

**NAME**

RSA\_meth\_get0\_app\_data, RSA\_meth\_set0\_app\_data, RSA\_meth\_new, RSA\_meth\_free, RSA\_meth\_dup, RSA\_meth\_get0\_name, RSA\_meth\_set1\_name, RSA\_meth\_get\_flags, RSA\_meth\_set\_flags, RSA\_meth\_get\_pub\_enc, RSA\_meth\_set\_pub\_enc, RSA\_meth\_get\_pub\_dec, RSA\_meth\_set\_pub\_dec, RSA\_meth\_get\_priv\_enc, RSA\_meth\_set\_priv\_enc, RSA\_meth\_get\_priv\_dec, RSA\_meth\_set\_priv\_dec, RSA\_meth\_get\_mod\_exp, RSA\_meth\_set\_mod\_exp, RSA\_meth\_get\_bn\_mod\_exp, RSA\_meth\_set\_bn\_mod\_exp, RSA\_meth\_get\_init, RSA\_meth\_set\_init, RSA\_meth\_get\_finish, RSA\_meth\_set\_finish, RSA\_meth\_get\_sign, RSA\_meth\_set\_sign, RSA\_meth\_get\_verify, RSA\_meth\_set\_verify, RSA\_meth\_get\_keygen, RSA\_meth\_set\_keygen, RSA\_meth\_get\_multi\_prime\_keygen, RSA\_meth\_set\_multi\_prime\_keygen - Routines to build up RSA methods

**SYNOPSIS**

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

The following functions have been deprecated since OpenSSL 3.0, and can be hidden entirely by defining **OPENSSL\_API\_COMPAT** with a suitable version value, see **openssl\_user\_macros(7)**:

```
RSA_METHOD *RSA_meth_new(const char *name, int flags);
void RSA_meth_free(RSA_METHOD *meth);
```

```
RSA_METHOD *RSA_meth_dup(const RSA_METHOD *meth);
```

```
const char *RSA_meth_get0_name(const RSA_METHOD *meth);
int RSA_meth_set1_name(RSA_METHOD *meth, const char *name);
```

```
int RSA_meth_get_flags(const RSA_METHOD *meth);
int RSA_meth_set_flags(RSA_METHOD *meth, int flags);
```

```
void *RSA_meth_get0_app_data(const RSA_METHOD *meth);
int RSA_meth_set0_app_data(RSA_METHOD *meth, void *app_data);
```

```
int (*RSA_meth_get_pub_enc(const RSA_METHOD *meth))(int flen, const unsigned char *from,
                                                    unsigned char *to, RSA *rsa, int padding);
int RSA_meth_set_pub_enc(RSA_METHOD *rsa,
                        int (*pub_enc)(int flen, const unsigned char *from,
                                       unsigned char *to, RSA *rsa,
                                       int padding));
```

```
int (*RSA_meth_get_pub_dec(const RSA_METHOD *meth))
```

```

    (int flen, const unsigned char *from,
     unsigned char *to, RSA *rsa, int padding);
int RSA_meth_set_pub_dec(RSA_METHOD *rsa,
                        int (*pub_dec)(int flen, const unsigned char *from,
                                       unsigned char *to, RSA *rsa,
                                       int padding));

int (*RSA_meth_get_priv_enc(const RSA_METHOD *meth))(int flen, const unsigned char *from,
                                                    unsigned char *to, RSA *rsa,
                                                    int padding);
int RSA_meth_set_priv_enc(RSA_METHOD *rsa,
                        int (*priv_enc)(int flen, const unsigned char *from,
                                       unsigned char *to, RSA *rsa, int padding));

int (*RSA_meth_get_priv_dec(const RSA_METHOD *meth))(int flen, const unsigned char *from,
                                                    unsigned char *to, RSA *rsa,
                                                    int padding);
int RSA_meth_set_priv_dec(RSA_METHOD *rsa,
                        int (*priv_dec)(int flen, const unsigned char *from,
                                       unsigned char *to, RSA *rsa, int padding));

/* Can be null */
int (*RSA_meth_get_mod_exp(const RSA_METHOD *meth))(BIGNUM *r0, const BIGNUM *i,
                                                    RSA *rsa, BN_CTX *ctx);
int RSA_meth_set_mod_exp(RSA_METHOD *rsa,
                        int (*mod_exp)(BIGNUM *r0, const BIGNUM *i, RSA *rsa,
                                       BN_CTX *ctx));

/* Can be null */
int (*RSA_meth_get_bn_mod_exp(const RSA_METHOD *meth))(BIGNUM *r, const BIGNUM *a,
                                                       const BIGNUM *p, const BIGNUM *m,
                                                       BN_CTX *ctx, BN_MONT_CTX *m_ctx);
int RSA_meth_set_bn_mod_exp(RSA_METHOD *rsa,
                        int (*bn_mod_exp)(BIGNUM *r, const BIGNUM *a,
                                       const BIGNUM *p, const BIGNUM *m,
                                       BN_CTX *ctx, BN_MONT_CTX *m_ctx));

/* called at new */
int (*RSA_meth_get_init(const RSA_METHOD *meth) (RSA *rsa);
int RSA_meth_set_init(RSA_METHOD *rsa, int (*init (RSA *rsa));

```

```

/* called at free */
int (*RSA_meth_get_finish(const RSA_METHOD *meth))(RSA *rsa);
int RSA_meth_set_finish(RSA_METHOD *rsa, int (*finish)(RSA *rsa));

int (*RSA_meth_get_sign(const RSA_METHOD *meth))(int type, const unsigned char *m,
        unsigned int m_length,
        unsigned char *sigret,
        unsigned int *siglen, const RSA *rsa);
int RSA_meth_set_sign(RSA_METHOD *rsa,
        int (*sign)(int type, const unsigned char *m,
        unsigned int m_length, unsigned char *sigret,
        unsigned int *siglen, const RSA *rsa));

int (*RSA_meth_get_verify(const RSA_METHOD *meth))(int dtype, const unsigned char *m,
        unsigned int m_length,
        const unsigned char *sigbuf,
        unsigned int siglen, const RSA *rsa);
int RSA_meth_set_verify(RSA_METHOD *rsa,
        int (*verify)(int dtype, const unsigned char *m,
        unsigned int m_length,
        const unsigned char *sigbuf,
        unsigned int siglen, const RSA *rsa));

int (*RSA_meth_get_keygen(const RSA_METHOD *meth))(RSA *rsa, int bits, BIGNUM *e,
        BN_GENCB *cb);
int RSA_meth_set_keygen(RSA_METHOD *rsa,
        int (*keygen)(RSA *rsa, int bits, BIGNUM *e,
        BN_GENCB *cb));

int (*RSA_meth_get_multi_prime_keygen(const RSA_METHOD *meth))(RSA *rsa, int bits,
        int primes, BIGNUM *e,
        BN_GENCB *cb);

int RSA_meth_set_multi_prime_keygen(RSA_METHOD *meth,
        int (*keygen) (RSA *rsa, int bits,
        int primes, BIGNUM *e,
        BN_GENCB *cb));

```

**DESCRIPTION**

All of the functions described on this page are deprecated. Applications should instead use the

OSSL\_PROVIDER APIs.

The **RSA\_METHOD** type is a structure used for the provision of custom RSA implementations. It provides a set of functions used by OpenSSL for the implementation of the various RSA capabilities.

**RSA\_meth\_new()** creates a new **RSA\_METHOD** structure. It should be given a unique **name** and a set of **flags**. The **name** should be a NULL terminated string, which will be duplicated and stored in the **RSA\_METHOD** object. It is the callers responsibility to free the original string. The flags will be used during the construction of a new **RSA** object based on this **RSA\_METHOD**. Any new **RSA** object will have those flags set by default.

**RSA\_meth\_dup()** creates a duplicate copy of the **RSA\_METHOD** object passed as a parameter. This might be useful for creating a new **RSA\_METHOD** based on an existing one, but with some differences.

**RSA\_meth\_free()** destroys an **RSA\_METHOD** structure and frees up any memory associated with it.

**RSA\_meth\_get0\_name()** will return a pointer to the name of this **RSA\_METHOD**. This is a pointer to the internal name string and so should not be freed by the caller. **RSA\_meth\_set1\_name()** sets the name of the **RSA\_METHOD** to **name**. The string is duplicated and the copy is stored in the **RSA\_METHOD** structure, so the caller remains responsible for freeing the memory associated with the name.

**RSA\_meth\_get\_flags()** returns the current value of the flags associated with this **RSA\_METHOD**.

**RSA\_meth\_set\_flags()** provides the ability to set these flags.

The functions **RSA\_meth\_get0\_app\_data()** and **RSA\_meth\_set0\_app\_data()** provide the ability to associate implementation specific data with the **RSA\_METHOD**. It is the application's responsibility to free this data before the **RSA\_METHOD** is freed via a call to **RSA\_meth\_free()**.

**RSA\_meth\_get\_sign()** and **RSA\_meth\_set\_sign()** get and set the function used for creating an RSA signature respectively. This function will be called in response to the application calling **RSA\_sign()**. The parameters for the function have the same meaning as for **RSA\_sign()**.

**RSA\_meth\_get\_verify()** and **RSA\_meth\_set\_verify()** get and set the function used for verifying an RSA signature respectively. This function will be called in response to the application calling **RSA\_verify()**. The parameters for the function have the same meaning as for **RSA\_verify()**.

**RSA\_meth\_get\_mod\_exp()** and **RSA\_meth\_set\_mod\_exp()** get and set the function used for CRT computations.

**RSA\_meth\_get\_bn\_mod\_exp()** and **RSA\_meth\_set\_bn\_mod\_exp()** get and set the function used for CRT computations, specifically the following value:

$$r = a ^ p \text{ mod } m$$

Both the **mod\_exp()** and **bn\_mod\_exp()** functions are called by the default OpenSSL method during encryption, decryption, signing and verification.

**RSA\_meth\_get\_init()** and **RSA\_meth\_set\_init()** get and set the function used for creating a new RSA instance respectively. This function will be called in response to the application calling **RSA\_new()** (if the current default RSA\_METHOD is this one) or **RSA\_new\_method()**. The **RSA\_new()** and **RSA\_new\_method()** functions will allocate the memory for the new RSA object, and a pointer to this newly allocated structure will be passed as a parameter to the function. This function may be NULL.

**RSA\_meth\_get\_finish()** and **RSA\_meth\_set\_finish()** get and set the function used for destroying an instance of an RSA object respectively. This function will be called in response to the application calling **RSA\_free()**. A pointer to the RSA to be destroyed is passed as a parameter. The destroy function should be used for RSA implementation specific clean up. The memory for the RSA itself should not be freed by this function. This function may be NULL.

**RSA\_meth\_get\_keygen()** and **RSA\_meth\_set\_keygen()** get and set the function used for generating a new RSA key pair respectively. This function will be called in response to the application calling **RSA\_generate\_key\_ex()**. The parameter for the function has the same meaning as for **RSA\_generate\_key\_ex()**.

**RSA\_meth\_get\_multi\_prime\_keygen()** and **RSA\_meth\_set\_multi\_prime\_keygen()** get and set the function used for generating a new multi-prime RSA key pair respectively. This function will be called in response to the application calling **RSA\_generate\_multi\_prime\_key()**. The parameter for the function has the same meaning as for **RSA\_generate\_multi\_prime\_key()**.

**RSA\_meth\_get\_pub\_enc()**, **RSA\_meth\_set\_pub\_enc()**, **RSA\_meth\_get\_pub\_dec()**, **RSA\_meth\_set\_pub\_dec()**, **RSA\_meth\_get\_priv\_enc()**, **RSA\_meth\_set\_priv\_enc()**, **RSA\_meth\_get\_priv\_dec()**, **RSA\_meth\_set\_priv\_dec()** get and set the functions used for public and private key encryption and decryption. These functions will be called in response to the application calling **RSA\_public\_encrypt()**, **RSA\_private\_decrypt()**, **RSA\_private\_encrypt()** and **RSA\_public\_decrypt()** and take the same parameters as those.

## RETURN VALUES

**RSA\_meth\_new()** and **RSA\_meth\_dup()** return the newly allocated RSA\_METHOD object or NULL on failure.

**RSA\_meth\_get0\_name()** and **RSA\_meth\_get\_flags()** return the name and flags associated with the **RSA\_METHOD** respectively.

All other **RSA\_meth\_get\_\***() functions return the appropriate function pointer that has been set in the **RSA\_METHOD**, or **NULL** if no such pointer has yet been set.

**RSA\_meth\_set1\_name** and all **RSA\_meth\_set\_\***() functions return 1 on success or 0 on failure.

## SEE ALSO

**RSA\_new(3)**, **RSA\_generate\_key\_ex(3)**, **RSA\_sign(3)**, **RSA\_set\_method(3)**, **RSA\_size(3)**,  
**RSA\_get0\_key(3)**, **RSA\_generate\_multi\_prime\_key(3)**

## HISTORY

All of these functions were deprecated in OpenSSL 3.0.

**RSA\_meth\_get\_multi\_prime\_keygen()** and **RSA\_meth\_set\_multi\_prime\_keygen()** were added in OpenSSL 1.1.1.

Other functions described here were added in OpenSSL 1.1.0.

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