

**NAME**

OSSL\_HTTP\_open, OSSL\_HTTP\_bio\_cb\_t, OSSL\_HTTP\_proxy\_connect,  
OSSL\_HTTP\_set1\_request, OSSL\_HTTP\_exchange, OSSL\_HTTP\_get, OSSL\_HTTP\_transfer,  
OSSL\_HTTP\_close - HTTP client high-level functions

**SYNOPSIS**

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

```
typedef BIO *(*OSSL_HTTP_bio_cb_t)(BIO *bio, void *arg,  
    int connect, int detail);  
OSSL_HTTP_REQ_CTX *OSSL_HTTP_open(const char *server, const char *port,  
    const char *proxy, const char *no_proxy,  
    int use_ssl, BIO *bio, BIO *rbio,  
    OSSL_HTTP_bio_cb_t bio_update_fn, void *arg,  
    int buf_size, int overall_timeout);  
int OSSL_HTTP_proxy_connect(BIO *bio, const char *server, const char *port,  
    const char *proxyuser, const char *proxypass,  
    int timeout, BIO *bio_err, const char *prog);  
int OSSL_HTTP_set1_request(OSSL_HTTP_REQ_CTX *rctx, const char *path,  
    const STACK_OF(CONF_VALUE) *headers,  
    const char *content_type, BIO *req,  
    const char *expected_content_type, int expect_asn1,  
    size_t max_resp_len, int timeout, int keep_alive);  
BIO *OSSL_HTTP_exchange(OSSL_HTTP_REQ_CTX *rctx, char **redirection_url);  
BIO *OSSL_HTTP_get(const char *url, const char *proxy, const char *no_proxy,  
    BIO *bio, BIO *rbio,  
    OSSL_HTTP_bio_cb_t bio_update_fn, void *arg,  
    int buf_size, const STACK_OF(CONF_VALUE) *headers,  
    const char *expected_content_type, int expect_asn1,  
    size_t max_resp_len, int timeout);  
BIO *OSSL_HTTP_transfer(OSSL_HTTP_REQ_CTX **prctx,  
    const char *server, const char *port,  
    const char *path, int use_ssl,  
    const char *proxy, const char *no_proxy,  
    BIO *bio, BIO *rbio,  
    OSSL_HTTP_bio_cb_t bio_update_fn, void *arg,  
    int buf_size, const STACK_OF(CONF_VALUE) *headers,  
    const char *content_type, BIO *req,  
    const char *expected_content_type, int expect_asn1,  
    size_t max_resp_len, int timeout, int keep_alive);
```

```
int OSSL_HTTP_close(OSSL_HTTP_REQ_CTX *rctx, int ok);
```

## DESCRIPTION

**OSSL\_HTTP\_open()** initiates an HTTP session using the *bio* argument if not NULL, else by connecting to a given *server* optionally via a *proxy*.

Typically the OpenSSL build supports sockets and the *bio* parameter is NULL. In this case *rbio* must be NULL as well and the *server* must be non-NULL. The function creates a network BIO internally using **BIO\_new\_connect(3)** for connecting to the given server and the optionally given *port*, defaulting to 80 for HTTP or 443 for HTTPS. Then this internal BIO is used for setting up a connection and for exchanging one or more request and response. If *bio* is given and *rbio* is NULL then this *bio* is used instead. If both *bio* and *rbio* are given (which may be memory BIOs for instance) then no explicit connection is set up, but *bio* is used for writing requests and *rbio* for reading responses. As soon as the client has flushed *bio* the server must be ready to provide a response or indicate a waiting condition via *rbio*.

If *bio* is given, it is an error to provide *proxy* or *no\_proxy* arguments, while *server* and *port* arguments may be given to support diagnostic output. If *bio* is NULL the optional *proxy* parameter can be used to set an HTTP(S) proxy to use (unless overridden by "no\_proxy" settings). If TLS is not used this defaults to the environment variable "http\_proxy" if set, else "HTTP\_PROXY". If *use\_ssl* != 0 it defaults to "https\_proxy" if set, else "HTTPS\_PROXY". An empty proxy string "" forbids using a proxy. Else the format is "[http[s]://][userinfo@]host[:port][/path][?query][#fragment]", where any userinfo, path, query, and fragment given is ignored. The default proxy port number is 80, or 443 in case "https:" is given. The HTTP client functions connect via the given proxy unless the *server* is found in the optional list *no\_proxy* of proxy hostnames (if not NULL; default is the environment variable "no\_proxy" if set, else "NO\_PROXY"). Proxying plain HTTP is supported directly, while using a proxy for HTTPS connections requires a suitable callback function such as **OSSL\_HTTP\_proxy\_connect()**, described below.

If *use\_ssl* is nonzero a TLS connection is requested and the *bio\_update\_fn* parameter must be provided.

The parameter *bio\_update\_fn*, which is optional if *use\_ssl* is 0, may be used to modify the connection BIO used by the HTTP client, but cannot be used when both *bio* and *rbio* are given. *bio\_update\_fn* is a BIO connect/disconnect callback function with prototype

```
BIO *(*OSSL_HTTP_bio_cb_t)(BIO *bio, void *arg, int connect, int detail)
```

The callback function may modify the BIO provided in the *bio* argument, whereby it may make use of a custom defined argument *arg*, which may for instance point to an **SSL\_CTX** structure. During connection establishment, just after calling **BIO\_do\_connect\_retry()**, the callback function is invoked

with the *connect* argument being 1 and *detail* being 1 if *use\_ssl* is nonzero (i.e., HTTPS is requested), else 0. On disconnect *connect* is 0 and *detail* is 1 if no error occurred, else 0. For instance, on connect the callback may push an SSL BIO to implement HTTPS; after disconnect it may do some diagnostic output and pop and free the SSL BIO.

The callback function must return either the potentially modified BIO *bio*. or NULL to indicate failure, in which case it should not modify the BIO.

Here is a simple example that supports TLS connections (but not via a proxy):

```
BIO *http_tls_cb(BIO *bio, void *arg, int connect, int detail)
{
    if (connect && detail) { /* connecting with TLS */
        SSL_CTX *ctx = (SSL_CTX *)arg;
        BIO *sbio = BIO_new_ssl(ctx, 1);

        bio = sbio != NULL ? BIO_push(sbio, bio) : NULL;
    } else if (!connect) { /* disconnecting */
        BIO *hbio;

        if (!detail) { /* an error has occurred */
            /* optionally add diagnostics here */
        }
        BIO_ssl_shutdown(bio);
        hbio = BIO_pop(bio);
        BIO_free(bio); /* SSL BIO */
        bio = hbio;
    }
    return bio;
}
```

After disconnect the modified BIO will be deallocated using **BIO\_free\_all()**.

The *buf\_size* parameter specifies the response header maximum line length. A value  $\leq 0$  means that the **OSSL\_HTTP\_DEFAULT\_MAX\_LINE\_LEN** (4KiB) is used. *buf\_size* is also used as the number of content bytes that are read at a time.

If the *overall\_timeout* parameter is  $> 0$  this indicates the maximum number of seconds the overall HTTP transfer (i.e., connection setup if needed, sending requests, and receiving responses) is allowed to take until completion. A value  $\leq 0$  enables waiting indefinitely, i.e., no timeout.

**OSSL\_HTTP\_proxy\_connect()** may be used by an above BIO connect callback function to set up an SSL/TLS connection via an HTTPS proxy. It promotes the given BIO *bio* representing a connection pre-established with a TLS proxy using the HTTP CONNECT method, optionally using proxy client credentials *proxyuser* and *proxypass*, to connect with TLS protection ultimately to *server* and *port*. If the *port* argument is NULL or the empty string it defaults to "443". If the *timeout* parameter is > 0 this indicates the maximum number of seconds the connection setup is allowed to take. A value <= 0 enables waiting indefinitely, i.e., no timeout. Since this function is typically called by applications such as **openssl-s\_client(1)** it uses the *bio\_err* and *prog* parameters (unless NULL) to print additional diagnostic information in a user-oriented way.

**OSSL\_HTTP\_set1\_request()** sets up in *rctx* the request header and content data and expectations on the response using the following parameters. If <*rctx*> indicates using a proxy for HTTP (but not HTTPS), the server host (and optionally port) needs to be placed in the header; thus it must be present in *rctx*. For backward compatibility, the server (and optional port) may also be given in the *path* argument beginning with "http://" (thus giving an absoluteURI). If *path* is NULL it defaults to "". If *req* is NULL the HTTP GET method will be used to send the request else HTTP POST with the contents of *req* and optional *content\_type*, where the length of the data in *req* does not need to be determined in advance: the BIO will be read on-the-fly while sending the request, which supports streaming. The optional list *headers* may contain additional custom HTTP header lines. If the parameter *expected\_content\_type* is not NULL then the client will check that the given content type string is included in the HTTP header of the response and return an error if not. If the *expect\_asn1* parameter is nonzero, a structure in ASN.1 encoding will be expected as response content. The *max\_resp\_len* parameter specifies the maximum allowed response content length, where the value 0 indicates no limit. If the *timeout* parameter is > 0 this indicates the maximum number of seconds the subsequent HTTP transfer (sending the request and receiving a response) is allowed to take. A value of 0 enables waiting indefinitely, i.e., no timeout. A value < 0 indicates that the *overall\_timeout* parameter value given when opening the HTTP transfer will be used instead. If *keep\_alive* is 0 the connection is not kept open after receiving a response, which is the default behavior for HTTP 1.0. If the value is 1 or 2 then a persistent connection is requested. If the value is 2 then a persistent connection is required, i.e., an error occurs in case the server does not grant it.

**OSSL\_HTTP\_exchange()** exchanges any form of HTTP request and response as specified by *rctx*, which must include both connection and request data, typically set up using **OSSL\_HTTP\_open()** and **OSSL\_HTTP\_set1\_request()**. It implements the core of the functions described below. If the HTTP method is GET and *redirection\_url* is not NULL the latter pointer is used to provide any new location that the server may return with HTTP code 301 (MOVED\_PERMANENTLY) or 302 (FOUND). In this case the function returns NULL and the caller is responsible for deallocating the URL with **OPENSSL\_free(3)**. If the response header contains one or more "Content-Length" header lines and/or an ASN.1-encoded response is expected, which should include a total length, the length indications received are checked for consistency and for not exceeding any given maximum response length. If an

ASN.1-encoded response is expected, the function returns on success the contents buffered in a memory BIO, which does not support streaming. Otherwise it returns directly the read BIO that holds the response contents, which allows a response of indefinite length and may support streaming. The caller is responsible for freeing the BIO pointer obtained.

**OSSL\_HTTP\_get()** uses HTTP GET to obtain data from *bio* if non-NULL, else from the server contained in the *url*, and returns it as a BIO. It supports redirection via HTTP status code 301 or 302. It is meant for transfers with a single round trip, so does not support persistent connections. If *bio* is non-NULL, any host and port components in the *url* are not used for connecting but the hostname is used, as usual, for the "Host" header. Any userinfo and fragment components in the *url* are ignored. Any query component is handled as part of the path component. If the scheme component of the *url* is "https" a TLS connection is requested and the *bio\_update\_fn*, as described for **OSSL\_HTTP\_open()**, must be provided. Also the remaining parameters are interpreted as described for **OSSL\_HTTP\_open()** and **OSSL\_HTTP\_set1\_request()**, respectively. The caller is responsible for freeing the BIO pointer obtained.

**OSSL\_HTTP\_transfer()** exchanges an HTTP request and response over a connection managed via *prctx* without supporting redirection. It combines **OSSL\_HTTP\_open()**, **OSSL\_HTTP\_set1\_request()**, **OSSL\_HTTP\_exchange()**, and **OSSL\_HTTP\_close()**. If *prctx* is not NULL it reuses any open connection represented by a non-NULL *\*prctx*. It keeps the connection open if a persistent connection is requested or required and this was granted by the server, else it closes the connection and assigns NULL to *\*prctx*. The remaining parameters are interpreted as described for **OSSL\_HTTP\_open()** and **OSSL\_HTTP\_set1\_request()**, respectively. The caller is responsible for freeing the BIO pointer obtained.

**OSSL\_HTTP\_close()** closes the connection and releases *rctx*. The *ok* parameter is passed to any BIO update function given during setup as described above for **OSSL\_HTTP\_open()**. It must be 1 if no error occurred during the HTTP transfer and 0 otherwise.

## NOTES

The names of the environment variables used by this implementation: "http\_proxy", "HTTP\_PROXY", "https\_proxy", "HTTPS\_PROXY", "no\_proxy", and "NO\_PROXY", have been chosen for maximal compatibility with other HTTP client implementations such as wget, curl, and git.

## RETURN VALUES

**OSSL\_HTTP\_open()** returns on success a **OSSL\_HTTP\_REQ\_CTX**, else NULL.

**OSSL\_HTTP\_proxy\_connect()** and **OSSL\_HTTP\_set1\_request()** return 1 on success, 0 on error.

On success, **OSSL\_HTTP\_exchange()**, **OSSL\_HTTP\_get()**, and **OSSL\_HTTP\_transfer()** return a

memory BIO that buffers all the data received if an ASN.1-encoded response is expected, otherwise a BIO that may support streaming. The BIO must be freed by the caller. On failure, they return NULL. Failure conditions include connection/transfer timeout, parse errors, etc. The caller is responsible for freeing the BIO pointer obtained.

**OSSL\_HTTP\_close()** returns 0 if anything went wrong while disconnecting, else 1.

### SEE ALSO

**OSSL\_HTTP\_parse\_url(3)**, **BIO\_new\_connect(3)**, **ASN1\_item\_i2d\_mem\_bio(3)**, **ASN1\_item\_d2i\_bio(3)**, **OSSL\_HTTP\_is\_alive(3)**

### HISTORY

All the functions described here were added in OpenSSL 3.0.

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