

**NAME**

OSSL\_PARAM\_BLD, OSSL\_PARAM\_BLD\_new, OSSL\_PARAM\_BLD\_to\_param,  
 OSSL\_PARAM\_BLD\_free, OSSL\_PARAM\_BLD\_push\_int, OSSL\_PARAM\_BLD\_push\_uint,  
 OSSL\_PARAM\_BLD\_push\_long, OSSL\_PARAM\_BLD\_push\_ulong,  
 OSSL\_PARAM\_BLD\_push\_int32, OSSL\_PARAM\_BLD\_push\_uint32,  
 OSSL\_PARAM\_BLD\_push\_int64, OSSL\_PARAM\_BLD\_push\_uint64,  
 OSSL\_PARAM\_BLD\_push\_size\_t, OSSL\_PARAM\_BLD\_push\_time\_t,  
 OSSL\_PARAM\_BLD\_push\_double, OSSL\_PARAM\_BLD\_push\_BN,  
 OSSL\_PARAM\_BLD\_push\_BN\_pad, OSSL\_PARAM\_BLD\_push\_utf8\_string,  
 OSSL\_PARAM\_BLD\_push\_utf8\_ptr, OSSL\_PARAM\_BLD\_push\_octet\_string,  
 OSSL\_PARAM\_BLD\_push\_octet\_ptr - functions to assist in the creation of OSSL\_PARAM arrays

**SYNOPSIS**

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

typedef struct OSSL_PARAM_BLD;

OSSL_PARAM_BLD *OSSL_PARAM_BLD_new(void);
OSSL_PARAM *OSSL_PARAM_BLD_to_param(OSSL_PARAM_BLD *bld);
void OSSL_PARAM_BLD_free(OSSL_PARAM_BLD *bld);

int OSSL_PARAM_BLD_push_TYPE(OSSL_PARAM_BLD *bld, const char *key, TYPE val);

int OSSL_PARAM_BLD_push_BN(OSSL_PARAM_BLD *bld, const char *key,
                           const BIGNUM *bn);
int OSSL_PARAM_BLD_push_BN_pad(OSSL_PARAM_BLD *bld, const char *key,
                               const BIGNUM *bn, size_t sz);

int OSSL_PARAM_BLD_push_utf8_string(OSSL_PARAM_BLD *bld, const char *key,
                                    const char *buf, size_t bsize);
int OSSL_PARAM_BLD_push_utf8_ptr(OSSL_PARAM_BLD *bld, const char *key,
                                  char *buf, size_t bsize);
int OSSL_PARAM_BLD_push_octet_string(OSSL_PARAM_BLD *bld, const char *key,
                                     const void *buf, size_t bsize);
int OSSL_PARAM_BLD_push_octet_ptr(OSSL_PARAM_BLD *bld, const char *key,
                                   void *buf, size_t bsize);
```

**DESCRIPTION**

A collection of utility functions that simplify the creation of OSSL\_PARAM arrays. The *TYPE* names are as per **OSSL\_PARAM\_int(3)**.

**OSSL\_PARAM\_BLD\_new()** allocates and initialises a new **OSSL\_PARAM\_BLD** structure so that values can be added. Any existing values are cleared.

**OSSL\_PARAM\_BLD\_free()** deallocates the memory allocated by **OSSL\_PARAM\_BLD\_new()**.

**OSSL\_PARAM\_BLD\_to\_param()** converts a built up **OSSL\_PARAM\_BLD** structure *bld* into an allocated **OSSL\_PARAM** array. The **OSSL\_PARAM** array and all associated storage must be freed by calling **OSSL\_PARAM\_free()** with the functions return value. **OSSL\_PARAM\_BLD\_free()** can safely be called any time after this function is.

**OSSL\_PARAM\_BLD\_push\_TYPE()** are a series of functions which will create **OSSL\_PARAM** objects of the specified size and correct type for the *val* argument. *val* is stored by value and an expression or auto variable can be used.

**OSSL\_PARAM\_BLD\_push\_BN()** is a function that will create an **OSSL\_PARAM** object that holds the specified **BIGNUM** *bn*. If *bn* is marked as being securely allocated, its **OSSL\_PARAM** representation will also be securely allocated. The *bn* argument is stored by reference and the underlying **BIGNUM** object must exist until after **OSSL\_PARAM\_BLD\_to\_param()** has been called.

**OSSL\_PARAM\_BLD\_push\_BN\_pad()** is a function that will create an **OSSL\_PARAM** object that holds the specified **BIGNUM** *bn*. The object will be padded to occupy exactly *sz* bytes, if insufficient space is specified an error results. If *bn* is marked as being securely allocated, its **OSSL\_PARAM** representation will also be securely allocated. The *bn* argument is stored by reference and the underlying **BIGNUM** object must exist until after **OSSL\_PARAM\_BLD\_to\_param()** has been called.

**OSSL\_PARAM\_BLD\_push\_utf8\_string()** is a function that will create an **OSSL\_PARAM** object that references the UTF8 string specified by *buf*. The length of the string *bsize* should not include the terminating NUL byte. If it is zero then it will be calculated. The string that *buf* points to is stored by reference and must remain in scope until after **OSSL\_PARAM\_BLD\_to\_param()** has been called.

**OSSL\_PARAM\_BLD\_push\_octet\_string()** is a function that will create an **OSSL\_PARAM** object that references the octet string specified by *buf* and *<bsize>*. The memory that *buf* points to is stored by reference and must remain in scope until after **OSSL\_PARAM\_BLD\_to\_param()** has been called.

**OSSL\_PARAM\_BLD\_push\_utf8\_ptr()** is a function that will create an **OSSL\_PARAM** object that references the UTF8 string specified by *buf*. The length of the string *bsize* should not include the terminating NUL byte. If it is zero then it will be calculated. The string *buf* points to is stored by reference and must remain in scope until the **OSSL\_PARAM** array is freed.

**OSSL\_PARAM\_BLD\_push\_octet\_ptr()** is a function that will create an **OSSL\_PARAM** object that

references the octet string specified by *buf*. The memory *buf* points to is stored by reference and must remain in scope until the OSSL\_PARAM array is freed.

## RETURN VALUES

**OSSL\_PARAM\_BLD\_new()** returns the allocated OSSL\_PARAM\_BLD structure, or NULL on error.

**OSSL\_PARAM\_BLD\_to\_param()** returns the allocated OSSL\_PARAM array, or NULL on error.

All of the OSSL\_PARAM\_BLD\_push\_TYPE functions return 1 on success and 0 on error.

## NOTES

**OSSL\_PARAM\_BLD\_push\_BN()** and **OSSL\_PARAM\_BLD\_push\_BN\_pad()** currently only support nonnegative **BIGNUM**s. They return an error on negative **BIGNUM**s.

## EXAMPLES

Both examples creating an OSSL\_PARAM array that contains an RSA key. For both, the predefined key variables are:

```
BIGNUM *n;      /* modulus */
unsigned int e; /* public exponent */
BIGNUM *d;      /* private exponent */
BIGNUM *p, *q;  /* first two prime factors */
BIGNUM *dmp1, *dmq1; /* first two CRT exponents */
BIGNUM *iqmp;   /* first CRT coefficient */
```

### Example 1

This example shows how to create an OSSL\_PARAM array that contains an RSA private key.

```
OSSL_PARAM_BLD *bld = OSSL_PARAM_BLD_new();
OSSL_PARAM *params = NULL;

if (bld == NULL)
    || !OSSL_PARAM_BLD_push_BN(bld, "n", n)
    || !OSSL_PARAM_BLD_push_uint(bld, "e", e)
    || !OSSL_PARAM_BLD_push_BN(bld, "d", d)
    || !OSSL_PARAM_BLD_push_BN(bld, "rsa-factor1", p)
    || !OSSL_PARAM_BLD_push_BN(bld, "rsa-factor2", q)
    || !OSSL_PARAM_BLD_push_BN(bld, "rsa-exponent1", dmp1)
    || !OSSL_PARAM_BLD_push_BN(bld, "rsa-exponent2", dmq1)
    || !OSSL_PARAM_BLD_push_BN(bld, "rsa-coefficient1", iqmp)
```

```

    || (params = OSSL_PARAM_BLD_to_param(bld)) == NULL)
    goto err;
OSSL_PARAM_BLD_free(bld);
/* Use params */
...
OSSL_PARAM_free(params);

```

**Example 2**

This example shows how to create an OSSL\_PARAM array that contains an RSA public key.

```

OSSL_PARAM_BLD *bld = OSSL_PARAM_BLD_new();
OSSL_PARAM *params = NULL;

if (nld == NULL
    || !OSSL_PARAM_BLD_push_BN(bld, "n", n)
    || !OSSL_PARAM_BLD_push_uint(bld, "e", e)
    || (params = OSSL_PARAM_BLD_to_param(bld)) == NULL)
    goto err;
OSSL_PARAM_BLD_free(bld);
/* Use params */
...
OSSL_PARAM_free(params);

```

**SEE ALSO**

**OSSL\_PARAM\_int(3)**, **OSSL\_PARAM(3)**, **OSSL\_PARAM\_free(3)**

**HISTORY**

The functions described here were all added in OpenSSL 3.0.

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