

**NAME**

PKCS5\_PBE\_keyivgen, PKCS5\_PBE\_keyivgen\_ex, PKCS5\_pbe2\_set, PKCS5\_pbe2\_set\_iv, PKCS5\_pbe2\_set\_iv\_ex, PKCS5\_pbe\_set, PKCS5\_pbe\_set\_ex, PKCS5\_pbe2\_set\_scrypt, PKCS5\_pbe\_set0\_algor, PKCS5\_pbe\_set0\_algor\_ex, PKCS5\_v2\_PBE\_keyivgen, PKCS5\_v2\_PBE\_keyivgen\_ex, PKCS5\_v2\_scrypt\_keyivgen, PKCS5\_v2\_scrypt\_keyivgen\_ex, PKCS5\_pbkdf2\_set, PKCS5\_pbkdf2\_set\_ex, EVP\_PBE\_scrypt, EVP\_PBE\_scrypt\_ex - PKCS#5 Password based encryption routines

**SYNOPSIS**

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

```
int PKCS5_PBE_keyivgen(EVP_CIPHER_CTX *ctx, const char *pass, int passlen,
    ASN1_TYPE *param, const EVP_CIPHER *cipher,
    const EVP_MD *md, int en_de);
int PKCS5_PBE_keyivgen_ex(EVP_CIPHER_CTX *cctx, const char *pass, int passlen,
    ASN1_TYPE *param, const EVP_CIPHER *cipher,
    const EVP_MD *md, int en_de, OSSL_LIB_CTX *libctx,
    const char *propq);
int PKCS5_v2_PBE_keyivgen(EVP_CIPHER_CTX *ctx, const char *pass, int passlen,
    ASN1_TYPE *param, const EVP_CIPHER *cipher,
    const EVP_MD *md, int en_de);
int PKCS5_v2_PBE_keyivgen_ex(EVP_CIPHER_CTX *ctx, const char *pass, int passlen,
    ASN1_TYPE *param, const EVP_CIPHER *cipher,
    const EVP_MD *md, int en_de,
    OSSL_LIB_CTX *libctx, const char *propq);
int EVP_PBE_scrypt(const char *pass, size_t passlen,
    const unsigned char *salt, size_t saltlen,
    uint64_t N, uint64_t r, uint64_t p, uint64_t maxmem,
    unsigned char *key, size_t keylen);
int EVP_PBE_scrypt_ex(const char *pass, size_t passlen,
    const unsigned char *salt, size_t saltlen,
    uint64_t N, uint64_t r, uint64_t p, uint64_t maxmem,
    unsigned char *key, size_t keylen,
    OSSL_LIB_CTX *ctx, const char *propq);
int PKCS5_v2_scrypt_keyivgen(EVP_CIPHER_CTX *ctx, const char *pass,
    int passlen, ASN1_TYPE *param,
    const EVP_CIPHER *c, const EVP_MD *md, int en_de);
int PKCS5_v2_scrypt_keyivgen_ex(EVP_CIPHER_CTX *ctx, const char *pass,
    int passlen, ASN1_TYPE *param,
    const EVP_CIPHER *c, const EVP_MD *md, int en_de,
```

```

        OSSL_LIB_CTX *libctx, const char *propq);

#include <openssl/x509.h>

int PKCS5_pbe_set0_algor(X509_ALGOR *algor, int alg, int iter,
        const unsigned char *salt, int saltlen);
int PKCS5_pbe_set0_algor_ex(X509_ALGOR *algor, int alg, int iter,
        const unsigned char *salt, int saltlen,
        OSSL_LIB_CTX *libctx);

X509_ALGOR *PKCS5_pbe_set(int alg, int iter,
        const unsigned char *salt, int saltlen);
X509_ALGOR *PKCS5_pbe_set_ex(int alg, int iter,
        const unsigned char *salt, int saltlen,
        OSSL_LIB_CTX *libctx);

X509_ALGOR *PKCS5_pbe2_set(const EVP_CIPHER *cipher, int iter,
        unsigned char *salt, int saltlen);
X509_ALGOR *PKCS5_pbe2_set_iv(const EVP_CIPHER *cipher, int iter,
        unsigned char *salt, int saltlen,
        unsigned char *aiv, int prf_nid);
X509_ALGOR *PKCS5_pbe2_set_iv_ex(const EVP_CIPHER *cipher, int iter,
        unsigned char *salt, int saltlen,
        unsigned char *aiv, int prf_nid,
        OSSL_LIB_CTX *libctx);
X509_ALGOR *PKCS5_pbe2_set_scrypt(const EVP_CIPHER *cipher,
        const unsigned char *salt, int saltlen,
        unsigned char *aiv, uint64_t N, uint64_t r,
        uint64_t p);

X509_ALGOR *PKCS5_pbkdf2_set(int iter, unsigned char *salt, int saltlen,
        int prf_nid, int keylen);
X509_ALGOR *PKCS5_pbkdf2_set_ex(int iter, unsigned char *salt, int saltlen,
        int prf_nid, int keylen,
        OSSL_LIB_CTX *libctx);

```

## DESCRIPTION

### Key Derivation

**PKCS5\_PBE\_keyivgen()** and **PKCS5\_PBE\_keyivgen\_ex()** take a password *pass* of length *passlen*, parameters *param* and a message digest function *md\_type* and performs a key derivation according to

PKCS#5 PBES1. The resulting key is then used to initialise the cipher context *ctx* with a cipher *cipher* for encryption (*en\_de*=1) or decryption (*en\_de*=0).

*pass* is an optional parameter and can be NULL. If *passlen* is -1, then the function will calculate the length of *pass* using **strlen()**.

**PKCS5\_v2\_PBE\_keyivgen()** and **PKCS5\_v2\_PBE\_keyivgen\_ex()** are similar to the above but instead use PKCS#5 PBES2 as the encryption algorithm using the supplied parameters.

**PKCS5\_v2\_scrypt\_keyivgen()** and **PKCS5\_v2\_scrypt\_keyivgen\_ex()** use SCRYPT as the key derivation part of the encryption algorithm.

*salt* is the salt used in the derivation of length *saltlen*. If the *salt* is NULL, then *saltlen* must be 0. The function will not attempt to calculate the length of the *salt* because it is not assumed to be NULL terminated.

*iter* is the iteration count and its value should be greater than or equal to 1. RFC 2898 suggests an iteration count of at least 1000. Any *iter* less than 1 is treated as a single iteration.

*digest* is the message digest function used in the derivation.

Functions ending in **\_ex()** take optional parameters *libctx* and *propq* which are used to select appropriate algorithm implementations.

### Algorithm Identifier Creation

**PKCS5\_pbe\_set()**, **PKCS5\_pbe\_set\_ex()**, **PKCS5\_pbe2\_set()**, **PKCS5\_pbe2\_set\_iv()**, **PKCS5\_pbe2\_set\_iv\_ex()** and **PKCS5\_pbe2\_set\_scrypt()** generate an **X509\_ALGOR** object which represents an AlgorithmIdentifier containing the algorithm OID and associated parameters for the PBE algorithm.

**PKCS5\_pbkdf2\_set()** and **PKCS5\_pbkdf2\_set\_ex()** generate an **X509\_ALGOR** object which represents an AlgorithmIdentifier containing the algorithm OID and associated parameters for the PBKDF2 algorithm.

**PKCS5\_pbe\_set0\_algor()** and **PKCS5\_pbe\_set0\_algor\_ex()** set the PBE algorithm OID and parameters into the supplied **X509\_ALGOR**.

### NOTES

The \*\_**keyivgen()** functions are typically used in PKCS#12 to encrypt objects.

These functions make no assumption regarding the given password. It will simply be treated as a byte sequence.

## RETURN VALUES

**PKCS5\_PBE\_keyivgen()**, **PKCS5\_v2\_PBE\_keyivgen()**, **PKCS5\_v2\_PBE\_keyivgen\_ex()**, **PKCS5\_v2\_scrypt\_keyivgen()**, **PKCS5\_v2\_scrypt\_keyivgen\_ex()**, **PKCS5\_pbe\_set0\_algor()** and **PKCS5\_pbe\_set0\_algor\_ex()** return 1 for success and 0 if an error occurs.

**PKCS5\_pbe\_set()**, **PKCS5\_pbe\_set\_ex()**, **PKCS5\_pbe2\_set()**, **PKCS5\_pbe2\_set\_iv()**, **PKCS5\_pbe2\_set\_iv\_ex()**, **PKCS5\_pbe2\_set\_scrypt()**, **PKCS5\_pbkdf2\_set()** and **PKCS5\_pbkdf2\_set\_ex()** return an **X509\_ALGOR** object or NULL if an error occurs.

## CONFORMING TO

IETF RFC 8018 (<<https://tools.ietf.org/html/rfc8018>>)

## SEE ALSO

**EVP\_PBE\_CipherInit\_ex(3)**, **PKCS12\_pbe\_crypt\_ex(3)**, **passphrase-encoding(7)**

## HISTORY

**PKCS5\_v2\_PBE\_keyivgen\_ex()**, **EVP\_PBE\_scrypt\_ex()**, **PKCS5\_v2\_scrypt\_keyivgen\_ex()**, **PKCS5\_pbe\_set0\_algor\_ex()**, **PKCS5\_pbe\_set\_ex()**, **PKCS5\_pbe2\_set\_iv\_ex()** and **PKCS5\_pbkdf2\_set\_ex()** were added in OpenSSL 3.0.

From OpenSSL 3.0 the PBKDF1 algorithm used in **PKCS5\_PBE\_keyivgen()** and **PKCS5\_PBE\_keyivgen\_ex()** has been moved to the legacy provider as an **EVP\_KDF**.

## COPYRIGHT

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