

**NAME**

BN\_set\_bit, BN\_clear\_bit, BN\_is\_bit\_set, BN\_mask\_bits, BN\_lshift, BN\_lshift1, BN\_rshift, BN\_rshift1 - bit operations on BIGNUMs

**SYNOPSIS**

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

```
int BN_set_bit(BIGNUM *a, int n);  
int BN_clear_bit(BIGNUM *a, int n);
```

```
int BN_is_bit_set(const BIGNUM *a, int n);
```

```
int BN_mask_bits(BIGNUM *a, int n);
```

```
int BN_lshift(BIGNUM *r, const BIGNUM *a, int n);  
int BN_lshift1(BIGNUM *r, BIGNUM *a);
```

```
int BN_rshift(BIGNUM *r, BIGNUM *a, int n);  
int BN_rshift1(BIGNUM *r, BIGNUM *a);
```

**DESCRIPTION**

**BN\_set\_bit()** sets bit **n** in **a** to 1 (" $a|=1<<n$ "). The number is expanded if necessary.

**BN\_clear\_bit()** sets bit **n** in **a** to 0 (" $a&=~(1<<n)$ "). An error occurs if **a** is shorter than **n** bits.

**BN\_is\_bit\_set()** tests if bit **n** in **a** is set.

**BN\_mask\_bits()** truncates **a** to an **n** bit number (" $a&=~((~0)<<n)$ "). An error occurs if **a** already is shorter than **n** bits.

**BN\_lshift()** shifts **a** left by **n** bits and places the result in **r** (" $r=a*2^n$ "). Note that **n** must be nonnegative. **BN\_lshift1()** shifts **a** left by one and places the result in **r** (" $r=2*a$ ").

**BN\_rshift()** shifts **a** right by **n** bits and places the result in **r** (" $r=a/2^n$ "). Note that **n** must be nonnegative. **BN\_rshift1()** shifts **a** right by one and places the result in **r** (" $r=a/2$ ").

For the shift functions, **r** and **a** may be the same variable.

**RETURN VALUES**

**BN\_is\_bit\_set()** returns 1 if the bit is set, 0 otherwise.

All other functions return 1 for success, 0 on error. The error codes can be obtained by **ERR\_get\_error(3)**.

**SEE ALSO**

**BN\_num\_bytes(3)**, **BN\_add(3)**

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