



*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 'EVP\_EC\_gen.3ossl'***

***\$ man EVP\_EC\_gen.3ossl***

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

NAME

EVP\_EC\_gen, EC\_KEY\_get\_method, EC\_KEY\_set\_method, EC\_KEY\_new\_ex,  
EC\_KEY\_new, EC\_KEY\_get\_flags, EC\_KEY\_set\_flags, EC\_KEY\_clear\_flags,  
EC\_KEY\_new\_by\_curve\_name\_ex, EC\_KEY\_new\_by\_curve\_name, EC\_KEY\_free,  
EC\_KEY\_copy, EC\_KEY\_dup, EC\_KEY\_up\_ref, EC\_KEY\_get0\_engine,  
EC\_KEY\_get0\_group, EC\_KEY\_set\_group, EC\_KEY\_get0\_private\_key,  
EC\_KEY\_set\_private\_key, EC\_KEY\_get0\_public\_key, EC\_KEY\_set\_public\_key,  
EC\_KEY\_get\_conv\_form, EC\_KEY\_set\_conv\_form, EC\_KEY\_set\_asn1\_flag,  
EC\_KEY\_decoded\_from\_explicit\_params, EC\_KEY\_precompute\_mult,  
EC\_KEY\_generate\_key, EC\_KEY\_check\_key,  
EC\_KEY\_set\_public\_key\_affine\_coordinates, EC\_KEY\_oct2key,  
EC\_KEY\_key2buf, EC\_KEY\_oct2priv, EC\_KEY\_priv2oct, EC\_KEY\_priv2buf -  
Functions for creating, destroying and manipulating EC\_KEY objects

SYNOPSIS

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

```
EVP_PKEY *EVP_EC_gen(const char *curve);
```

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):

```
EC_KEY *EC_KEY_new_ex(OSSL_LIB_CTX *ctx, const char *propq);
EC_KEY *EC_KEY_new(void);
int EC_KEY_get_flags(const EC_KEY *key);
void EC_KEY_set_flags(EC_KEY *key, int flags);
void EC_KEY_clear_flags(EC_KEY *key, int flags);
EC_KEY *EC_KEY_new_by_curve_name_ex(OSSL_LIB_CTX *ctx, const char *propq,
                                     int nid);
EC_KEY *EC_KEY_new_by_curve_name(int nid);
void EC_KEY_free(EC_KEY *key);
EC_KEY *EC_KEY_copy(EC_KEY *dst, const EC_KEY *src);
EC_KEY *EC_KEY_dup(const EC_KEY *src);
int EC_KEY_up_ref(EC_KEY *key);
ENGINE *EC_KEY_get0_engine(const EC_KEY *eckey);
const EC_GROUP *EC_KEY_get0_group(const EC_KEY *key);
int EC_KEY_set_group(EC_KEY *key, const EC_GROUP *group);
const BIGNUM *EC_KEY_get0_private_key(const EC_KEY *key);
int EC_KEY_set_private_key(EC_KEY *key, const BIGNUM *priv_key);
const EC_POINT *EC_KEY_get0_public_key(const EC_KEY *key);
int EC_KEY_set_public_key(EC_KEY *key, const EC_POINT *pub);
point_conversion_form_t EC_KEY_get_conv_form(const EC_KEY *key);
void EC_KEY_set_conv_form(EC_KEY *eckey, point_conversion_form_t cform);
void EC_KEY_set_asn1_flag(EC_KEY *eckey, int asn1_flag);
int EC_KEY_decoded_from_explicit_params(const EC_KEY *key);
int EC_KEY_generate_key(EC_KEY *key);
int EC_KEY_check_key(const EC_KEY *key);
int EC_KEY_set_public_key_affine_coordinates(EC_KEY *key, BIGNUM *x, BIGNUM *y);
const EC_KEY_METHOD *EC_KEY_get_method(const EC_KEY *key);
int EC_KEY_set_method(EC_KEY *key, const EC_KEY_METHOD *meth);
int EC_KEY_oct2key(EC_KEY *eckey, const unsigned char *buf, size_t len, BN_CTX *ctx);
size_t EC_KEY_key2buf(const EC_KEY *eckey, point_conversion_form_t form,
                     unsigned char **pbuf, BN_CTX *ctx);
```

```
int EC_KEY_oct2priv(EC_KEY *eckey, const unsigned char *buf, size_t len);
size_t EC_KEY_priv2oct(const EC_KEY *eckey, unsigned char *buf, size_t len);
size_t EC_KEY_priv2buf(const EC_KEY *eckey, unsigned char **pbuf);
int EC_KEY_precompute_mult(EC_KEY *key, BN_CTX *ctx);
```

## DESCRIPTION

EVP\_EC\_gen() generates a new EC key pair on the given curve.

All of the functions described below are deprecated. Applications should instead use EVP\_EC\_gen(), EVP\_PKEY\_Q\_keygen(3), or EVP\_PKEY\_keygen\_init(3) and EVP\_PKEY\_keygen(3).

An EC\_KEY represents a public key and, optionally, the associated private key. A new EC\_KEY with no associated curve can be constructed by calling EC\_KEY\_new\_ex() and specifying the associated library context in ctx (see OSSL\_LIB\_CTX(3)) and property query string propq.

The ctx parameter may be NULL in which case the default library context is used. The reference count for the newly created EC\_KEY is initially set to 1. A curve can be associated with the EC\_KEY by calling EC\_KEY\_set\_group().

EC\_KEY\_new() is the same as EC\_KEY\_new\_ex() except that the default library context is always used.

Alternatively a new EC\_KEY can be constructed by calling EC\_KEY\_new\_by\_curve\_name\_ex() and supplying the nid of the associated curve, the library context to be used ctx (see OSSL\_LIB\_CTX(3)) and any property query string propq. The ctx parameter may be NULL in which case the default library context is used. The propq value may also be NULL. See EC\_GROUP\_new(3) for a description of curve names. This function simply wraps calls to EC\_KEY\_new\_ex() and EC\_GROUP\_new\_by\_curve\_name\_ex().

EC\_KEY\_new\_by\_curve\_name() is the same as EC\_KEY\_new\_by\_curve\_name\_ex() except that the default library context is always used and a NULL property query string.

Calling EC\_KEY\_free() decrements the reference count for the EC\_KEY object, and if it has dropped to zero then frees the memory associated with it. If key is NULL nothing is done.

EC\_KEY\_copy() copies the contents of the EC\_KEY in src into dest.

EC\_KEY\_dup() creates a new EC\_KEY object and copies ec\_key into it.

EC\_KEY\_up\_ref() increments the reference count associated with the EC\_KEY object.

EC\_KEY\_get0\_engine() returns a handle to the ENGINE that has been set for this EC\_KEY object.

EC\_KEY\_generate\_key() generates a new public and private key for the supplied eckey object. eckey must have an EC\_GROUP object associated with it before calling this function. The private key is a random integer ( $0 < \text{priv\_key} < \text{order}$ , where order is the order of the EC\_GROUP object). The public key is an EC\_POINT on the curve calculated by multiplying the generator for the curve by the private key.

EC\_KEY\_check\_key() performs various sanity checks on the EC\_KEY object to confirm that it is valid.

EC\_KEY\_set\_public\_key\_affine\_coordinates() sets the public key for key based on its affine co-ordinates; i.e., it constructs an EC\_POINT object based on the supplied x and y values and sets the public key to be this EC\_POINT. It also performs certain sanity checks on the key to confirm that it is valid.

The functions EC\_KEY\_get0\_group(), EC\_KEY\_set\_group(), EC\_KEY\_get0\_private\_key(), EC\_KEY\_set\_private\_key(), EC\_KEY\_get0\_public\_key(), and EC\_KEY\_set\_public\_key() get and set the EC\_GROUP object, the private key, and the EC\_POINT public key for the key respectively. The function EC\_KEY\_set\_private\_key() accepts NULL as the priv\_key argument to securely clear the private key component from the EC\_KEY.

The functions EC\_KEY\_get\_conv\_form() and EC\_KEY\_set\_conv\_form() get and set the point\_conversion\_form for the key. For a description of point\_conversion\_forms please see EC\_POINT\_new(3).

EC\_KEY\_set\_flags() sets the flags in the flags parameter on the EC\_KEY object. Any flags that are already set are left set. The flags currently defined are EC\_FLAG\_NON\_FIPS\_ALLOW and EC\_FLAG\_FIPS\_CHECKED.

In addition there is the flag EC\_FLAG\_COFACTOR\_ECDH which is specific

to ECDH. `EC_KEY_get_flags()` returns the current flags that are set for this `EC_KEY`. `EC_KEY_clear_flags()` clears the flags indicated by the flags parameter; all other flags are left in their existing state.

`EC_KEY_set_asn1_flag()` sets the `asn1_flag` on the underlying `EC_GROUP` object (if set). Refer to `EC_GROUP_copy(3)` for further information on the `asn1_flag`.

`EC_KEY_decoded_from_explicit_params()` returns 1 if the group of the key was decoded from data with explicitly encoded group parameters, -1 if the key is NULL or the group parameters are missing, and 0 otherwise.

`EC_KEY_precompute_mult()` stores multiples of the underlying `EC_GROUP` generator for faster point multiplication. See also `EC_POINT_add(3)`.

Modern versions should instead switch to named curves which OpenSSL has hardcoded lookup tables for.

`EC_KEY_oct2key()` and `EC_KEY_key2buf()` are identical to the functions `EC_POINT_oct2point()` and `EC_POINT_point2buf()` except they use the public key `EC_POINT` in `eckey`.

`EC_KEY_oct2priv()` and `EC_KEY_priv2oct()` convert between the private key component of `eckey` and octet form. The octet form consists of the content octets of the privateKey OCTET STRING in an `ECPrivateKey` ASN.1 structure.

The function `EC_KEY_priv2oct()` 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 just return the required buffer length.

The function `EC_KEY_priv2buf()` allocates a buffer of suitable length and writes an `EC_KEY` 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.

`EC_KEY_priv2buf()` converts an `EC_KEY` private key into an allocated buffer.

## RETURN VALUES

`EC_KEY_new_ex()`, `EC_KEY_new()`, `EC_KEY_new_by_curve_name_ex()`,

EC\_KEY\_new\_by\_curve\_name() and EC\_KEY\_dup() return a pointer to the newly created EC\_KEY object, or NULL on error.

EC\_KEY\_get\_flags() returns the flags associated with the EC\_KEY object as an integer.

EC\_KEY\_copy() returns a pointer to the destination key, or NULL on error.

EC\_KEY\_get0\_engine() returns a pointer to an ENGINE, or NULL if it wasn't set.

EC\_KEY\_up\_ref(), EC\_KEY\_set\_group(), EC\_KEY\_set\_public\_key(), EC\_KEY\_precompute\_mult(), EC\_KEY\_generate\_key(), EC\_KEY\_check\_key(), EC\_KEY\_set\_public\_key\_affine\_coordinates(), EC\_KEY\_oct2key() and EC\_KEY\_oct2priv() return 1 on success or 0 on error.

EC\_KEY\_set\_private\_key() returns 1 on success or 0 on error except when the priv\_key argument is NULL, in that case it returns 0, for legacy compatibility, and should not be treated as an error.

EC\_KEY\_get0\_group() returns the EC\_GROUP associated with the EC\_KEY.

EC\_KEY\_get0\_private\_key() returns the private key associated with the EC\_KEY.

EC\_KEY\_get\_conv\_form() return the point\_conversion\_form for the EC\_KEY.

EC\_KEY\_key2buf(), EC\_KEY\_priv2oct() and EC\_KEY\_priv2buf() return the length of the buffer or 0 on error.

#### SEE ALSO

EVP\_PKEY\_Q\_keygen(3) crypto(7), EC\_GROUP\_new(3), EC\_GROUP\_copy(3), EC\_POINT\_new(3), EC\_POINT\_add(3), EC\_GFp\_simple\_method(3), d2i\_ECPKParameters(3), OSSL\_LIB\_CTX(3)

#### HISTORY

EVP\_EC\_gen() was added in OpenSSL 3.0. All other functions described here were deprecated in OpenSSL 3.0. For replacement see EVP\_PKEY-EC(7).

#### COPYRIGHT

Copyright 2013-2022 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>>.

3.0.7

2023-07-13

EC\_KEY\_NEW(3ossl)