

NAME

ECDSA_size, ECDSA_sign, ECDSA_do_sign, ECDSA_verify, ECDSA_do_verify, ECDSA_sign_setup, ECDSA_sign_ex, ECDSA_do_sign_ex – deprecated low-level elliptic curve digital signature algorithm (ECDSA) functions

SYNOPSIS

```
#include <openssl/ecdsa.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):

```
int ECDSA_size(const EC_KEY *eckey);

int ECDSA_sign(int type, const unsigned char *dgst, int dgstlen,
               unsigned char *sig, unsigned int *siglen, EC_KEY *eckey);
ECDSA_SIG *ECDSA_do_sign(const unsigned char *dgst, int dgstlen,
                        EC_KEY *eckey);

int ECDSA_verify(int type, const unsigned char *dgst, int dgstlen,
                 const unsigned char *sig, int siglen, EC_KEY *eckey);
int ECDSA_do_verify(const unsigned char *dgst, int dgstlen,
                   const ECDSA_SIG *sig, EC_KEY *eckey);

ECDSA_SIG *ECDSA_do_sign_ex(const unsigned char *dgst, int dgstlen,
                           const BIGNUM *kinv, const BIGNUM *rp,
                           EC_KEY *eckey);
int ECDSA_sign_setup(EC_KEY *eckey, BN_CTX *ctx, BIGNUM **kinv, BIGNUM **rp);
int ECDSA_sign_ex(int type, const unsigned char *dgst, int dgstlen,
                 unsigned char *sig, unsigned int *siglen,
                 const BIGNUM *kinv, const BIGNUM *rp, EC_KEY *eckey);
```

DESCRIPTION

See **ECDSA_SIG_new** (3) for a description of the **ECDSA_SIG** object.

See **i2d_ECDSA_SIG** (3) and **d2i_ECDSA_SIG** (3) for information about encoding and decoding ECDSA signatures to/from DER.

All of the functions described below are deprecated. Applications should use the higher level **EVP** interface such as **EVP_DigestSignInit** (3) or **EVP_DigestVerifyInit** (3) instead.

ECDSA_size() returns the maximum length of a DER encoded ECDSA signature created with the private EC key *eckey*. To obtain the actual signature size use **EVP_PKEY_sign** (3) with a NULL *sig* parameter.

ECDSA_sign() computes a digital signature of the *dgstlen* bytes hash value *dgst* using the private EC key *eckey*. The DER encoded signature is stored in *sig* and its length is returned in *siglen*. Note: *sig* must point to **ECDSA_size**(*eckey*) bytes of memory. The parameter *type* is currently ignored. **ECDSA_sign()** is wrapper function for **ECDSA_sign_ex()** with *kinv* and *rp* set to NULL.

ECDSA_do_sign() is similar to **ECDSA_sign()** except the signature is returned as a newly allocated **ECDSA_SIG** structure (or NULL on error). **ECDSA_do_sign()** is a wrapper function for **ECDSA_do_sign_ex()** with *kinv* and *rp* set to NULL.

ECDSA_verify() verifies that the signature in *sig* of size *siglen* is a valid ECDSA signature of the hash value *dgst* of size *dgstlen* using the public key *eckey*. The parameter *type* is ignored.

ECDSA_do_verify() is similar to **ECDSA_verify()** except the signature is presented in the form of a pointer to an **ECDSA_SIG** structure.

The remaining functions utilise the internal *kinv* and *r* values used during signature computation. Most applications will never need to call these and some external ECDSA ENGINE implementations may not support them at all if either *kinv* or *r* is not NULL.

ECDSA_sign_setup() may be used to precompute parts of the signing operation. *eckey* is the private EC key and *ctx* is a pointer to **BN_CTX** structure (or NULL). The precomputed values are returned in *kinv* and *rp* and can be used in a later call to **ECDSA_sign_ex()** or **ECDSA_do_sign_ex()**.

ECDSA_sign_ex() computes a digital signature of the *dgstlen* bytes hash value *dgst* using the private EC key *eckey* and the optional pre-computed values *kinv* and *rp*. The DER encoded signature is stored in *sig* and its length is returned in *siglen*. Note: *sig* must point to **ECDSA_size**(*eckey*) bytes of memory. The parameter *type* is ignored.

ECDSA_do_sign_ex() is similar to **ECDSA_sign_ex()** except the signature is returned as a newly allocated **ECDSA_SIG** structure (or NULL on error).

RETURN VALUES

ECDSA_size() returns the maximum length signature or 0 on error.

ECDSA_sign(), **ECDSA_sign_ex()** and **ECDSA_sign_setup()** return 1 if successful or 0 on error.

ECDSA_do_sign() and **ECDSA_do_sign_ex()** return a pointer to an allocated **ECDSA_SIG** structure or NULL on error.

ECDSA_verify() and **ECDSA_do_verify()** return 1 for a valid signature, 0 for an invalid signature and -1 on error. The error codes can be obtained by **ERR_get_err** or (3).

EXAMPLES

Creating an ECDSA signature of a given SHA-256 hash value using the named curve prime256v1 (aka P-256). This example uses deprecated functionality. See "DESCRIPTION".

First step: create an **EC_KEY** object (note: this part is **not** ECDSA specific)

```
int ret;
ECDSA_SIG *sig;
EC_KEY *eckey;

eckey = EC_KEY_new_by_curve_name(NID_X9_62_prime256v1);
if (eckey == NULL)
    /* error */
if (EC_KEY_generate_key(eckey) == 0)
    /* error */
```

Second step: compute the ECDSA signature of a SHA-256 hash value using **ECDSA_do_sign()**:

```
sig = ECDSA_do_sign(digest, 32, eckey);
if (sig == NULL)
    /* error */
```

or using **ECDSA_sign()**:

```
unsigned char *buffer, *pp;
int buf_len;

buf_len = ECDSA_size(eckey);
buffer = OPENSSL_malloc(buf_len);
pp = buffer;
if (ECDSA_sign(0, dgst, dgstlen, pp, &buf_len, eckey) == 0)
    /* error */
```

Third step: verify the created ECDSA signature using **ECDSA_do_verify()**:

```
ret = ECDSA_do_verify(digest, 32, sig, eckey);
```

or using **ECDSA_verify()**:

```
ret = ECDSA_verify(0, digest, 32, buffer, buf_len, eckey);
```

and finally evaluate the return value:

```
if (ret == 1)
    /* signature ok */
else if (ret == 0)
    /* incorrect signature */
else
    /* error */
```

CONFORMING TO

ANSI X9.62, US Federal Information Processing Standard FIPS186-2 (Digital Signature Standard, DSS)

SEE ALSO

EC_KEY_new(3), **EVP_DigestSignInit**(3), **EVP_DigestVerifyInit**(3), **EVP_PKEY_sign**(3)
i2d_ECDSA_SIG(3), **d2i_ECDSA_SIG**(3)

HISTORY

All functionality described here was deprecated in OpenSSL 3.0.

COPYRIGHT

Copyright 2004–2022 The OpenSSL Project Authors. All Rights Reserved.

Licensed under the Apache License 2.0 (the "License"). You may not use this file except in compliance with the License. You can obtain a copy in the file LICENSE in the source distribution or at [<https://www.openssl.org/source/license.html>](https://www.openssl.org/source/license.html).