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## ***Rocky Enterprise Linux 9.2 Manual Pages on command 'EVP\_PKEY\_asn1\_set\_security\_bits.3ossl'***

***\$ man EVP\_PKEY\_asn1\_set\_security\_bits.3ossl***

EVP\_PKEY\_ASN1\_METHOD(3ossl)      OpenSSL      EVP\_PKEY\_ASN1\_METHOD(3ossl)

### NAME

EVP\_PKEY\_ASN1\_METHOD, EVP\_PKEY\_asn1\_new, EVP\_PKEY\_asn1\_copy,  
EVP\_PKEY\_asn1\_free, EVP\_PKEY\_asn1\_add0, EVP\_PKEY\_asn1\_add\_alias,  
EVP\_PKEY\_asn1\_set\_public, EVP\_PKEY\_asn1\_set\_private,  
EVP\_PKEY\_asn1\_set\_param, EVP\_PKEY\_asn1\_set\_free,  
EVP\_PKEY\_asn1\_set\_ctrl, EVP\_PKEY\_asn1\_set\_item,  
EVP\_PKEY\_asn1\_set\_siginf, EVP\_PKEY\_asn1\_set\_check,  
EVP\_PKEY\_asn1\_set\_public\_check, EVP\_PKEY\_asn1\_set\_param\_check,  
EVP\_PKEY\_asn1\_set\_security\_bits, EVP\_PKEY\_asn1\_set\_set\_priv\_key,  
EVP\_PKEY\_asn1\_set\_set\_pub\_key, EVP\_PKEY\_asn1\_set\_get\_priv\_key,  
EVP\_PKEY\_asn1\_set\_get\_pub\_key, EVP\_PKEY\_get0\_asn1 - manipulating and  
registering EVP\_PKEY\_ASN1\_METHOD structure

### SYNOPSIS

```
#include <openssl/evp.h>

typedef struct evp_pkey_asn1_method_st EVP_PKEY_ASN1_METHOD;

EVP_PKEY_ASN1_METHOD *EVP_PKEY_asn1_new(int id, int flags,

const char *pem_str,
```

```

        const char *info);

void EVP_PKEY_asn1_copy(EVP_PKEY_ASN1_METHOD *dst,
        const EVP_PKEY_ASN1_METHOD *src);

void EVP_PKEY_asn1_free(EVP_PKEY_ASN1_METHOD *ameth);

int EVP_PKEY_asn1_add0(const EVP_PKEY_ASN1_METHOD *ameth);

int EVP_PKEY_asn1_add_alias(int to, int from);

void EVP_PKEY_asn1_set_public(EVP_PKEY_ASN1_METHOD *ameth,
        int (*pub_decode) (EVP_PKEY *pk,
                const X509_PUBKEY *pub),
        int (*pub_encode) (X509_PUBKEY *pub,
                const EVP_PKEY *pk),
        int (*pub_cmp) (const EVP_PKEY *a,
                const EVP_PKEY *b),
        int (*pub_print) (BIO *out,
                const EVP_PKEY *pkey,
                int indent, ASN1_PCTX *pctx),
        int (*pkey_size) (const EVP_PKEY *pk),
        int (*pkey_bits) (const EVP_PKEY *pk));

void EVP_PKEY_asn1_set_private(EVP_PKEY_ASN1_METHOD *ameth,
        int (*priv_decode) (EVP_PKEY *pk,
                const PKCS8_PRIV_KEY_INFO
                *p8inf),
        int (*priv_encode) (PKCS8_PRIV_KEY_INFO *p8,
                const EVP_PKEY *pk),
        int (*priv_print) (BIO *out,
                const EVP_PKEY *pkey,
                int indent,
                ASN1_PCTX *pctx));

void EVP_PKEY_asn1_set_param(EVP_PKEY_ASN1_METHOD *ameth,
        int (*param_decode) (EVP_PKEY *pkey,
                const unsigned char **pder,
                int derlen),
        int (*param_encode) (const EVP_PKEY *pkey,

```

```

        unsigned char **pder),
int (*param_missing) (const EVP_PKEY *pk),
int (*param_copy) (EVP_PKEY *to,
        const EVP_PKEY *from),
int (*param_cmp) (const EVP_PKEY *a,
        const EVP_PKEY *b),
int (*param_print) (BIO *out,
        const EVP_PKEY *pkey,
        int indent,
        ASN1_PCTX *pctx));
void EVP_PKEY_asn1_set_free(EVP_PKEY_ASN1_METHOD *ameth,
        void (*pkey_free) (EVP_PKEY *pkey));
void EVP_PKEY_asn1_set_ctrl(EVP_PKEY_ASN1_METHOD *ameth,
        int (*pkey_ctrl) (EVP_PKEY *pkey, int op,
        long arg1, void *arg2));
void EVP_PKEY_asn1_set_item(EVP_PKEY_ASN1_METHOD *ameth,
        int (*item_verify) (EVP_MD_CTX *ctx,
        const ASN1_ITEM *it,
        void *asn,
        X509_ALGOR *a,
        ASN1_BIT_STRING *sig,
        EVP_PKEY *pkey),
        int (*item_sign) (EVP_MD_CTX *ctx,
        const ASN1_ITEM *it,
        void *asn,
        X509_ALGOR *alg1,
        X509_ALGOR *alg2,
        ASN1_BIT_STRING *sig));
void EVP_PKEY_asn1_set_siginf(EVP_PKEY_ASN1_METHOD *ameth,
        int (*siginf_set) (X509_SIG_INFO *siginf,
        const X509_ALGOR *alg,
        const ASN1_STRING *sig));
void EVP_PKEY_asn1_set_check(EVP_PKEY_ASN1_METHOD *ameth,

```

```

        int (*pkey_check) (const EVP_PKEY *pk));
void EVP_PKEY_asn1_set_public_check(EVP_PKEY_ASN1_METHOD *ameth,
        int (*pkey_pub_check) (const EVP_PKEY *pk));
void EVP_PKEY_asn1_set_param_check(EVP_PKEY_ASN1_METHOD *ameth,
        int (*pkey_param_check) (const EVP_PKEY *pk));
void EVP_PKEY_asn1_set_security_bits(EVP_PKEY_ASN1_METHOD *ameth,
        int (*pkey_security_bits) (const EVP_PKEY
                *pk));
void EVP_PKEY_asn1_set_set_priv_key(EVP_PKEY_ASN1_METHOD *ameth,
        int (*set_priv_key) (EVP_PKEY *pk,
                const unsigned char
                *priv,
                size_t len));
void EVP_PKEY_asn1_set_set_pub_key(EVP_PKEY_ASN1_METHOD *ameth,
        int (*set_pub_key) (EVP_PKEY *pk,
                const unsigned char *pub,
                size_t len));
void EVP_PKEY_asn1_set_get_priv_key(EVP_PKEY_ASN1_METHOD *ameth,
        int (*get_priv_key) (const EVP_PKEY *pk,
                unsigned char *priv,
                size_t *len));
void EVP_PKEY_asn1_set_get_pub_key(EVP_PKEY_ASN1_METHOD *ameth,
        int (*get_pub_key) (const EVP_PKEY *pk,
                unsigned char *pub,
                size_t *len));

const EVP_PKEY_ASN1_METHOD *EVP_PKEY_get0_asn1(const EVP_PKEY *pkey);

```

## DESCRIPTION

EVP\_PKEY\_ASN1\_METHOD is a structure which holds a set of ASN.1 conversion, printing and information methods for a specific public key algorithm.

There are two places where the EVP\_PKEY\_ASN1\_METHOD objects are stored: one is a built-in array representing the standard methods for different algorithms, and the other one is a stack of user-defined application-

specific methods, which can be manipulated by using

EVP\_PKEY\_asn1\_add0(3).

## Methods

The methods are the underlying implementations of a particular public key algorithm present by the EVP\_PKEY object.

```
int (*pub_decode) (EVP_PKEY *pk, const X509_PUBKEY *pub);
```

```
int (*pub_encode) (X509_PUBKEY *pub, const EVP_PKEY *pk);
```

```
int (*pub_cmp) (const EVP_PKEY *a, const EVP_PKEY *b);
```

```
int (*pub_print) (BIO *out, const EVP_PKEY *pkey, int indent,  
                 ASN1_PCTX *pctx);
```

The pub\_decode() and pub\_encode() methods are called to decode / encode X509\_PUBKEY ASN.1 parameters to / from pk. They MUST return 0 on error, 1 on success. They're called by X509\_PUBKEY\_get0(3) and X509\_PUBKEY\_set(3).

The pub\_cmp() method is called when two public keys are to be compared.

It MUST return 1 when the keys are equal, 0 otherwise. It's called by EVP\_PKEY\_eq(3).

The pub\_print() method is called to print a public key in humanly readable text to out, indented indent spaces. It MUST return 0 on error, 1 on success. It's called by EVP\_PKEY\_print\_public(3).

```
int (*priv_decode) (EVP_PKEY *pk, const PKCS8_PRIV_KEY_INFO *p8inf);
```

```
int (*priv_encode) (PKCS8_PRIV_KEY_INFO *p8, const EVP_PKEY *pk);
```

```
int (*priv_print) (BIO *out, const EVP_PKEY *pkey, int indent,  
                 ASN1_PCTX *pctx);
```

The priv\_decode() and priv\_encode() methods are called to decode / encode PKCS8\_PRIV\_KEY\_INFO form private key to / from pk. They MUST return 0 on error, 1 on success. They're called by EVP\_PKCS82PKEY(3) and EVP\_PKEY2PKCS8(3).

The priv\_print() method is called to print a private key in humanly readable text to out, indented indent spaces. It MUST return 0 on error, 1 on success. It's called by EVP\_PKEY\_print\_private(3).

```
int (*pkey_size) (const EVP_PKEY *pk);
```

```
int (*pkey_bits) (const EVP_PKEY *pk);
```

```
int (*pkey_security_bits) (const EVP_PKEY *pk);
```

The `pkey_size()` method returns the key size in bytes. It's called by `EVP_PKEY_get_size(3)`.

The `pkey_bits()` method returns the key size in bits. It's called by `EVP_PKEY_get_bits(3)`.

```
int (*param_decode) (EVP_PKEY *pkey,  
                    const unsigned char **pder, int derlen);  
int (*param_encode) (const EVP_PKEY *pkey, unsigned char **pder);  
int (*param_missing) (const EVP_PKEY *pk);  
int (*param_copy) (EVP_PKEY *to, const EVP_PKEY *from);  
int (*param_cmp) (const EVP_PKEY *a, const EVP_PKEY *b);  
int (*param_print) (BIO *out, const EVP_PKEY *pkey, int indent,  
                   ASN1_PCTX *pctx);
```

The `param_decode()` and `param_encode()` methods are called to decode / encode DER formatted parameters to / from `pk`. They MUST return 0 on error, 1 on success. They're called by `PEM_read_bio_Parameters(3)` and the file: `OSSL_STORE_LOADER(3)`.

The `param_missing()` method returns 0 if a key parameter is missing, otherwise 1. It's called by `EVP_PKEY_missing_parameters(3)`.

The `param_copy()` method copies key parameters from `from` to `to`. It MUST return 0 on error, 1 on success. It's called by `EVP_PKEY_copy_parameters(3)`.

The `param_cmp()` method compares the parameters of keys `a` and `b`. It MUST return 1 when the keys are equal, 0 when not equal, or a negative number on error. It's called by `EVP_PKEY_parameters_eq(3)`.

The `param_print()` method prints the private key parameters in humanly readable text to `out`, indented `indent` spaces. It MUST return 0 on error, 1 on success. It's called by `EVP_PKEY_print_params(3)`.

```
int (*sig_print) (BIO *out,  
                 const X509_ALGOR *sigalg, const ASN1_STRING *sig,  
                 int indent, ASN1_PCTX *pctx);
```

The `sig_print()` method prints a signature in humanly readable text to `out`, indented `indent` spaces. `sigalg` contains the exact signature

algorithm. If the signature in sig doesn't correspond to what this method expects, X509\_signature\_dump() must be used as a last resort.

It MUST return 0 on error, 1 on success. It's called by

X509\_signature\_print(3).

```
void (*pkey_free) (EVP_PKEY *pkey);
```

The pkey\_free() method helps freeing the internals of pkey. It's

called by EVP\_PKEY\_free(3), EVP\_PKEY\_set\_type(3),

EVP\_PKEY\_set\_type\_str(3), and EVP\_PKEY\_assign(3).

```
int (*pkey_ctrl) (EVP_PKEY *pkey, int op, long arg1, void *arg2);
```

The pkey\_ctrl() method adds extra algorithm specific control. It's

called by EVP\_PKEY\_get\_default\_digest\_nid(3),

EVP\_PKEY\_set1\_encoded\_public\_key(3),

EVP\_PKEY\_get1\_encoded\_public\_key(3), PKCS7\_SIGNER\_INFO\_set(3),

PKCS7\_RECIP\_INFO\_set(3), ...

```
int (*old_priv_decode) (EVP_PKEY *pkey,  
                        const unsigned char **pder, int derlen);
```

```
int (*old_priv_encode) (const EVP_PKEY *pkey, unsigned char **pder);
```

The old\_priv\_decode() and old\_priv\_encode() methods decode / encode

they private key pkey from / to a DER formatted array. These are

exclusively used to help decoding / encoding older (pre PKCS#8) PEM

formatted encrypted private keys. old\_priv\_decode() MUST return 0 on

error, 1 on success. old\_priv\_encode() MUST the return same kind of

values as i2d\_PrivateKey(). They're called by d2i\_PrivateKey(3) and

i2d\_PrivateKey(3).

```
int (*item_verify) (EVP_MD_CTX *ctx, const ASN1_ITEM *it, void *asn,  
                   X509_ALGOR *a, ASN1_BIT_STRING *sig, EVP_PKEY *pkey);
```

```
int (*item_sign) (EVP_MD_CTX *ctx, const ASN1_ITEM *it, void *asn,  
                 X509_ALGOR *alg1, X509_ALGOR *alg2,  
                 ASN1_BIT_STRING *sig);
```

The item\_sign() and item\_verify() methods make it possible to have

algorithm specific signatures and verification of them.

item\_sign() MUST return one of:

<=0 error

- 1 `item_sign()` did everything, OpenSSL internals just needs to pass the signature length back.
- 2 `item_sign()` did nothing, OpenSSL internal standard routines are expected to continue with the default signature production.
- 3 `item_sign()` set the algorithm identifier `algor1` and `algor2`, OpenSSL internals should just sign using those algorithms.

`item_verify()` MUST return one of:

`<=0` error

- 1 `item_sign()` did everything, OpenSSL internals just needs to pass the signature length back.
- 2 `item_sign()` did nothing, OpenSSL internal standard routines are expected to continue with the default signature production.

`item_verify()` and `item_sign()` are called by `ASN1_item_verify(3)` and `ASN1_item_sign(3)`, and by extension, `X509_verify(3)`, `X509_REQ_verify(3)`, `X509_sign(3)`, `X509_REQ_sign(3)`, ...

```
int (*siginf_set) (X509_SIG_INFO *siginf, const X509_ALGOR *alg,
                 const ASN1_STRING *sig);
```

The `siginf_set()` method is used to set custom `X509_SIG_INFO` parameters.

It MUST return 0 on error, or 1 on success. It's called as part of `X509_check_purpose(3)`, `X509_check_ca(3)` and `X509_check_issued(3)`.

```
int (*pkey_check) (const EVP_PKEY *pk);
int (*pkey_public_check) (const EVP_PKEY *pk);
int (*pkey_param_check) (const EVP_PKEY *pk);
```

The `pkey_check()`, `pkey_public_check()` and `pkey_param_check()` methods are used to check the validity of `pk` for key-pair, public component and parameters, respectively. They MUST return 0 for an invalid key, or 1 for a valid key. They are called by `EVP_PKEY_check(3)`, `EVP_PKEY_public_check(3)` and `EVP_PKEY_param_check(3)` respectively.

```
int (*set_priv_key) (EVP_PKEY *pk, const unsigned char *priv, size_t len);
int (*set_pub_key) (EVP_PKEY *pk, const unsigned char *pub, size_t len);
```

The `set_priv_key()` and `set_pub_key()` methods are used to set the raw private and public key data for an `EVP_PKEY`. They MUST return 0 on error, or 1 on success. They are called by

EVP\_PKEY\_new\_raw\_private\_key(3), and EVP\_PKEY\_new\_raw\_public\_key(3) respectively.

```
size_t (*dirty) (const EVP_PKEY *pk);
```

```
void (*export_to) (const EVP_PKEY *pk, EVP_KEYMGMT *keymgmt);
```

dirty\_cnt() returns the internal key's dirty count. This can be used to synchronise different copies of the same keys.

The export\_to() method exports the key material from the given key to a provider, through the EVP\_KEYMGMT(3) interface, if that provider supports importing key material.

## Functions

EVP\_PKEY\_asn1\_new() creates and returns a new EVP\_PKEY\_ASN1\_METHOD object, and associates the given id, flags, pem\_str and info. id is a NID, pem\_str is the PEM type string, info is a descriptive string. The following flags are supported:

```
ASN1_PKEY_SIGPARAM_NULL
```

If ASN1\_PKEY\_SIGPARAM\_NULL is set, then the signature algorithm parameters are given the type V\_ASN1\_NULL by default, otherwise they will be given the type V\_ASN1\_UNDEF (i.e. the parameter is omitted).

See X509\_ALGOR\_set0(3) for more information.

EVP\_PKEY\_asn1\_copy() copies an EVP\_PKEY\_ASN1\_METHOD object from src to dst. This function is not thread safe, it's recommended to only use this when initializing the application.

EVP\_PKEY\_asn1\_free() frees an existing EVP\_PKEY\_ASN1\_METHOD pointed by ameth.

EVP\_PKEY\_asn1\_add0() adds ameth to the user defined stack of methods unless another EVP\_PKEY\_ASN1\_METHOD with the same NID is already there.

This function is not thread safe, it's recommended to only use this when initializing the application.

EVP\_PKEY\_asn1\_add\_alias() creates an alias with the NID to for the EVP\_PKEY\_ASN1\_METHOD with NID from unless another EVP\_PKEY\_ASN1\_METHOD with the same NID is already added. This function is not thread safe, it's recommended to only use this when initializing the application.

```
EVP_PKEY_asn1_set_public(), EVP_PKEY_asn1_set_private(),
```

EVP\_PKEY\_asn1\_set\_param(), EVP\_PKEY\_asn1\_set\_free(),  
EVP\_PKEY\_asn1\_set\_ctrl(), EVP\_PKEY\_asn1\_set\_item(),  
EVP\_PKEY\_asn1\_set\_siginf(), EVP\_PKEY\_asn1\_set\_check(),  
EVP\_PKEY\_asn1\_set\_public\_check(), EVP\_PKEY\_asn1\_set\_param\_check(),  
EVP\_PKEY\_asn1\_set\_security\_bits(), EVP\_PKEY\_asn1\_set\_set\_priv\_key(),  
EVP\_PKEY\_asn1\_set\_set\_pub\_key(), EVP\_PKEY\_asn1\_set\_get\_priv\_key() and  
EVP\_PKEY\_asn1\_set\_get\_pub\_key() set the diverse methods of the given  
EVP\_PKEY\_ASN1\_METHOD object.

EVP\_PKEY\_get0\_asn1() finds the EVP\_PKEY\_ASN1\_METHOD associated with the  
key pkey.

## RETURN VALUES

EVP\_PKEY\_asn1\_new() returns NULL on error, or a pointer to an  
EVP\_PKEY\_ASN1\_METHOD object otherwise.

EVP\_PKEY\_asn1\_add0() and EVP\_PKEY\_asn1\_add\_alias() return 0 on error,  
or 1 on success.

EVP\_PKEY\_get0\_asn1() returns NULL on error, or a pointer to a constant  
EVP\_PKEY\_ASN1\_METHOD object otherwise.

## HISTORY

The signature of the pub\_decode functional argument of  
EVP\_PKEY\_asn1\_set\_public() has changed in OpenSSL 3.0 so its pub  
parameter is now constified.

## COPYRIGHT

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