



*Full credit is given to the above companies including the OS that this PDF file was generated!*

## ***Rocky Enterprise Linux 9.2 Manual Pages on command 'EC\_POINT\_set\_affine\_coordinates.3ossl'***

***\$ man EC\_POINT\_set\_affine\_coordinates.3ossl***

EC\_POINT\_NEW(3ossl)            OpenSSL            EC\_POINT\_NEW(3ossl)

NAME

EC\_POINT\_set\_Jprojective\_coordinates\_GFp, EC\_POINT\_point2buf,  
EC\_POINT\_new, EC\_POINT\_free, EC\_POINT\_clear\_free, EC\_POINT\_copy,  
EC\_POINT\_dup, EC\_POINT\_method\_of, EC\_POINT\_set\_to\_infinity,  
EC\_POINT\_get\_Jprojective\_coordinates\_GFp,  
EC\_POINT\_set\_affine\_coordinates, EC\_POINT\_get\_affine\_coordinates,  
EC\_POINT\_set\_compressed\_coordinates,  
EC\_POINT\_set\_affine\_coordinates\_GFp,  
EC\_POINT\_get\_affine\_coordinates\_GFp,  
EC\_POINT\_set\_compressed\_coordinates\_GFp,  
EC\_POINT\_set\_affine\_coordinates\_GF2m,  
EC\_POINT\_get\_affine\_coordinates\_GF2m,  
EC\_POINT\_set\_compressed\_coordinates\_GF2m, EC\_POINT\_point2oct,  
EC\_POINT\_oct2point, EC\_POINT\_point2bn, EC\_POINT\_bn2point,  
EC\_POINT\_point2hex, EC\_POINT\_hex2point - Functions for creating,  
destroying and manipulating EC\_POINT objects

SYNOPSIS

```

#include <openssl/ec.h>

EC_POINT *EC_POINT_new(const EC_GROUP *group);

void EC_POINT_free(EC_POINT *point);

void EC_POINT_clear_free(EC_POINT *point);

int EC_POINT_copy(EC_POINT *dst, const EC_POINT *src);

EC_POINT *EC_POINT_dup(const EC_POINT *src, const EC_GROUP *group);

int EC_POINT_set_to_infinity(const EC_GROUP *group, EC_POINT *point);

int EC_POINT_set_affine_coordinates(const EC_GROUP *group, EC_POINT *p,
    const BIGNUM *x, const BIGNUM *y,
    BN_CTX *ctx);

int EC_POINT_get_affine_coordinates(const EC_GROUP *group, const EC_POINT *p,
    BIGNUM *x, BIGNUM *y, BN_CTX *ctx);

int EC_POINT_set_compressed_coordinates(const EC_GROUP *group, EC_POINT *p,
    const BIGNUM *x, int y_bit,
    BN_CTX *ctx);

size_t EC_POINT_point2oct(const EC_GROUP *group, const EC_POINT *p,
    point_conversion_form_t form,
    unsigned char *buf, size_t len, BN_CTX *ctx);

size_t EC_POINT_point2buf(const EC_GROUP *group, const EC_POINT *point,
    point_conversion_form_t form,
    unsigned char **pbuf, BN_CTX *ctx);

int EC_POINT_oct2point(const EC_GROUP *group, EC_POINT *p,
    const unsigned char *buf, size_t len, BN_CTX *ctx);

char *EC_POINT_point2hex(const EC_GROUP *group, const EC_POINT *p,
    point_conversion_form_t form, BN_CTX *ctx);

EC_POINT *EC_POINT_hex2point(const EC_GROUP *group, const char *hex,
    EC_POINT *p, 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)`:

```

const EC_METHOD *EC_POINT_method_of(const EC_POINT *point);

int EC_POINT_set_Jprojective_coordinates_GFp(const EC_GROUP *group,
    EC_POINT *p,

```

```

        const BIGNUM *x, const BIGNUM *y,
        const BIGNUM *z, BN_CTX *ctx);

int EC_POINT_get_Jprojective_coordinates_GFp(const EC_GROUP *group,
        const EC_POINT *p,
        BIGNUM *x, BIGNUM *y, BIGNUM *z,
        BN_CTX *ctx);

int EC_POINT_set_affine_coordinates_GFp(const EC_GROUP *group, EC_POINT *p,
        const BIGNUM *x, const BIGNUM *y,
        BN_CTX *ctx);

int EC_POINT_get_affine_coordinates_GFp(const EC_GROUP *group,
        const EC_POINT *p,
        BIGNUM *x, BIGNUM *y, BN_CTX *ctx);

int EC_POINT_set_compressed_coordinates_GFp(const EC_GROUP *group,
        EC_POINT *p,
        const BIGNUM *x, int y_bit,
        BN_CTX *ctx);

int EC_POINT_set_affine_coordinates_GF2m(const EC_GROUP *group, EC_POINT *p,
        const BIGNUM *x, const BIGNUM *y,
        BN_CTX *ctx);

int EC_POINT_get_affine_coordinates_GF2m(const EC_GROUP *group,
        const EC_POINT *p,
        BIGNUM *x, BIGNUM *y, BN_CTX *ctx);

int EC_POINT_set_compressed_coordinates_GF2m(const EC_GROUP *group,
        EC_POINT *p,
        const BIGNUM *x, int y_bit,
        BN_CTX *ctx);

BIGNUM *EC_POINT_point2bn(const EC_GROUP *group, const EC_POINT *p,
        point_conversion_form_t form, BIGNUM *bn,
        BN_CTX *ctx);

EC_POINT *EC_POINT_bn2point(const EC_GROUP *group, const BIGNUM *bn,
        EC_POINT *p, BN_CTX *ctx);

```

## DESCRIPTION

An EC\_POINT structure represents a point on a curve. A new point is

constructed by calling the function `EC_POINT_new()` and providing the group object that the point relates to.

`EC_POINT_free()` frees the memory associated with the `EC_POINT`. If point is `NULL` nothing is done.

`EC_POINT_clear_free()` destroys any sensitive data held within the `EC_POINT` and then frees its memory. If point is `NULL` nothing is done.

`EC_POINT_copy()` copies the point `src` into `dst`. Both `src` and `dst` must use the same `EC_METHOD`.

`EC_POINT_dup()` creates a new `EC_POINT` object and copies the content from `src` to the newly created `EC_POINT` object.

`EC_POINT_method_of()` obtains the `EC_METHOD` associated with point. This function was deprecated in OpenSSL 3.0, since `EC_METHOD` is no longer a public concept.

A valid point on a curve is the special point at infinity. A point is set to be at infinity by calling `EC_POINT_set_to_infinity()`.

The affine co-ordinates for a point describe a point in terms of its x and y position. The function `EC_POINT_set_affine_coordinates()` sets the x and y co-ordinates for the point `p` defined over the curve given in group. The function `EC_POINT_get_affine_coordinates()` sets x and y, either of which may be `NULL`, to the corresponding coordinates of `p`.

The functions `EC_POINT_set_affine_coordinates_GFp()` and `EC_POINT_set_affine_coordinates_GF2m()` are synonyms for `EC_POINT_set_affine_coordinates()`. They are defined for backwards compatibility only and should not be used.

The functions `EC_POINT_get_affine_coordinates_GFp()` and `EC_POINT_get_affine_coordinates_GF2m()` are synonyms for `EC_POINT_get_affine_coordinates()`. They are defined for backwards compatibility only and should not be used.

As well as the affine co-ordinates, a point can alternatively be described in terms of its Jacobian projective co-ordinates (for `Fp` curves only). Jacobian projective co-ordinates are expressed as three values x, y and z. Working in this co-ordinate system provides more efficient point multiplication operations. A mapping exists between

Jacobian projective co-ordinates and affine co-ordinates. A Jacobian projective co-ordinate  $(x, y, z)$  can be written as an affine co-ordinate as  $(x/(z^2), y/(z^3))$ . Conversion to Jacobian projective from affine co-ordinates is simple. The co-ordinate  $(x, y)$  is mapped to  $(x, y, 1)$ . Although deprecated in OpenSSL 3.0 and should no longer be used, to set or get the projective co-ordinates in older versions use `EC_POINT_set_Jprojective_coordinates_GFp()` and `EC_POINT_get_Jprojective_coordinates_GFp()` respectively. Modern versions should instead use `EC_POINT_set_affine_coordinates()` and `EC_POINT_get_affine_coordinates()`, performing the conversion manually using the above maps in such rare circumstances.

Points can also be described in terms of their compressed co-ordinates. For a point  $(x, y)$ , for any given value for  $x$  such that the point is on the curve there will only ever be two possible values for  $y$ . Therefore, a point can be set using the `EC_POINT_set_compressed_coordinates()` function where  $x$  is the  $x$  co-ordinate and  $y\_bit$  is a value 0 or 1 to identify which of the two possible values for  $y$  should be used.

The functions `EC_POINT_set_compressed_coordinates_GFp()` and `EC_POINT_set_compressed_coordinates_GF2m()` are synonyms for `EC_POINT_set_compressed_coordinates()`. They are defined for backwards compatibility only and should not be used.

In addition `EC_POINT` can be converted to and from various external representations. The octet form is the binary encoding of the `ECPoint` structure (as defined in RFC5480 and used in certificates and TLS records): only the content octets are present, the `OCTET STRING` tag and length are not included. `BIGNUM` form is the octet form interpreted as a big endian integer converted to a `BIGNUM` structure. Hexadecimal form is the octet form converted to a NULL terminated character string where each character is one of the printable values 0-9 or A-F (or a-f).

The functions `EC_POINT_point2oct()`, `EC_POINT_oct2point()`, `EC_POINT_point2bn()`, `EC_POINT_bn2point()`, `EC_POINT_point2hex()` and `EC_POINT_hex2point()` convert from and to `EC_POINTS` for the formats: octet, `BIGNUM` and hexadecimal respectively.

The function `EC_POINT_point2oct()` encodes the given curve point `p` as an octet string into the buffer `buf` of size `len`, using the specified conversion form `form`. The encoding conforms with Sec. 2.3.3 of the SECG SEC 1 ("Elliptic Curve Cryptography") standard. Similarly the function `EC_POINT_oct2point()` decodes a curve point into `p` from the octet string contained in the given buffer `buf` of size `len`, conforming to Sec. 2.3.4 of the SECG SEC 1 ("Elliptic Curve Cryptography") standard.

The functions `EC_POINT_point2hex()` and `EC_POINT_point2bn()` convert a point `p`, respectively, to the hexadecimal or BIGNUM representation of the same encoding of the function `EC_POINT_point2oct()`. Vice versa, similarly to the function `EC_POINT_oct2point()`, the functions `EC_POINT_hex2point()` and `EC_POINT_bn2point()` decode the hexadecimal or BIGNUM representation into the `EC_POINT` `p`.

Notice that, according to the standard, the octet string encoding of the point at infinity for a given curve is fixed to a single octet of value zero and that, vice versa, a single octet of size zero is decoded as the point at infinity.

The function `EC_POINT_point2oct()` must be supplied with a buffer long enough to store the octet form. The return value provides the number of octets stored. Calling the function with a NULL buffer will not perform the conversion but will still return the required buffer length.

The function `EC_POINT_point2buf()` allocates a buffer of suitable length and writes an `EC_POINT` to it in octet format. The allocated buffer is written to `*pbuf` and its length is returned. The caller must free up the allocated buffer with a call to `OPENSSL_free()`. Since the allocated buffer value is written to `*pbuf` the `pbuf` parameter MUST NOT be NULL. The function `EC_POINT_point2hex()` will allocate sufficient memory to store the hexadecimal string. It is the caller's responsibility to free this memory with a subsequent call to `OPENSSL_free()`.

## RETURN VALUES

`EC_POINT_new()` and `EC_POINT_dup()` return the newly allocated `EC_POINT`

or NULL on error.

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

EC\_POINT\_copy(), EC\_POINT\_set\_to\_infinity(),  
EC\_POINT\_set\_Jprojective\_coordinates\_GFp(),  
EC\_POINT\_get\_Jprojective\_coordinates\_GFp(),  
EC\_POINT\_set\_affine\_coordinates\_GFp(),  
EC\_POINT\_get\_affine\_coordinates\_GFp(),  
EC\_POINT\_set\_compressed\_coordinates\_GFp(),  
EC\_POINT\_set\_affine\_coordinates\_GF2m(),  
EC\_POINT\_get\_affine\_coordinates\_GF2m(),  
EC\_POINT\_set\_compressed\_coordinates\_GF2m() and EC\_POINT\_oct2point().  
EC\_POINT\_method\_of returns the EC\_METHOD associated with the supplied  
EC\_POINT.

EC\_POINT\_point2oct() and EC\_POINT\_point2buf() return the length of the  
required buffer or 0 on error.

EC\_POINT\_point2bn() returns the pointer to the BIGNUM supplied, or NULL  
on error.

EC\_POINT\_bn2point() returns the pointer to the EC\_POINT supplied, or  
NULL on error.

EC\_POINT\_point2hex() returns a pointer to the hex string, or NULL on  
error.

EC\_POINT\_hex2point() returns the pointer to the EC\_POINT supplied, or  
NULL on error.

#### SEE ALSO

crypto(7), EC\_GROUP\_new(3), EC\_GROUP\_copy(3), EC\_POINT\_add(3),  
EC\_KEY\_new(3), EC\_GFp\_simple\_method(3), d2i\_ECPKParameters(3)

#### HISTORY

EC\_POINT\_method\_of(), EC\_POINT\_set\_Jprojective\_coordinates\_GFp(),  
EC\_POINT\_get\_Jprojective\_coordinates\_GFp(),  
EC\_POINT\_set\_affine\_coordinates\_GFp(),  
EC\_POINT\_get\_affine\_coordinates\_GFp(),  
EC\_POINT\_set\_compressed\_coordinates\_GFp(),  
EC\_POINT\_set\_affine\_coordinates\_GF2m(),

EC\_POINT\_get\_affine\_coordinates\_GF2m(),  
EC\_POINT\_set\_compressed\_coordinates\_GF2m(), EC\_POINT\_point2bn(), and  
EC\_POINT\_bn2point() were deprecated in OpenSSL 3.0.  
EC\_POINT\_set\_affine\_coordinates, EC\_POINT\_get\_affine\_coordinates, and  
EC\_POINT\_set\_compressed\_coordinates were added in OpenSSL 1.1.1.

#### COPYRIGHT

Copyright 2013-2021 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>>.

3.0.7                    2023-07-13                    EC\_POINT\_NEW(3ossl)