line option or the environment variable are in the form:

<tcti-name>:<tcti-option-config>

Specifying an empty string for either the <tcti-name> or <tcti-option-config> results in the default being used for that portion respectively.

TCTI Defaults

When a TCTI is not specified, the default TCTI is searched for using `dlopen(3)` semantics. The tools will search for `tabrmd`, `device` and `mssim` TCTIs IN THAT ORDER and USE THE FIRST ONE FOUND. You can query what TCTI will be chosen as the default by using the `-v` option to print the version information. The `?default-tcti?` key-value pair will indicate which of the aforementioned TCTIs is the default.

Custom TCTIs

Any TCTI that implements the dynamic TCTI interface can be loaded. The tools internally use `dlopen(3)`, and the raw `tcti-name` value is used for the lookup. Thus, this could be a path to the shared library, or a library name as understood by `dlopen(3)` semantics.

TCTI OPTIONS

This collection of options are used to configure the various known TCTI modules available:

? `device`: For the `device` TCTI, the TPM character device file for use by the `device` TCTI can be specified. The default is `/dev/tpm0`.

Example: `-T device:/dev/tpm0` or `export TPM2TOOLS_TCTI=?device:/dev/tpm0?`

? `mssim`: For the `mssim` TCTI, the domain name or IP address and port number used by the simulator can be specified. The default are `127.0.0.1` and `2321`.

Example: `-T mssim:host=localhost,port=2321` or `export TPM2TOOLS_TCTI=?mssim:host=localhost,port=2321?`

? `abrmd`: For the `abrmd` TCTI, the configuration string format is a series of simple key value pairs separated by a ``,'` character. Each key and value string are separated by a ``='` character.

? TCTI abrmd supports two keys:

1. 'bus_name' : The name of the tabrmd service on the bus (a string).
2. 'bus_type' : The type of the dbus instance (a string) limited to 'session' and 'system'.

Specify the tabrmd tcti name and a config string of bus_name=com.ex?

ample.FooBar:

```
\--tcti=tabrmd:bus_name=com.example.FooBar
```

Specify the default (abrmd) tcti and a config string of bus_type=ses?

sion:

```
\--tcti:bus_type=session
```

NOTE: abrmd and tabrmd are synonymous. the various known TCTI mod?

ules.

EXAMPLES

Create an RSA key and load it

```
tpm2_createprimary -c primary.ctx  
tpm2_create -C primary.ctx -Grsa2048 -u key.pub -r key.priv  
tpm2_load -C primary.ctx -u key.pub -r key.priv -c key.ctx
```

Encrypt using RSA

```
echo "my message" > msg.dat  
tpm2_rsaencrypt -c key.ctx -o msg.enc msg.dat
```

Decrypt using RSA

```
tpm2_rsadecrypt -c key.ctx -o msg.ptext msg.enc  
cat msg.ptext  
my message
```

Returns

Tools can return any of the following codes:

- ? 0 - Success.
- ? 1 - General non-specific error.
- ? 2 - Options handling error.
- ? 3 - Authentication error.
- ? 4 - TCTI related error.
- ? 5 - Non supported scheme. Applicable to tpm2_testparams.

BUGS

Github Issues (<https://github.com/tpm2-software/tpm2-tools/issues>)

HELP

See the Mailing List (<https://lists.01.org/mailman/listinfo/tpm2>)

tpm2-tools

tpm2_rsaencrypt(1)