

**NAME**

EC\_KEY\_new, EC\_KEY\_get\_flags, EC\_KEY\_set\_flags, EC\_KEY\_clear\_flags,  
 EC\_KEY\_new\_by\_curve\_name, EC\_KEY\_free, EC\_KEY\_copy, EC\_KEY\_dup, EC\_KEY\_up\_ref,  
 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\_enc\_flags, EC\_KEY\_set\_enc\_flags, EC\_KEY\_get\_conv\_form,  
 EC\_KEY\_set\_conv\_form, EC\_KEY\_get\_key\_method\_data, EC\_KEY\_insert\_key\_method\_data,  
 EC\_KEY\_set\_asn1\_flag, EC\_KEY\_precompute\_mult, EC\_KEY\_generate\_key,  
 EC\_KEY\_check\_key, EC\_KEY\_set\_public\_key\_affine\_coordinates - Functions for creating,  
 destroying and manipulating EC\_KEY objects.

**SYNOPSIS**

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

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(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);
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 *prv);
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_get_key_method_data(EC_KEY *key,
void *(*dup_func)(void *), void (*free_func)(void *), void (*clear_free_func)(void *));
void EC_KEY_insert_key_method_data(EC_KEY *key, void *data,
void *(*dup_func)(void *), void (*free_func)(void *), void (*clear_free_func)(void *));
void EC_KEY_set_asn1_flag(EC_KEY *eckey, int asn1_flag);
int EC_KEY_precompute_mult(EC_KEY *key, BN_CTX *ctx);
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);
```

**DESCRIPTION**

An EC\_KEY represents a public key and (optionally) an associated private key. A new EC\_KEY (with no associated curve) can be constructed by calling EC\_KEY\_new. 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.

Alternatively a new EC\_KEY can be constructed by calling EC\_KEY\_new\_by\_curve\_name and supplying the nid of the associated curve. Refer to [EC\\_GROUP\\_new\(3\)](#) for a description of curve names. This function simply wraps calls to EC\_KEY\_new and EC\_GROUP\_new\_by\_curve\_name.

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.

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\_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 coordinates, 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 will also perform 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 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 refer to [EC\\_POINT\\_new\(3\)](#).

EC\_KEY\_insert\_key\_method\_data and EC\_KEY\_get\_key\_method\_data enable the caller to associate arbitrary additional data specific to the elliptic curve scheme being used with the EC\_KEY object. This data is treated as a “black box” by the ec library. The data to be stored by EC\_KEY\_insert\_key\_method\_data is provided in the **data** parameter, which must have associated functions for duplicating, freeing and “clear\_freeing” the data item. If a subsequent EC\_KEY\_get\_key\_method\_data call is issued, the functions for duplicating, freeing and “clear\_freeing” the data item must be provided again, and they must be the same as they were when the data item was inserted.

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 currently defined standard flags 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 and is defined in ecdh.h. 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\_precompute\_mult stores multiples of the underlying EC\_GROUP generator for faster point multiplication. See also [EC\\_POINT\\_add\(3\)](#).

## RETURN VALUES

EC\_KEY\_new, 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\_up\_ref, EC\_KEY\_set\_group, EC\_KEY\_set\_private\_key, EC\_KEY\_set\_public\_key, EC\_KEY\_precompute\_mult, EC\_KEY\_generate\_key, EC\_KEY\_check\_key and EC\_KEY\_set\_public\_key\_affine\_coordinates return 1 on success or 0 on 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.

**SEE ALSO**

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