

NAME

BN_mod_mul_reciprocal, BN_div_rec, BN_RECP_CTX_new, BN_RECP_CTX_free,
BN_RECP_CTX_set – modular multiplication using reciprocal

SYNOPSIS

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

```
BN_RECP_CTX *BN_RECP_CTX_new(void);
void BN_RECP_CTX_free(BN_RECP_CTX *recp);
```

```
int BN_RECP_CTX_set(BN_RECP_CTX *recp, const BIGNUM *m, BN_CTX *ctx);
```

```
int BN_div_rec(BIGNUM *dv, BIGNUM *rem, const BIGNUM *a, BN_RECP_CTX *recp,
               BN_CTX *ctx);
```

```
int BN_mod_mul_reciprocal(BIGNUM *r, const BIGNUM *a, const BIGNUM *b,
                          BN_RECP_CTX *recp, BN_CTX *ctx);
```

DESCRIPTION

BN_mod_mul_reciprocal() can be used to perform an efficient **BN_mod_mul(3)** operation when the operation will be performed repeatedly with the same modulus. It computes $r = (a * b) \% m$ using **recp** = 1/**m**, which is set as described below. **ctx** is a previously allocated **BN_CTX** used for temporary variables.

BN_RECP_CTX_new() allocates and initializes a **BN_RECP** structure.

BN_RECP_CTX_free() frees the components of the **BN_RECP**, and, if it was created by **BN_RECP_CTX_new()**, also the structure itself. If **recp** is NULL, nothing is done.

BN_RECP_CTX_set() stores **m** in **recp** and sets it up for computing 1/**m** and shifting it left by **BN_num_bits(m)+1** to make it an integer. The result and the number of bits it was shifted left will later be stored in **recp**.

BN_div_rec() divides **a** by **m** using **recp**. It places the quotient in **dv** and the remainder in **rem**.

The **BN_RECP_CTX** structure cannot be shared between threads.

RETURN VALUES

BN_RECP_CTX_new() returns the newly allocated **BN_RECP_CTX**, and NULL on error.

BN_RECP_CTX_free() has no return value.

For the other functions, 1 is returned for success, 0 on error. The error codes can be obtained by **ERR_get_error(3)**.

SEE ALSO

ERR_get_error(3), **BN_add(3)**, **BN_CTX_new(3)**

HISTORY

BN_RECP_CTX_init() was removed in OpenSSL 1.1.0

COPYRIGHT

Copyright 2000–2017 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>](https://www.openssl.org/source/license.html).