

**NAME**

EVP\_PKEY\_derive\_init, EVP\_PKEY\_derive\_init\_ex, EVP\_PKEY\_derive\_set\_peer\_ex,  
EVP\_PKEY\_derive\_set\_peer, EVP\_PKEY\_derive - derive public key algorithm shared secret

**SYNOPSIS**

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

```
int EVP_PKEY_derive_init(EVP_PKEY_CTX *ctx);
int EVP_PKEY_derive_init_ex(EVP_PKEY_CTX *ctx, const OSSL_PARAM params[]);
int EVP_PKEY_derive_set_peer_ex(EVP_PKEY_CTX *ctx, EVP_PKEY *peer,
                               int validate_peer);
int EVP_PKEY_derive_set_peer(EVP_PKEY_CTX *ctx, EVP_PKEY *peer);
int EVP_PKEY_derive(EVP_PKEY_CTX *ctx, unsigned char *key, size_t *keylen);
```

**DESCRIPTION**

**EVP\_PKEY\_derive\_init()** initializes a public key algorithm context *ctx* for shared secret derivation using the algorithm given when the context was created using **EVP\_PKEY\_CTX\_new(3)** or variants thereof. The algorithm is used to fetch a **EVP\_KEYEXCH** method implicitly, see "Implicit fetch" in **provider(7)** for more information about implicit fetches.

**EVP\_PKEY\_derive\_init\_ex()** is the same as **EVP\_PKEY\_derive\_init()** but additionally sets the passed parameters *params* on the context before returning.

**EVP\_PKEY\_derive\_set\_peer\_ex()** sets the peer key: this will normally be a public key. The *validate\_peer* will validate the public key if this value is non zero.

**EVP\_PKEY\_derive\_set\_peer()** is similar to **EVP\_PKEY\_derive\_set\_peer\_ex()** with *validate\_peer* set to 1.

**EVP\_PKEY\_derive()** derives a shared secret using *ctx*. If *key* is NULL then the maximum size of the output buffer is written to the *keylen* parameter. If *key* is not NULL then before the call the *keylen* parameter should contain the length of the *key* buffer, if the call is successful the shared secret is written to *key* and the amount of data written to *keylen*.

**NOTES**

After the call to **EVP\_PKEY\_derive\_init()**, algorithm specific control operations can be performed to set any appropriate parameters for the operation.

The function **EVP\_PKEY\_derive()** can be called more than once on the same context if several operations are performed using the same parameters.

## RETURN VALUES

**EVP\_PKEY\_derive\_init()** and **EVP\_PKEY\_derive()** return 1 for success and 0 or a negative value for failure. In particular a return value of -2 indicates the operation is not supported by the public key algorithm.

## EXAMPLES

Derive shared secret (for example DH or EC keys):

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

EVP_PKEY_CTX *ctx;
ENGINE *eng;
unsigned char *skey;
size_t skeylen;
EVP_PKEY *pkey, *peerkey;
/* NB: assumes pkey, eng, peerkey have been already set up */

ctx = EVP_PKEY_CTX_new(pkey, eng);
if (!ctx)
    /* Error occurred */
if (EVP_PKEY_derive_init(ctx) <= 0)
    /* Error */
if (EVP_PKEY_derive_set_peer(ctx, peerkey) <= 0)
    /* Error */

/* Determine buffer length */
if (EVP_PKEY_derive(ctx, NULL, &skeylen) <= 0)
    /* Error */

skey = OPENSSL_malloc(skeylen);

if (!skey)
    /* malloc failure */

if (EVP_PKEY_derive(ctx, skey, &skeylen) <= 0)
    /* Error */

/* Shared secret is skey bytes written to buffer skey */
```

**SEE ALSO**

**EVP\_PKEY\_CTX\_new(3), EVP\_PKEY\_encrypt(3), EVP\_PKEY\_decrypt(3), EVP\_PKEY\_sign(3),  
EVP\_PKEY\_verify(3), EVP\_PKEY\_verify\_recover(3), EVP\_KEYEXCH\_fetch(3)**

**HISTORY**

The **EVP\_PKEY\_derive\_init()**, **EVP\_PKEY\_derive\_set\_peer()** and **EVP\_PKEY\_derive()** functions were originally added in OpenSSL 1.0.0.

The **EVP\_PKEY\_derive\_init\_ex()** and **EVP\_PKEY\_derive\_set\_peer\_ex()** functions were added in OpenSSL 3.0.

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