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Rocky Enterprise Linux 9.2 Manual Pages on command 'EC_POINT_dbl.3ossl'

\$ man EC_POINT_dbl.3ossl

EC_POINT_ADD(3ossl) OpenSSL EC_POINT_ADD(3ossl)

NAME

EC_POINT_add, EC_POINT_dbl, EC_POINT_invert, EC_POINT_is_at_infinity,
EC_POINT_is_on_curve, EC_POINT_cmp, EC_POINT_make_affine,
EC_POINTs_make_affine, EC_POINTs_mul, EC_POINT_mul,
EC_GROUP_precompute_mult, EC_GROUP_have_precompute_mult - Functions for
performing mathematical operations and tests on EC_POINT objects

SYNOPSIS

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

```
int EC_POINT_add(const EC_GROUP *group, EC_POINT *r, const EC_POINT *a,  
                  const EC_POINT *b, BN_CTX *ctx);
```

```
int EC_POINT_dbl(const EC_GROUP *group, EC_POINT *r, const EC_POINT *a, BN_CTX *ctx);
```

```
int EC_POINT_invert(const EC_GROUP *group, EC_POINT *a, BN_CTX *ctx);
```

```
int EC_POINT_is_at_infinity(const EC_GROUP *group, const EC_POINT *p);
```

```
int EC_POINT_is_on_curve(const EC_GROUP *group, const EC_POINT *point, BN_CTX *ctx);
```

```
int EC_POINT_cmp(const EC_GROUP *group, const EC_POINT *a, const EC_POINT *b, BN_CTX *ctx);
int EC_POINT_mul(const EC_GROUP *group, EC_POINT *r, const BIGNUM *n,
                 const EC_POINT *q, const BIGNUM *m, BN_CTX *ctx);
```

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 EC_POINT_make_affine(const EC_GROUP *group, EC_POINT *point, BN_CTX *ctx);
int EC_POINTs_make_affine(const EC_GROUP *group, size_t num,
                          EC_POINT *points[], BN_CTX *ctx);
int EC_POINTs_mul(const EC_GROUP *group, EC_POINT *r, const BIGNUM *n, size_t num,
                 const EC_POINT *p[], const BIGNUM *m[], BN_CTX *ctx);
int EC_GROUP_precompute_mult(EC_GROUP *group, BN_CTX *ctx);
int EC_GROUP_have_precompute_mult(const EC_GROUP *group);
```

DESCRIPTION

EC_POINT_add adds the two points a and b and places the result in r.

Similarly EC_POINT_dbl doubles the point a and places the result in r.

In both cases it is valid for r to be one of a or b.

EC_POINT_invert calculates the inverse of the supplied point a. The result is placed back in a.

The function EC_POINT_is_at_infinity tests whether the supplied point is at infinity or not.

EC_POINT_is_on_curve tests whether the supplied point is on the curve or not.

EC_POINT_cmp compares the two supplied points and tests whether or not they are equal.

The functions `EC_POINT_make_affine` and `EC_POINTS_make_affine` force the internal representation of the `EC_POINT(s)` into the affine co-ordinate system. In the case of `EC_POINTS_make_affine` the value `num` provides the number of points in the array `points` to be forced. These functions were deprecated in OpenSSL 3.0 and should no longer be used. Modern versions automatically perform this conversion when needed.

`EC_POINT_mul` calculates the value $\text{generator} * n + q * m$ and stores the result in `r`. The value `n` may be `NULL` in which case the result is just $q * m$ (variable point multiplication). Alternatively, both `q` and `m` may be `NULL`, and `n` non-`NULL`, in which case the result is just $\text{generator} * n$ (fixed point multiplication). When performing a single fixed or variable point multiplication, the underlying implementation uses a constant time algorithm, when the input scalar (either `n` or `m`) is in the range $[0, \text{ec_group_order})$.

Although deprecated in OpenSSL 3.0 and should no longer be used, `EC_POINTS_mul` calculates the value $\text{generator} * n + q[0] * m[0] + \dots + q[\text{num}-1] * m[\text{num}-1]$. As for `EC_POINT_mul` the value `n` may be `NULL` or `num` may be zero. When performing a fixed point multiplication (`n` is non-`NULL` and `num` is 0) or a variable point multiplication (`n` is `NULL` and `num` is 1), the underlying implementation uses a constant time algorithm, when the input scalar (either `n` or `m[0]`) is in the range $[0, \text{ec_group_order})$. Modern versions should instead use `EC_POINT_mul()`, combined (if needed) with `EC_POINT_add()` in such rare circumstances.

The function `EC_GROUP_precompute_mult` stores multiples of the generator for faster point multiplication, whilst `EC_GROUP_have_precompute_mult` tests whether precomputation has already been done. See `EC_GROUP_copy(3)` for information about the generator. Precomputation functionality was deprecated in OpenSSL 3.0. Users of `EC_GROUP_precompute_mult()` and `EC_GROUP_have_precompute_mult()` should switch to named curves which OpenSSL has hardcoded lookup tables for.

RETURN VALUES

The following functions return 1 on success or 0 on error:

`EC_POINT_add`, `EC_POINT_dbl`, `EC_POINT_invert`, `EC_POINT_make_affine`,
`EC_POINTs_make_affine`, `EC_POINTs_make_affine`, `EC_POINT_mul`,
`EC_POINTs_mul` and `EC_GROUP_precompute_mult`.

`EC_POINT_is_at_infinity` returns 1 if the point is at infinity, or 0 otherwise.

`EC_POINT_is_on_curve` returns 1 if the point is on the curve, 0 if not, or -1 on error.

`EC_POINT_cmp` returns 1 if the points are not equal, 0 if they are, or -1 on error.

`EC_GROUP_have_precompute_mult` return 1 if a precomputation has been done, or 0 if not.

SEE ALSO

`crypto(7)`, `EC_GROUP_new(3)`, `EC_GROUP_copy(3)`, `EC_POINT_new(3)`,
`EC_KEY_new(3)`, `EC_GFp_simple_method(3)`, `d2i_ECPKParameters(3)`

HISTORY

`EC_POINT_make_affine()`, `EC_POINTs_make_affine()`, `EC_POINTs_mul()`,
`EC_GROUP_precompute_mult()`, and `EC_GROUP_have_precompute_mult()` were deprecated in OpenSSL 3.0.

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