

# **GnuTLS API Reference Manual**

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## Chapter 1

# GnuTLS API Reference Manual

GnuTLS implements the Transport Layer Security (TLS) and Secure Sockets Layer (SSL) protocols for the GNU project.

More up to date information can be found at <http://www.gnu.org/software/gnutls/>.

### 1.1 gnutls

gnutls —

#### Synopsis

```
#define HAVE__SSIZE_T
#define GNUTLS_VERSION
#define GNUTLS_VERSION_MAJOR
#define GNUTLS_VERSION_MINOR
#define GNUTLS_VERSION_PATCH
#define GNUTLS_VERSION_NUMBER
#define GNUTLS_CIPHER_RIJNDAEL_128_CBC
#define GNUTLS_CIPHER_RIJNDAEL_256_CBC
#define GNUTLS_CIPHER_RIJNDAEL_CBC
#define GNUTLS_CIPHER_ARCFOUR
enum gnutls_cipher_algorithm_t;
enum gnutls_kx_algorithm_t;
enum gnutls_params_type_t;
enum gnutls_credentials_type_t;
#define GNUTLS_MAC_SHA
#define GNUTLS_DIG_SHA
enum gnutls_mac_algorithm_t;
enum gnutls_digest_algorithm_t;
#define GNUTLS_MAX_ALGORITHM_NUM
enum gnutls_compression_method_t;
#define GNUTLS_SERVER
#define GNUTLS_CLIENT
#define GNUTLS_DATAGRAM
#define GNUTLS_NONBLOCK
enum gnutls_alert_level_t;
enum gnutls_alert_description_t;
enum gnutls_handshake_description_t;
enum gnutls_certificate_status_t;
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enum          gnutls_certificate_request_t;
enum          gnutls_openpgp_crt_status_t;
enum          gnutls_close_request_t;
enum          gnutls_protocol_t;
enum          gnutls_certificate_type_t;
enum          gnutls_x509_crt_fmt_t;
enum          gnutls_certificate_print_formats_t;
#define       GNUTLS_PK_ECC
enum          gnutls_pk_algorithm_t;
const char *  gnutls_pk_algorithm_get_name      (gnutls_pk_algorithm_t algorithm);
enum          gnutls_sign_algorithm_t;
enum          gnutls_ecc_curve_t;
enum          gnutls_sec_param_t;
enum          gnutls_channel_binding_t;
typedef       gnutls_transport_ptr_t;
struct       gnutls_session_int;
typedef       gnutls_session_t;
struct       gnutls_dh_params_int;
typedef       gnutls_dh_params_t;
struct       gnutls_ecdh_params_int;
typedef       gnutls_ecdh_params_t;
struct       gnutls_x509_privkey_int;
typedef       gnutls_rsa_params_t;
struct       gnutls_priority_st;
typedef       gnutls_priority_t;
int          gnutls_init                        (gnutls_session_t *session,
                                                unsigned int flags);

void         gnutls_deinit                     (gnutls_session_t session);
int          gnutls_bye                         (gnutls_session_t session,
                                                gnutls_close_request_t how);

int          gnutls_handshake                  (gnutls_session_t session);
int          gnutls_rehandshake                 (gnutls_session_t session);
gnutls_alert_description_t gnutls_alert_get     (gnutls_session_t session);
int          gnutls_alert_send                 (gnutls_session_t session,
                                                gnutls_alert_level_t level,
                                                gnutls_alert_description_t desc);

int          gnutls_alert_send_appropriate     (gnutls_session_t session,
                                                int err);

const char * gnutls_alert_get_name             (gnutls_alert_description_t alert);
const char * gnutls_alert_get_strname         (gnutls_alert_description_t alert);
gnutls_sec_param_t gnutls_pk_bits_to_sec_param (gnutls_pk_algorithm_t algo,
                                                unsigned int bits);

const char * gnutls_sec_param_get_name        (gnutls_sec_param_t param);
unsigned int gnutls_sec_param_to_pk_bits      (gnutls_pk_algorithm_t algo,
                                                gnutls_sec_param_t param);

const char * gnutls_ecc_curve_get_name        (gnutls_ecc_curve_t curve);
int          gnutls_ecc_curve_get_size        (gnutls_ecc_curve_t curve);
gnutls_ecc_curve_t gnutls_ecc_curve_get      (gnutls_session_t session);
gnutls_cipher_algorithm_t gnutls_cipher_get   (gnutls_session_t session);
gnutls_kx_algorithm_t gnutls_kx_get          (gnutls_session_t session);
gnutls_mac_algorithm_t gnutls_mac_get        (gnutls_session_t session);
gnutls_compression_method_t gnutls_compression_get (gnutls_session_t session);
gnutls_certificate_type_t gnutls_certificate_type_get (gnutls_session_t session);
int          gnutls_sign_algorithm_get_requested (gnutls_session_t session,
                                                size_t indx,
                                                gnutls_sign_algorithm_t *algo);

size_t       gnutls_cipher_get_key_size      (gnutls_cipher_algorithm_t algorithm);

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```
#define gnutls_mac_get_key_size (gnutls_mac_algorithm_t algorithm)
const char * gnutls_cipher_get_name (gnutls_cipher_algorithm_t algorit
const char * gnutls_mac_get_name (gnutls_mac_algorithm_t algorithm)
const char * gnutls_compression_get_name (gnutls_compression_method_t algor
const char * gnutls_kx_get_name (gnutls_kx_algorithm_t algorithm);
const char * gnutls_certificate_type_get_name (gnutls_certificate_type_t type);
const char * gnutls_pk_get_name (gnutls_pk_algorithm_t algorithm);
const char * gnutls_sign_get_name (gnutls_sign_algorithm_t algorithm)
#define gnutls_sign_algorithm_get_name
gnutls_mac_algorithm_t gnutls_mac_get_id (const char *name);
gnutls_compression_method_t gnutls_compression_get_id (const char *name);
gnutls_cipher_algorithm_t gnutls_cipher_get_id (const char *name);
gnutls_kx_algorithm_t gnutls_kx_get_id (const char *name);
gnutls_protocol_t gnutls_protocol_get_id (const char *name);
gnutls_certificate_type_t gnutls_certificate_type_get_id
(const char *name);
gnutls_pk_algorithm_t gnutls_pk_get_id (const char *name);
gnutls_sign_algorithm_t gnutls_sign_get_id (const char *name);
const gnutls_cipher_algorithm_t * gnutls_cipher_list (void);
const gnutls_mac_algorithm_t * gnutls_mac_list (void);
const gnutls_compression_method_t * gnutls_compression_list
(void);
const gnutls_protocol_t * gnutls_protocol_list (void);
const gnutls_certificate_type_t * gnutls_certificate_type_list
(void);
const gnutls_kx_algorithm_t * gnutls_kx_list (void);
const gnutls_pk_algorithm_t * gnutls_pk_list (void);
const gnutls_sign_algorithm_t * gnutls_sign_list (void);
const char * gnutls_cipher_suite_info (size_t idx,
unsigned char *cs_id,
gnutls_kx_algorithm_t *kx,
gnutls_cipher_algorithm_t *cipher,
gnutls_mac_algorithm_t *mac,
gnutls_protocol_t *min_version);
int gnutls_error_is_fatal (int error);
int gnutls_error_to_alert (int err,
int *level);
void gnutls_perror (int error);
const char * gnutls_strerror (int error);
const char * gnutls_strerror_name (int error);
void gnutls_handshake_set_private_extensions
(gnutls_session_t session,
int allow);
gnutls_handshake_description_t gnutls_handshake_get_last_out
(gnutls_session_t session);
gnutls_handshake_description_t gnutls_handshake_get_last_in
(gnutls_session_t session);
ssize_t gnutls_record_send (gnutls_session_t session,
const void *data,
size_t data_size);
ssize_t gnutls_record_recv (gnutls_session_t session,
void *data,
size_t data_size);
#define gnutls_read
#define gnutls_write
ssize_t gnutls_record_recv_seq (gnutls_session_t session,
void *data,
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		size_t data_size, unsigned char *seq);
void	gnutls_session_enable_compatibility_mode	(gnutls_session_t session);
void	gnutls_record_disable_padding	(gnutls_session_t session);
int	gnutls_record_get_direction	(gnutls_session_t session);
size_t	gnutls_record_get_max_size	(gnutls_session_t session);
ssize_t	gnutls_record_set_max_size	(gnutls_session_t session, size_t size);
size_t	gnutls_record_check_pending	(gnutls_session_t session);
int	gnutls_prf	(gnutls_session_t session, size_t label_size, const char *label, int server_random_first, size_t extra_size, const char *extra, size_t outsize, char *out);
int	gnutls_prf_raw	(gnutls_session_t session, size_t label_size, const char *label, size_t seed_size, const char *seed, size_t outsize, char *out);
enum	gnutls_server_name_type_t;	
int	gnutls_server_name_set	(gnutls_session_t session, gnutls_server_name_type_t type, const void *name, size_t name_length);
int	gnutls_server_name_get	(gnutls_session_t session, void *data, size_t *data_length, unsigned int *type, unsigned int idx);
int	gnutls_safe_renegotiation_status	(gnutls_session_t session);
enum	gnutls_supplemental_data_format_type_t;	
int	gnutls_session_ticket_key_generate	(gnutls_datum_t *key);
int	gnutls_session_ticket_enable_client	(gnutls_session_t session);
int	gnutls_session_ticket_enable_server	(gnutls_session_t session, const gnutls_datum_t *key);
int	gnutls_key_generate	(gnutls_datum_t *key, unsigned int key_size);
int	gnutls_priority_init	(gnutls_priority_t *priority_cache, const char *priorities, const char **err_pos);
void	gnutls_priority_deinit	(gnutls_priority_t priority_cache);
int	gnutls_priority_get_cipher_suite_index	(gnutls_priority_t pcache, unsigned int idx, unsigned int *sidx);
int	gnutls_priority_set	(gnutls_session_t session, gnutls_priority_t priority);
int	gnutls_priority_set_direct	(gnutls_session_t session, const char *priorities, const char **err_pos);
int	gnutls_set_default_priority	(gnutls_session_t session);

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const char *	gnutls_cipher_suite_get_name	(gnutls_kx_algorithm_t kx_algorithm, gnutls_cipher_algorithm_t cipher, gnutls_mac_algorithm_t mac_algorithm, gnutls_session_t session);
gnutls_protocol_t	gnutls_protocol_get_version	(gnutls_session_t session);
const char *	gnutls_protocol_get_name	(gnutls_protocol_t version);
int	gnutls_session_set_data	(gnutls_session_t session, const void *session_data, size_t session_data_size);
int	gnutls_session_get_data	(gnutls_session_t session, void *session_data, size_t *session_data_size);
int	gnutls_session_get_data2	(gnutls_session_t session, gnutls_datum_t *data);
#define	GNUTLS_MAX_SESSION_ID	
int	gnutls_session_get_id	(gnutls_session_t session, void *session_id, size_t *session_id_size);
int	gnutls_session_channel_binding	(gnutls_session_t session, gnutls_channel_binding_t cbtype, gnutls_datum_t *cb);
int	gnutls_session_is_resumed	(gnutls_session_t session);
int	gnutls_session_resumption_requested	(gnutls_session_t session);
int	(*gnutls_db_store_func)	(void *Param1, gnutls_datum_t key, gnutls_datum_t data);
int	(*gnutls_db_remove_func)	(void *Param1, gnutls_datum_t key);
gnutls_datum_t	(*gnutls_db_retr_func)	(void *Param1, gnutls_datum_t key);
void	gnutls_db_set_cache_expiration	(gnutls_session_t session, int seconds);
void	gnutls_db_remove_session	(gnutls_session_t session);
void	gnutls_db_set_retrieve_function	(gnutls_session_t session, gnutls_db_retr_func retr_func);
void	gnutls_db_set_remove_function	(gnutls_session_t session, gnutls_db_remove_func rem_func);
void	gnutls_db_set_store_function	(gnutls_session_t session, gnutls_db_store_func store_func);
void	gnutls_db_set_ptr	(gnutls_session_t session, void *ptr);
void *	gnutls_db_get_ptr	(gnutls_session_t session);
int	gnutls_db_check_entry	(gnutls_session_t session, gnutls_datum_t session_entry);
int	(*gnutls_handshake_post_client_hello_func)	(gnutls_session_t Param1);
void	gnutls_handshake_set_post_client_hello_function	(gnutls_session_t session, gnutls_handshake_post_client_hello_func post_client_hello_func);
void	gnutls_handshake_set_max_packet_length	(gnutls_session_t session, size_t max);
const char *	gnutls_check_version	(const char *req_version);
void	gnutls_credentials_clear	(gnutls_session_t session);
int	gnutls_credentials_set	(gnutls_session_t session, gnutls_credentials_type_t type, void *cred);
#define	gnutls_cred_set	

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typedef      gnutls_x509_privkey_t;
struct      gnutls_x509_crl_int;
typedef      gnutls_x509_crl_t;
struct      gnutls_x509_crt_int;
typedef      gnutls_x509_crt_t;
struct      gnutls_x509_crq_int;
typedef      gnutls_x509_crq_t;
struct      gnutls_openpgp_keyring_int;
typedef      gnutls_openpgp_keyring_t;
struct      gnutls_certificate_credentials_st;
void        gnutls_anon_free_server_credentials (gnutls_anon_server_credentials_t
int        gnutls_anon_allocate_server_credentials
                                                (gnutls_anon_server_credentials_t
void        gnutls_anon_set_server_dh_params    (gnutls_anon_server_credentials_t
                                                gnutls_dh_params_t dh_params);
void        gnutls_anon_set_server_params_function
                                                (gnutls_anon_server_credentials_t
                                                gnutls_params_function *func);
void        gnutls_anon_free_client_credentials (gnutls_anon_client_credentials_t
int        gnutls_anon_allocate_client_credentials
                                                (gnutls_anon_client_credentials_t
void        gnutls_certificate_free_credentials (gnutls_certificate_credentials_t
int        gnutls_certificate_allocate_credentials
                                                (gnutls_certificate_credentials_t
int        gnutls_certificate_get_issuer        (gnutls_certificate_credentials_t
                                                gnutls_x509_crt_t cert,
                                                gnutls_x509_crt_t *issuer,
                                                unsigned int flags);
void        gnutls_certificate_free_keys        (gnutls_certificate_credentials_t
void        gnutls_certificate_free_cas         (gnutls_certificate_credentials_t
void        gnutls_certificate_free_ca_names    (gnutls_certificate_credentials_t
void        gnutls_certificate_free_crls        (gnutls_certificate_credentials_t
void        gnutls_certificate_set_dh_params    (gnutls_certificate_credentials_t
                                                gnutls_dh_params_t dh_params);
void        gnutls_certificate_set_verify_flags (gnutls_certificate_credentials_t
                                                unsigned int flags);
void        gnutls_certificate_set_verify_limits
                                                (gnutls_certificate_credentials_t
                                                unsigned int max_bits,
                                                unsigned int max_depth);
int        gnutls_certificate_set_x509_trust_file
                                                (gnutls_certificate_credentials_t
                                                const char *cafile,
                                                gnutls_x509_crt_fmt_t type);
int        gnutls_certificate_set_x509_trust_mem
                                                (gnutls_certificate_credentials_t
                                                const gnutls_datum_t *ca,
                                                gnutls_x509_crt_fmt_t type);
int        gnutls_certificate_set_x509_crl_file
                                                (gnutls_certificate_credentials_t
                                                const char *crlfile,
                                                gnutls_x509_crt_fmt_t type);
int        gnutls_certificate_set_x509_crl_mem (gnutls_certificate_credentials_t
                                                const gnutls_datum_t *CRL,
                                                gnutls_x509_crt_fmt_t type);
int        gnutls_certificate_set_x509_key_file
                                                (gnutls_certificate_credentials_t

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		const char *certfile, const char *keyfile, gnutls_x509_crt_fmt_t type);
int	gnutls_certificate_set_x509_key_mem	(gnutls_certificate_credentials_t const gnutls_datum_t *cert, const gnutls_datum_t *key, gnutls_x509_crt_fmt_t type);
void	gnutls_certificate_send_x509_rdn_sequence	(gnutls_session_t session, int status);
int	gnutls_certificate_set_x509_simple_pkcs12_file	(gnutls_certificate_credentials_t const char *pkcs12file, gnutls_x509_crt_fmt_t type, const char *password);
int	gnutls_certificate_set_x509_simple_pkcs12_mem	(gnutls_certificate_credentials_t const gnutls_datum_t *p12blob, gnutls_x509_crt_fmt_t type, const char *password);
int	gnutls_certificate_set_x509_key	(gnutls_certificate_credentials_t gnutls_x509_crt_t *cert_list, int cert_list_size, gnutls_x509_privkey_t key);
int	gnutls_certificate_set_x509_trust	(gnutls_certificate_credentials_t gnutls_x509_crt_t *ca_list, int ca_list_size);
int	gnutls_certificate_set_x509_crl	(gnutls_certificate_credentials_t gnutls_x509_crl_t *crl_list, int crl_list_size);
void	gnutls_certificate_get_openpgp_keyring	(gnutls_certificate_credentials_t gnutls_openpgp_keyring_t *keyring);
int	gnutls_global_init	(void);
void	gnutls_global_deinit	(void);
time_t	(*gnutls_time_func)	(time_t *t);
int	(*mutex_init_func)	(void **mutex);
int	(*mutex_lock_func)	(void **mutex);
int	(*mutex_unlock_func)	(void **mutex);
int	(*mutex_deinit_func)	(void **mutex);
void	gnutls_global_set_mutex	(mutex_init_func init, mutex_deinit_func deinit, mutex_lock_func lock, mutex_unlock_func unlock);
void *	(*gnutls_alloc_function)	(size_t Param1);
void *	(*gnutls_calloc_function)	(size_t Param1, size_t Param2);
int	(*gnutls_is_secure_function)	(const void *Param1);
void	(*gnutls_free_function)	(void *Param1);
void *	(*gnutls_realloc_function)	(void *Param1, size_t Param2);
void	gnutls_global_set_mem_functions	(gnutls_alloc_function alloc_func, gnutls_alloc_function secure_allo gnutls_is_secure_function is_secu gnutls_realloc_function realloc_f gnutls_free_function free_func);
void	gnutls_global_set_time_function	(gnutls_time_func time_func);

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extern      gnutls_alloc_function gnutls_malloc;
extern      gnutls_alloc_function gnutls_secure_malloc;
extern      gnutls_realloc_function gnutls_realloc;
extern      gnutls_calloc_function gnutls_calloc;
extern      gnutls_free_function gnutls_free;
char *      (*gnutls_strdup)      (const char *Param1);
void        (*gnutls_log_func)    (... ,
                                const char *Param2);
void        (*gnutls_audit_log_func) (gnutls_session_t Param1,
                                const char *Param2);
void        gnutls_global_set_log_function (gnutls_log_func log_func);
void        gnutls_global_set_audit_log_function (gnutls_audit_log_func log_func);
void        gnutls_global_set_log_level (int level);
int         gnutls_dh_params_init      (gnutls_dh_params_t *dh_params);
void        gnutls_dh_params_deinit   (gnutls_dh_params_t dh_params);
int         gnutls_dh_params_import_raw (gnutls_dh_params_t dh_params,
                                const gnutls_datum_t *prime,
                                const gnutls_datum_t *generator);
int         gnutls_dh_params_import_pkcs3 (gnutls_dh_params_t params,
                                const gnutls_datum_t *pkcs3_param,
                                gnutls_x509_crt_fmt_t format);
int         gnutls_dh_params_generate2 (gnutls_dh_params_t params,
                                unsigned int bits);
int         gnutls_dh_params_export_pkcs3 (gnutls_dh_params_t params,
                                gnutls_x509_crt_fmt_t format,
                                unsigned char *params_data,
                                size_t *params_data_size);
int         gnutls_dh_params_export_raw (gnutls_dh_params_t params,
                                gnutls_datum_t *prime,
                                gnutls_datum_t *generator,
                                unsigned int *bits);
int         gnutls_dh_params_cpy      (gnutls_dh_params_t dst,
                                gnutls_dh_params_t src);
ssize_t     (*gnutls_pull_func)      (gnutls_transport_ptr_t Param1,
                                void *Param2,
                                size_t Param3);
ssize_t     (*gnutls_push_func)      (gnutls_transport_ptr_t Param1,
                                const void *Param2,
                                size_t Param3);
int         (*gnutls_pull_timeout_func) (gnutls_transport_ptr_t Param1,
                                unsigned int ms);
ssize_t     (*gnutls_vec_push_func)  (gnutls_transport_ptr_t Param1,
                                const glibc_iovec_t *iov,
                                int iovcnt);
int         (*gnutls_errno_func)     (gnutls_transport_ptr_t Param1);
void        gnutls_transport_set_ptr  (gnutls_session_t session,
                                gnutls_transport_ptr_t ptr);
void        gnutls_transport_set_ptr2 (gnutls_session_t session,
                                gnutls_transport_ptr_t recv_ptr,
                                gnutls_transport_ptr_t send_ptr);
gnutls_transport_ptr_t gnutls_transport_get_ptr (gnutls_session_t session);
void        gnutls_transport_get_ptr2 (gnutls_session_t session,
                                gnutls_transport_ptr_t *recv_ptr,
                                gnutls_transport_ptr_t *send_ptr);
void        gnutls_transport_set_vec_push_function (gnutls_session_t session,

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		gnutls_vec_push_func vec_func);
void	gnutls_transport_set_push_function	(gnutls_session_t session, gnutls_push_func push_func);
void	gnutls_transport_set_pull_function	(gnutls_session_t session, gnutls_pull_func pull_func);
void	gnutls_transport_set_pull_timeout_function	(gnutls_session_t session, gnutls_pull_timeout_func func);
void	gnutls_transport_set_errno_function	(gnutls_session_t session, gnutls_errno_func errno_func);
void	gnutls_transport_set_errno	(gnutls_session_t session, int err);
void	gnutls_session_set_ptr	(gnutls_session_t session, void *ptr);
void *	gnutls_session_get_ptr	(gnutls_session_t session);
void	gnutls_openpgp_send_cert	(gnutls_session_t session, gnutls_openpgp_cert_status_t statu
int	gnutls_fingerprint	(gnutls_digest_algorithm_t algo, const gnutls_datum_t *data, void *result, size_t *result_size);
enum	gnutls_random_art_t;	
int	gnutls_random_art	(gnutls_random_art_t type, const char *key_type, unsigned int key_size, void *fpr, size_t fpr_size, gnutls_datum_t *art);
void	gnutls_srp_free_client_credentials	(gnutls_srp_client_credentials_t s
int	gnutls_srp_allocate_client_credentials	(gnutls_srp_client_credentials_t *
int	gnutls_srp_set_client_credentials	(gnutls_srp_client_credentials_t r const char *username, const char *password);
void	gnutls_srp_free_server_credentials	(gnutls_srp_server_credentials_t s
int	gnutls_srp_allocate_server_credentials	(gnutls_srp_server_credentials_t *
int	gnutls_srp_set_server_credentials_file	(gnutls_srp_server_credentials_t r const char *password_file, const char *password_conf_file);
const char *	gnutls_srp_server_get_username	(gnutls_session_t session);
void	gnutls_srp_set_prime_bits	(gnutls_session_t session, unsigned int bits);
int	gnutls_srp_verifier	(const char *username, const char *password, const gnutls_datum_t *salt, const gnutls_datum_t *generator, const gnutls_datum_t *prime, gnutls_datum_t *res);
extern	const gnutls_datum_t gnutls_srp_4096_group_prime;	
extern	const gnutls_datum_t gnutls_srp_4096_group_generator;	
extern	const gnutls_datum_t gnutls_srp_3072_group_prime;	
extern	const gnutls_datum_t gnutls_srp_3072_group_generator;	
extern	const gnutls_datum_t gnutls_srp_2048_group_prime;	
extern	const gnutls_datum_t gnutls_srp_2048_group_generator;	
extern	const gnutls_datum_t gnutls_srp_1536_group_prime;	

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---

extern	const gnutls_datum_t gnutls_srp_1536_group_generator;	
extern	const gnutls_datum_t gnutls_srp_1024_group_prime;	
extern	const gnutls_datum_t gnutls_srp_1024_group_generator;	
void	gnutls_srp_set_server_credentials_function	(gnutls_srp_server_credentials_t c gnutls_srp_server_credentials_fun
void	gnutls_srp_set_client_credentials_function	(gnutls_srp_client_credentials_t c gnutls_srp_client_credentials_fun
int	gnutls_srp_base64_encode	(const gnutls_datum_t *data, char *result, size_t *result_size);
int	gnutls_srp_base64_encode_alloc	(const gnutls_datum_t *data, gnutls_datum_t *result);
int	gnutls_srp_base64_decode	(const gnutls_datum_t *b64_data, char *result, size_t *result_size);
int	gnutls_srp_base64_decode_alloc	(const gnutls_datum_t *b64_data, gnutls_datum_t *result);
enum	gnutls_psk_key_flags;	
void	gnutls_psk_free_client_credentials	(gnutls_psk_client_credentials_t s
int	gnutls_psk_allocate_client_credentials	(gnutls_psk_client_credentials_t *
int	gnutls_psk_set_client_credentials	(gnutls_psk_client_credentials_t r const char *username, const gnutls_datum_t *key, gnutls_psk_key_flags flags);
void	gnutls_psk_free_server_credentials	(gnutls_psk_server_credentials_t s
int	gnutls_psk_allocate_server_credentials	(gnutls_psk_server_credentials_t *
int	gnutls_psk_set_server_credentials_file	(gnutls_psk_server_credentials_t r const char *password_file);
int	gnutls_psk_set_server_credentials_hint	(gnutls_psk_server_credentials_t r const char *hint);
const char *	gnutls_psk_server_get_username	(gnutls_session_t session);
const char *	gnutls_psk_client_get_hint	(gnutls_session_t session);
void	gnutls_psk_set_server_credentials_function	(gnutls_psk_server_credentials_t c gnutls_psk_server_credentials_fun
void	gnutls_psk_set_client_credentials_function	(gnutls_psk_client_credentials_t c gnutls_psk_client_credentials_fun
int	gnutls_hex_encode	(const gnutls_datum_t *data, char *result, size_t *result_size);
int	gnutls_hex_decode	(const gnutls_datum_t *hex_data, char *result, size_t *result_size);
void	gnutls_psk_set_server_dh_params	(gnutls_psk_server_credentials_t r gnutls_dh_params_t dh_params);
void	gnutls_psk_set_server_params_function	(gnutls_psk_server_credentials_t r gnutls_params_function *func);
enum	gnutls_x509_subject_alt_name_t;	
struct	gnutls_openpgp_crt_int;	

---

---

```

typedef          gnutls_openpgp_crt_t;
struct           gnutls_openpgp_privkey_int;
typedef          gnutls_openpgp_privkey_t;
struct          gnutls_pkcs11_privkey_st;
typedef         gnutls_pkcs11_privkey_t;
enum            gnutls_privkey_type_t;
gnutls_credentials_type_t  gnutls_auth_get_type      (gnutls_session_t session);
gnutls_credentials_type_t  gnutls_auth_server_get_type (gnutls_session_t session);
gnutls_credentials_type_t  gnutls_auth_client_get_type (gnutls_session_t session);
void                    gnutls_dh_set_prime_bits      (gnutls_session_t session,
                                                    unsigned int bits);

int                    gnutls_dh_get_secret_bits      (gnutls_session_t session);
int                    gnutls_dh_get_peers_public_bits (gnutls_session_t session);
int                    gnutls_dh_get_prime_bits      (gnutls_session_t session);
int                    gnutls_dh_get_group           (gnutls_session_t session,
                                                    gnutls_datum_t *raw_gen,
                                                    gnutls_datum_t *raw_prime);

int                    gnutls_dh_get_pubkey          (gnutls_session_t session,
                                                    gnutls_datum_t *raw_key);

void                    gnutls_certificate_set_retrieve_function
                                                    (gnutls_certificate_credentials_t
                                                    gnutls_certificate_retrieve_func_t);

void                    gnutls_certificate_set_verify_function
                                                    (gnutls_certificate_credentials_t
                                                    gnutls_certificate_verify_function_t);

void                    gnutls_certificate_server_set_request
                                                    (gnutls_session_t session,
                                                    gnutls_certificate_request_t req);

const gnutls_datum_t * gnutls_certificate_get_peers (gnutls_session_t session,
                                                    unsigned int *list_size);

const gnutls_datum_t * gnutls_certificate_get_ours (gnutls_session_t session);
time_t                gnutls_certificate_activation_time_peers
                                                    (gnutls_session_t session);
time_t                gnutls_certificate_expiration_time_peers
                                                    (gnutls_session_t session);
int                    gnutls_certificate_client_get_request_status
                                                    (gnutls_session_t session);
int                    gnutls_certificate_verify_peers2
                                                    (gnutls_session_t session,
                                                    unsigned int *status);
int                    gnutls_pem_base64_encode      (const char *msg,
                                                    const gnutls_datum_t *data,
                                                    char *result,
                                                    size_t *result_size);

int                    gnutls_pem_base64_decode      (const char *header,
                                                    const gnutls_datum_t *b64_data,
                                                    unsigned char *result,
                                                    size_t *result_size);

int                    gnutls_pem_base64_encode_alloc
                                                    (const char *msg,
                                                    const gnutls_datum_t *data,
                                                    gnutls_datum_t *result);

int                    gnutls_pem_base64_decode_alloc
                                                    (const char *header,
                                                    const gnutls_datum_t *b64_data,
                                                    gnutls_datum_t *result);

#define            GNUTLS_KEY_DIGITAL_SIGNATURE
#define            GNUTLS_KEY_NON_REPUDIATION
#define            GNUTLS_KEY_KEY_ENCIPHERMENT
#define            GNUTLS_KEY_DATA_ENCIPHERMENT

```

---

---

```
#define          GNUTLS_KEY_KEY_AGREEMENT
#define          GNUTLS_KEY_KEY_CERT_SIGN
#define          GNUTLS_KEY_CRL_SIGN
#define          GNUTLS_KEY_ENCIPHER_ONLY
#define          GNUTLS_KEY_DECIPHER_ONLY
void            gnutls_certificate_set_params_function
                                   (gnutls_certificate_credentials_t
                                   gnutls_params_function *func);
void            gnutls_anon_set_params_function      (gnutls_anon_server_credentials_t
                                   gnutls_params_function *func);
void            gnutls_psk_set_params_function      (gnutls_psk_server_credentials_t r
                                   gnutls_params_function *func);
int             gnutls_hex2bin                      (const char *hex_data,
                                   size_t hex_size,
                                   char *bin_data,
                                   size_t *bin_size);

#define          GNUTLS_E_SUCCESS
#define          GNUTLS_E_UNKNOWN_COMPRESSION_ALGORITHM
#define          GNUTLS_E_UNKNOWN_CIPHER_TYPE
#define          GNUTLS_E_LARGE_PACKET
#define          GNUTLS_E_UNSUPPORTED_VERSION_PACKET
#define          GNUTLS_E_UNEXPECTED_PACKET_LENGTH
#define          GNUTLS_E_INVALID_SESSION
#define          GNUTLS_E_FATAL_ALERT_RECEIVED
#define          GNUTLS_E_UNEXPECTED_PACKET
#define          GNUTLS_E_WARNING_ALERT_RECEIVED
#define          GNUTLS_E_ERROR_IN_FINISHED_PACKET
#define          GNUTLS_E_UNEXPECTED_HANDSHAKE_PACKET
#define          GNUTLS_E_UNKNOWN_CIPHER_SUITE
#define          GNUTLS_E_UNWANTED_ALGORITHM
#define          GNUTLS_E_MPI_SCAN_FAILED
#define          GNUTLS_E_DECRYPTION_FAILED
#define          GNUTLS_E_MEMORY_ERROR
#define          GNUTLS_E_DECOMPRESSION_FAILED
#define          GNUTLS_E_COMPRESSION_FAILED
#define          GNUTLS_E_AGAIN
#define          GNUTLS_E_EXPIRED
#define          GNUTLS_E_DB_ERROR
#define          GNUTLS_E_SRP_PWD_ERROR
#define          GNUTLS_E_INSUFFICIENT_CREDENTIALS
#define          GNUTLS_E_INSUFFICIENT_CREDENTIALS
#define          GNUTLS_E_INSUFFICIENT_CRED
#define          GNUTLS_E_INSUFFICIENT_CRED
#define          GNUTLS_E_HASH_FAILED
#define          GNUTLS_E_BASE64_DECODING_ERROR
#define          GNUTLS_E_MPI_PRINT_FAILED
#define          GNUTLS_E_REHANDSHAKE
#define          GNUTLS_E_GOT_APPLICATION_DATA
#define          GNUTLS_E_RECORD_LIMIT_REACHED
#define          GNUTLS_E_ENCRYPTION_FAILED
#define          GNUTLS_E_PK_ENCRYPTION_FAILED
#define          GNUTLS_E_PK_DECRYPTION_FAILED
#define          GNUTLS_E_PK_SIGN_FAILED
#define          GNUTLS_E_X509_UNSUPPORTED_CRITICAL_EXTENSION
#define          GNUTLS_E_KEY_USAGE_VIOLATION
#define          GNUTLS_E_NO_CERTIFICATE_FOUND
#define          GNUTLS_E_INVALID_REQUEST
```

---

```
#define GNUTLS_E_SHORT_MEMORY_BUFFER
#define GNUTLS_E_INTERRUPTED
#define GNUTLS_E_PUSH_ERROR
#define GNUTLS_E_PULL_ERROR
#define GNUTLS_E_RECEIVED_ILLEGAL_PARAMETER
#define GNUTLS_E_REQUESTED_DATA_NOT_AVAILABLE
#define GNUTLS_E_PKCS1_WRONG_PAD
#define GNUTLS_E_RECEIVED_ILLEGAL_EXTENSION
#define GNUTLS_E_INTERNAL_ERROR
#define GNUTLS_E_DH_PRIME_UNACCEPTABLE
#define GNUTLS_E_FILE_ERROR
#define GNUTLS_E_TOO_MANY_EMPTY_PACKETS
#define GNUTLS_E_UNKNOWN_PK_ALGORITHM
#define GNUTLS_E_TOO_MANY_HANDSHAKE_PACKETS
#define GNUTLS_E_NO_TEMPORARY_RSA_PARAMS
#define GNUTLS_E_NO_COMPRESSION_ALGORITHMS
#define GNUTLS_E_NO_CIPHER_SUITES
#define GNUTLS_E_OPENPGP_GETKEY_FAILED
#define GNUTLS_E_PK_SIG_VERIFY_FAILED
#define GNUTLS_E_ILLEGAL_SRP_USERNAME
#define GNUTLS_E_SRP_PWD_PARSING_ERROR
#define GNUTLS_E_NO_TEMPORARY_DH_PARAMS
#define GNUTLS_E_ASN1_ELEMENT_NOT_FOUND
#define GNUTLS_E_ASN1_IDENTIFIER_NOT_FOUND
#define GNUTLS_E_ASN1_DER_ERROR
#define GNUTLS_E_ASN1_VALUE_NOT_FOUND
#define GNUTLS_E_ASN1_GENERIC_ERROR
#define GNUTLS_E_ASN1_VALUE_NOT_VALID
#define GNUTLS_E_ASN1_TAG_ERROR
#define GNUTLS_E_ASN1_TAG_IMPLICIT
#define GNUTLS_E_ASN1_TYPE_ANY_ERROR
#define GNUTLS_E_ASN1_SYNTAX_ERROR
#define GNUTLS_E_ASN1_DER_OVERFLOW
#define GNUTLS_E_OPENPGP_UID_REVOKED
#define GNUTLS_E_CERTIFICATE_ERROR
#define GNUTLS_E_X509_CERTIFICATE_ERROR
#define GNUTLS_E_CERTIFICATE_KEY_MISMATCH
#define GNUTLS_E_UNSUPPORTED_CERTIFICATE_TYPE
#define GNUTLS_E_X509_UNKNOWN_SAN
#define GNUTLS_E_OPENPGP_FINGERPRINT_UNSUPPORTED
#define GNUTLS_E_X509_UNSUPPORTED_ATTRIBUTE
#define GNUTLS_E_UNKNOWN_HASH_ALGORITHM
#define GNUTLS_E_UNKNOWN_PKCS_CONTENT_TYPE
#define GNUTLS_E_UNKNOWN_PKCS_BAG_TYPE
#define GNUTLS_E_INVALID_PASSWORD
#define GNUTLS_E_MAC_VERIFY_FAILED
#define GNUTLS_E_CONSTRAINT_ERROR
#define GNUTLS_E_WARNING_IA_IPHF_RECEIVED
#define GNUTLS_E_WARNING_IA_FPHF_RECEIVED
#define GNUTLS_E_IA_VERIFY_FAILED
#define GNUTLS_E_UNKNOWN_ALGORITHM
#define GNUTLS_E_UNSUPPORTED_SIGNATURE_ALGORITHM
#define GNUTLS_E_SAFE_RENEGOTIATION_FAILED
#define GNUTLS_E_UNSAFE_RENEGOTIATION_DENIED
#define GNUTLS_E_UNKNOWN_SRP_USERNAME
#define GNUTLS_E_PREMATURE_TERMINATION
#define GNUTLS_E_BASE64_ENCODING_ERROR
```



```
#define GNUTLS_E_INCOMPATIBLE_GCRYPT_LIBRARY
#define GNUTLS_E_INCOMPATIBLE_CRYPTOLIBRARY
#define GNUTLS_E_INCOMPATIBLE_LIBTASN1_LIBRARY
#define GNUTLS_E_OPENPGP_KEYRING_ERROR
#define GNUTLS_E_X509_UNSUPPORTED_OID
#define GNUTLS_E_RANDOM_FAILED
#define GNUTLS_E_BASE64_UNEXPECTED_HEADER_ERROR
#define GNUTLS_E_OPENPGP_SUBKEY_ERROR
#define GNUTLS_E_CRYPTOLIBRARY_ALREADY_REGISTERED
#define GNUTLS_E_HANDSHAKE_TOO_LARGE
#define GNUTLS_E_CRYPTODEV_IOCTL_ERROR
#define GNUTLS_E_CRYPTODEV_DEVICE_ERROR
#define GNUTLS_E_CHANNEL_BINDING_NOT_AVAILABLE
#define GNUTLS_E_BAD_COOKIE
#define GNUTLS_E_OPENPGP_PREFERRED_KEY_ERROR
#define GNUTLS_E_INCOMPAT_DSA_KEY_WITH_TLS_PROTOCOL
#define GNUTLS_E_PKCS11_ERROR
#define GNUTLS_E_PKCS11_LOAD_ERROR
#define GNUTLS_E_PARSING_ERROR
#define GNUTLS_E_PKCS11_PIN_ERROR
#define GNUTLS_E_PKCS11_SLOT_ERROR
#define GNUTLS_E_LOCKING_ERROR
#define GNUTLS_E_PKCS11_ATTRIBUTE_ERROR
#define GNUTLS_E_PKCS11_DEVICE_ERROR
#define GNUTLS_E_PKCS11_DATA_ERROR
#define GNUTLS_E_PKCS11_UNSUPPORTED_FEATURE_ERROR
#define GNUTLS_E_PKCS11_KEY_ERROR
#define GNUTLS_E_PKCS11_PIN_EXPIRED
#define GNUTLS_E_PKCS11_PIN_LOCKED
#define GNUTLS_E_PKCS11_SESSION_ERROR
#define GNUTLS_E_PKCS11_SIGNATURE_ERROR
#define GNUTLS_E_PKCS11_TOKEN_ERROR
#define GNUTLS_E_PKCS11_USER_ERROR
#define GNUTLS_E_CRYPTOLIBRARY_INIT_FAILED
#define GNUTLS_E_TIMEDOUT
#define GNUTLS_E_USER_ERROR
#define GNUTLS_E_ECC_NO_SUPPORTED_CURVES
#define GNUTLS_E_ECC_UNSUPPORTED_CURVE
#define GNUTLS_E_PKCS11_REQUESTED_OBJECT_NOT_AVAILABLE
#define GNUTLS_E_CERTIFICATE_LIST_UNSORTED
#define GNUTLS_E_ILLEGAL_PARAMETER
#define GNUTLS_E_NO_PRIORITIES_WERE_SET
#define GNUTLS_E_UNIMPLEMENTED_FEATURE
#define GNUTLS_E_APPLICATION_ERROR_MAX
#define GNUTLS_E_APPLICATION_ERROR_MIN
```

## Description

## Details

### HAVE\_SSIZE\_T

```
#define HAVE_SSIZE_T
```

**GNUTLS\_VERSION**

```
#define GNUTLS_VERSION "3.0.12"
```

**GNUTLS\_VERSION\_MAJOR**

```
#define GNUTLS_VERSION_MAJOR 3
```

**GNUTLS\_VERSION\_MINOR**

```
#define GNUTLS_VERSION_MINOR 0
```

**GNUTLS\_VERSION\_PATCH**

```
#define GNUTLS_VERSION_PATCH 12
```

**GNUTLS\_VERSION\_NUMBER**

```
#define GNUTLS_VERSION_NUMBER 0x03000c
```

**GNUTLS\_CIPHER\_RIJNDAEL\_128\_CBC**

```
#define GNUTLS_CIPHER_RIJNDAEL_128_CBC GNUTLS_CIPHER_AES_128_CBC
```

**GNUTLS\_CIPHER\_RIJNDAEL\_256\_CBC**

```
#define GNUTLS_CIPHER_RIJNDAEL_256_CBC GNUTLS_CIPHER_AES_256_CBC
```

**GNUTLS\_CIPHER\_RIJNDAEL\_CBC**

```
#define GNUTLS_CIPHER_RIJNDAEL_CBC GNUTLS_CIPHER_AES_128_CBC
```

**GNUTLS\_CIPHER\_ARCFOUR**

```
#define GNUTLS_CIPHER_ARCFOUR GNUTLS_CIPHER_ARCFOUR_128
```

**enum gnutls\_cipher\_algorithm\_t**

```
typedef enum gnutls_cipher_algorithm
{
    GNUTLS_CIPHER_UNKNOWN = 0,
    GNUTLS_CIPHER_NULL = 1,
    GNUTLS_CIPHER_ARCFOUR_128 = 2,
    GNUTLS_CIPHER_3DES_CBC = 3,
    GNUTLS_CIPHER_AES_128_CBC = 4,
    GNUTLS_CIPHER_AES_256_CBC = 5,
    GNUTLS_CIPHER_ARCFOUR_40 = 6,
    GNUTLS_CIPHER_CAMELLIA_128_CBC = 7,
    GNUTLS_CIPHER_CAMELLIA_256_CBC = 8,
    GNUTLS_CIPHER_RC2_40_CBC = 90,
    GNUTLS_CIPHER_DES_CBC = 91,
    GNUTLS_CIPHER_AES_192_CBC = 92,
    GNUTLS_CIPHER_AES_128_GCM = 93,
    GNUTLS_CIPHER_AES_256_GCM = 94,

    /* used only for PGP internals. Ignored in TLS/SSL
     */
    GNUTLS_CIPHER_IDEA_PGP_CFB = 200,
    GNUTLS_CIPHER_3DES_PGP_CFB = 201,
    GNUTLS_CIPHER_CAST5_PGP_CFB = 202,
    GNUTLS_CIPHER_BLOWFISH_PGP_CFB = 203,
    GNUTLS_CIPHER_SAFER_SK128_PGP_CFB = 204,
    GNUTLS_CIPHER_AES128_PGP_CFB = 205,
    GNUTLS_CIPHER_AES192_PGP_CFB = 206,
    GNUTLS_CIPHER_AES256_PGP_CFB = 207,
    GNUTLS_CIPHER_TWOFISH_PGP_CFB = 208
} gnutls_cipher_algorithm_t;
```

Enumeration of different symmetric encryption algorithms.

**GNUTLS\_CIPHER\_UNKNOWN** Unknown algorithm.

**GNUTLS\_CIPHER\_NULL** NULL algorithm.

**GNUTLS\_CIPHER\_ARCFOUR\_128** ARCFOUR stream cipher with 128-bit keys.

**GNUTLS\_CIPHER\_3DES\_CBC** 3DES in CBC mode.

**GNUTLS\_CIPHER\_AES\_128\_CBC** AES in CBC mode with 128-bit keys.

**GNUTLS\_CIPHER\_AES\_256\_CBC** AES in CBC mode with 256-bit keys.

**GNUTLS\_CIPHER\_ARCFOUR\_40** ARCFOUR stream cipher with 40-bit keys.

**GNUTLS\_CIPHER\_CAMELLIA\_128\_CBC** Camellia in CBC mode with 128-bit keys.

**GNUTLS\_CIPHER\_CAMELLIA\_256\_CBC** Camellia in CBC mode with 256-bit keys.

**GNUTLS\_CIPHER\_RC2\_40\_CBC** RC2 in CBC mode with 40-bit keys.

**GNUTLS\_CIPHER\_DES\_CBC** DES in CBC mode (56-bit keys).

**GNUTLS\_CIPHER\_AES\_192\_CBC** AES in CBC mode with 192-bit keys.

**GNUTLS\_CIPHER\_AES\_128\_GCM** AES in GCM mode with 128-bit keys.

**GNUTLS\_CIPHER\_AES\_256\_GCM** AES in GCM mode with 256-bit keys.

**GNUTLS\_CIPHER\_IDEA\_PGP\_CFB** IDEA in CFB mode.

**GNUTLS\_CIPHER\_3DES\_PGP\_CFB** 3DES in CFB mode.

**GNUTLS\_CIPHER\_CAST5\_PGP\_CFB** CAST5 in CFB mode.

**GNUTLS\_CIPHER\_BLOWFISH\_PGP\_CFB** Blowfish in CFB mode.

**GNUTLS\_CIPHER\_SAFER\_SK128\_PGP\_CFB** Safer-SK in CFB mode with 128-bit keys.

**GNUTLS\_CIPHER\_AES128\_PGP\_CFB** AES in CFB mode with 128-bit keys.

**GNUTLS\_CIPHER\_AES192\_PGP\_CFB** AES in CFB mode with 192-bit keys.

**GNUTLS\_CIPHER\_AES256\_PGP\_CFB** AES in CFB mode with 256-bit keys.

**GNUTLS\_CIPHER\_TWOFISH\_PGP\_CFB** Twofish in CFB mode.

#### **enum gnutls\_kx\_algorithm\_t**

```
typedef enum
{
    GNUTLS_KX_UNKNOWN = 0,
    GNUTLS_KX_RSA = 1,
    GNUTLS_KX_DHE_DSS = 2,
    GNUTLS_KX_DHE_RSA = 3,
    GNUTLS_KX_ANON_DH = 4,
    GNUTLS_KX_SRP = 5,
    GNUTLS_KX_RSA_EXPORT = 6,
    GNUTLS_KX_SRP_RSA = 7,
    GNUTLS_KX_SRP_DSS = 8,
    GNUTLS_KX_PSK = 9,
    GNUTLS_KX_DHE_PSK = 10,
    GNUTLS_KX_ANON_ECDH = 11,
    GNUTLS_KX_ECDHE_RSA = 12,
    GNUTLS_KX_ECDHE_ECDSA = 13,
    GNUTLS_KX_ECDHE_PSK = 14,
} gnutls_kx_algorithm_t;
```

Enumeration of different key exchange algorithms.

**GNUTLS\_KX\_UNKNOWN** Unknown key-exchange algorithm.

**GNUTLS\_KX\_RSA** RSA key-exchange algorithm.

**GNUTLS\_KX\_DHE\_DSS** DHE-DSS key-exchange algorithm.

**GNUTLS\_KX\_DHE\_RSA** DHE-RSA key-exchange algorithm.

**GNUTLS\_KX\_ANON\_DH** Anon-DH key-exchange algorithm.

**GNUTLS\_KX\_SRP** SRP key-exchange algorithm.

**GNUTLS\_KX\_RSA\_EXPORT** RSA-EXPORT key-exchange algorithm.

**GNUTLS\_KX\_SRP\_RSA** SRP-RSA key-exchange algorithm.

**GNUTLS\_KX\_SRP\_DSS** SRP-DSS key-exchange algorithm.

**GNUTLS\_KX\_PSK** PSK key-exchange algorithm.

**GNUTLS\_KX\_DHE\_PSK** DHE-PSK key-exchange algorithm.

**GNUTLS\_KX\_ANON\_ECDH** Anon-ECDH key-exchange algorithm.

**GNUTLS\_KX\_ECDHE\_RSA** ECDHE-RSA key-exchange algorithm.

**GNUTLS\_KX\_ECDHE\_ECDSA** ECDHE-ECDSA key-exchange algorithm.

**GNUTLS\_KX\_ECDHE\_PSK** ECDHE-PSK key-exchange algorithm.

**enum gnutls\_params\_type\_t**

```
typedef enum
{
    GNUTLS_PARAMS_RSA_EXPORT = 1,
    GNUTLS_PARAMS_DH = 2,
    GNUTLS_PARAMS_ECDH = 3,
} gnutls_params_type_t;
```

Enumeration of different TLS session parameter types.

**GNUTLS\_PARAMS\_RSA\_EXPORT** Session RSA-EXPORT parameters.

**GNUTLS\_PARAMS\_DH** Session Diffie-Hellman parameters.

**GNUTLS\_PARAMS\_ECDH** Session Elliptic-Curve Diffie-Hellman parameters.

**enum gnutls\_credentials\_type\_t**

```
typedef enum
{
    GNUTLS_CRD_CERTIFICATE = 1,
    GNUTLS_CRD_ANON,
    GNUTLS_CRD_SRP,
    GNUTLS_CRD_PSK,
    GNUTLS_CRD_IA
} gnutls_credentials_type_t;
```

Enumeration of different credential types.

**GNUTLS\_CRD\_CERTIFICATE** Certificate credential.

**GNUTLS\_CRD\_ANON** Anonymous credential.

**GNUTLS\_CRD\_SRP** SRP credential.

**GNUTLS\_CRD\_PSK** PSK credential.

**GNUTLS\_CRD\_IA** IA credential.

**GNUTLS\_MAC\_SHA**

```
#define GNUTLS_MAC_SHA GNUTLS_MAC_SHA1
```

**GNUTLS\_DIG\_SHA**

```
#define GNUTLS_DIG_SHA GNUTLS_DIG_SHA1
```

**enum gnutls\_mac\_algorithm\_t**

```
typedef enum
{
    GNUTLS_MAC_UNKNOWN = 0,
    GNUTLS_MAC_NULL = 1,
    GNUTLS_MAC_MD5 = 2,
    GNUTLS_MAC_SHA1 = 3,
    GNUTLS_MAC_RMD160 = 4,
    GNUTLS_MAC_MD2 = 5,
    GNUTLS_MAC_SHA256 = 6,
    GNUTLS_MAC_SHA384 = 7,
    GNUTLS_MAC_SHA512 = 8,
    GNUTLS_MAC_SHA224 = 9,
    /* If you add anything here, make sure you align with
       gnutls_digest_algorithm_t. */
    GNUTLS_MAC_AEAD = 200 /* indicates that MAC is on the cipher */
} gnutls_mac_algorithm_t;
```

Enumeration of different Message Authentication Code (MAC) algorithms.

**GNUTLS\_MAC\_UNKNOWN** Unknown MAC algorithm.

**GNUTLS\_MAC\_NULL** NULL MAC algorithm (empty output).

**GNUTLS\_MAC\_MD5** HMAC-MD5 algorithm.

**GNUTLS\_MAC\_SHA1** HMAC-SHA-1 algorithm.

**GNUTLS\_MAC\_RMD160** HMAC-RMD160 algorithm.

**GNUTLS\_MAC\_MD2** HMAC-MD2 algorithm.

**GNUTLS\_MAC\_SHA256** HMAC-SHA-256 algorithm.

**GNUTLS\_MAC\_SHA384** HMAC-SHA-384 algorithm.

**GNUTLS\_MAC\_SHA512** HMAC-SHA-512 algorithm.

**GNUTLS\_MAC\_SHA224** HMAC-SHA-224 algorithm.

**GNUTLS\_MAC\_AEAD** MAC implicit through AEAD cipher.

**enum gnutls\_digest\_algorithm\_t**

```
typedef enum
{
    GNUTLS_DIG_UNKNOWN = GNUTLS_MAC_UNKNOWN,
    GNUTLS_DIG_NULL = GNUTLS_MAC_NULL,
    GNUTLS_DIG_MD5 = GNUTLS_MAC_MD5,
    GNUTLS_DIG_SHA1 = GNUTLS_MAC_SHA1,
    GNUTLS_DIG_RMD160 = GNUTLS_MAC_RMD160,
    GNUTLS_DIG_MD2 = GNUTLS_MAC_MD2,
    GNUTLS_DIG_SHA256 = GNUTLS_MAC_SHA256,
    GNUTLS_DIG_SHA384 = GNUTLS_MAC_SHA384,
    GNUTLS_DIG_SHA512 = GNUTLS_MAC_SHA512,
    GNUTLS_DIG_SHA224 = GNUTLS_MAC_SHA224
    /* If you add anything here, make sure you align with
       gnutls_mac_algorithm_t. */
} gnutls_digest_algorithm_t;
```

Enumeration of different digest (hash) algorithms.

**GNUTLS\_DIG\_UNKNOWN** Unknown hash algorithm.

**GNUTLS\_DIG\_NULL** NULL hash algorithm (empty output).

**GNUTLS\_DIG\_MD5** MD5 algorithm.

**GNUTLS\_DIG\_SHA1** SHA-1 algorithm.

**GNUTLS\_DIG\_RMD160** RMD160 algorithm.

**GNUTLS\_DIG\_MD2** MD2 algorithm.

**GNUTLS\_DIG\_SHA256** SHA-256 algorithm.

**GNUTLS\_DIG\_SHA384** SHA-384 algorithm.

**GNUTLS\_DIG\_SHA512** SHA-512 algorithm.

**GNUTLS\_DIG\_SHA224** SHA-224 algorithm.

## **GNUTLS\_MAX\_ALGORITHM\_NUM**

```
#define GNUTLS_MAX_ALGORITHM_NUM 32
```

## **enum gnutls\_compression\_method\_t**

```
typedef enum
{
    GNUTLS_COMP_UNKNOWN = 0,
    GNUTLS_COMP_NULL = 1,
    GNUTLS_COMP_DEFLATE = 2,
    GNUTLS_COMP_ZLIB = GNUTLS_COMP_DEFLATE,
} gnutls_compression_method_t;
```

Enumeration of different TLS compression methods.

**GNUTLS\_COMP\_UNKNOWN** Unknown compression method.

**GNUTLS\_COMP\_NULL** The NULL compression method (no compression).

**GNUTLS\_COMP\_DEFLATE** The DEFLATE compression method from zlib.

**GNUTLS\_COMP\_ZLIB** Same as **GNUTLS\_COMP\_DEFLATE**.

## **GNUTLS\_SERVER**

```
#define GNUTLS_SERVER 1
```

## **GNUTLS\_CLIENT**

```
#define GNUTLS_CLIENT (1<<1)
```

## **GNUTLS\_DATAGRAM**

```
#define GNUTLS_DATAGRAM (1<<2)
```

**GNUTLS\_NONBLOCK**

```
#define GNUTLS_NONBLOCK (1<<3)
```

**enum gnutls\_alert\_level\_t**

```
typedef enum
{
    GNUTLS_AL_WARNING = 1,
    GNUTLS_AL_FATAL
} gnutls_alert_level_t;
```

Enumeration of different TLS alert severities.

**GNUTLS\_AL\_WARNING** Alert of warning severity.

**GNUTLS\_AL\_FATAL** Alert of fatal severity.

**enum gnutls\_alert\_description\_t**

```
typedef enum
{
    GNUTLS_A_CLOSE_NOTIFY,
    GNUTLS_A_UNEXPECTED_MESSAGE = 10,
    GNUTLS_A_BAD_RECORD_MAC = 20,
    GNUTLS_A_DECRYPTION_FAILED,
    GNUTLS_A_RECORD_OVERFLOW,
    GNUTLS_A_DECOMPRESSION_FAILURE = 30,
    GNUTLS_A_HANDSHAKE_FAILURE = 40,
    GNUTLS_A_SSL3_NO_CERTIFICATE = 41,
    GNUTLS_A_BAD_CERTIFICATE = 42,
    GNUTLS_A_UNSUPPORTED_CERTIFICATE,
    GNUTLS_A_CERTIFICATE_REVOKED,
    GNUTLS_A_CERTIFICATE_EXPIRED,
    GNUTLS_A_CERTIFICATE_UNKNOWN,
    GNUTLS_A_ILLEGAL_PARAMETER,
    GNUTLS_A_UNKNOWN_CA,
    GNUTLS_A_ACCESS_DENIED,
    GNUTLS_A_DECODE_ERROR = 50,
    GNUTLS_A_DECRYPT_ERROR,
    GNUTLS_A_EXPORT_RESTRICTION = 60,
    GNUTLS_A_PROTOCOL_VERSION = 70,
    GNUTLS_A_INSUFFICIENT_SECURITY,
    GNUTLS_A_INTERNAL_ERROR = 80,
    GNUTLS_A_USER_CANCELED = 90,
    GNUTLS_A_NO_RENEGOTIATION = 100,
    GNUTLS_A_UNSUPPORTED_EXTENSION = 110,
    GNUTLS_A_CERTIFICATE_UNOBTAINABLE = 111,
    GNUTLS_A_UNRECOGNIZED_NAME = 112,
    GNUTLS_A_UNKNOWN_PSK_IDENTITY = 115,
} gnutls_alert_description_t;
```

Enumeration of different TLS alerts.

**GNUTLS\_A\_CLOSE\_NOTIFY** Close notify.

**GNUTLS\_A\_UNEXPECTED\_MESSAGE** Unexpected message.



**GNUTLS\_A\_BAD\_RECORD\_MAC** Bad record MAC.

**GNUTLS\_A\_DECRYPTION\_FAILED** Decryption failed.

**GNUTLS\_A\_RECORD\_OVERFLOW** Record overflow.

**GNUTLS\_A\_DECOMPRESSION\_FAILURE** Decompression failed.

**GNUTLS\_A\_HANDSHAKE\_FAILURE** Handshake failed.

**GNUTLS\_A\_SSL3\_NO\_CERTIFICATE** No certificate.

**GNUTLS\_A\_BAD\_CERTIFICATE** Certificate is bad.

**GNUTLS\_A\_UNSUPPORTED\_CERTIFICATE** Certificate is not supported.

**GNUTLS\_A\_CERTIFICATE\_REVOKED** Certificate was revoked.

**GNUTLS\_A\_CERTIFICATE\_EXPIRED** Certificate is expired.

**GNUTLS\_A\_CERTIFICATE\_UNKNOWN** Unknown certificate.

**GNUTLS\_A\_ILLEGAL\_PARAMETER** Illegal parameter.

**GNUTLS\_A\_UNKNOWN\_CA** CA is unknown.

**GNUTLS\_A\_ACCESS\_DENIED** Access was denied.

**GNUTLS\_A\_DECODE\_ERROR** Decode error.

**GNUTLS\_A\_DECRYPT\_ERROR** Decrypt error.

**GNUTLS\_A\_EXPORT\_RESTRICTION** Export restriction.

**GNUTLS\_A\_PROTOCOL\_VERSION** Error in protocol version.

**GNUTLS\_A\_INSUFFICIENT\_SECURITY** Insufficient security.

**GNUTLS\_A\_INTERNAL\_ERROR** Internal error.

**GNUTLS\_A\_USER\_CANCELED** User canceled.

**GNUTLS\_A\_NO\_RENEGOTIATION** No renegotiation is allowed.

**GNUTLS\_A\_UNSUPPORTED\_EXTENSION** An unsupported extension was sent.

**GNUTLS\_A\_CERTIFICATE\_UNOBTAINABLE** Could not retrieve the specified certificate.

**GNUTLS\_A\_UNRECOGNIZED\_NAME** The server name sent was not recognized.

**GNUTLS\_A\_UNKNOWN\_PSK\_IDENTITY** The SRP/PSK username is missing or not known.

#### **enum gnutls\_handshake\_description\_t**

```
typedef enum
{
    GNUTLS_HANDSHAKE_HELLO_REQUEST = 0,
    GNUTLS_HANDSHAKE_CLIENT_HELLO = 1,
    GNUTLS_HANDSHAKE_SERVER_HELLO = 2,
    GNUTLS_HANDSHAKE_HELLO_VERIFY_REQUEST = 3,
    GNUTLS_HANDSHAKE_NEW_SESSION_TICKET = 4,
    GNUTLS_HANDSHAKE_CERTIFICATE_PKT = 11,
    GNUTLS_HANDSHAKE_SERVER_KEY_EXCHANGE = 12,
    GNUTLS_HANDSHAKE_CERTIFICATE_REQUEST = 13,
    GNUTLS_HANDSHAKE_SERVER_HELLO_DONE = 14,
    GNUTLS_HANDSHAKE_CERTIFICATE_VERIFY = 15,
```

```
GNUTLS_HANDSHAKE_CLIENT_KEY_EXCHANGE = 16,  
GNUTLS_HANDSHAKE_FINISHED = 20,  
GNUTLS_HANDSHAKE_SUPPLEMENTAL = 23,  
GNUTLS_HANDSHAKE_CHANGE_CIPHER_SPEC = 254,  
GNUTLS_HANDSHAKE_CLIENT_HELLO_V2 = 1024,  
} gnutls_handshake_description_t;
```

Enumeration of different TLS handshake packets.

**GNUTLS\_HANDSHAKE\_HELLO\_REQUEST** Hello request.

**GNUTLS\_HANDSHAKE\_CLIENT\_HELLO** Client hello.

**GNUTLS\_HANDSHAKE\_SERVER\_HELLO** Server hello.

**GNUTLS\_HANDSHAKE\_HELLO\_VERIFY\_REQUEST** DTLS Hello verify request.

**GNUTLS\_HANDSHAKE\_NEW\_SESSION\_TICKET** New session ticket.

**GNUTLS\_HANDSHAKE\_CERTIFICATE\_PKT** Certificate packet.

**GNUTLS\_HANDSHAKE\_SERVER\_KEY\_EXCHANGE** Server key exchange.

**GNUTLS\_HANDSHAKE\_CERTIFICATE\_REQUEST** Certificate request.

**GNUTLS\_HANDSHAKE\_SERVER\_HELLO\_DONE** Server hello done.

**GNUTLS\_HANDSHAKE\_CERTIFICATE\_VERIFY** Certificate verify.

**GNUTLS\_HANDSHAKE\_CLIENT\_KEY\_EXCHANGE** Client key exchange.

**GNUTLS\_HANDSHAKE\_FINISHED** Finished.

**GNUTLS\_HANDSHAKE\_SUPPLEMENTAL** Supplemental.

**GNUTLS\_HANDSHAKE\_CHANGE\_CIPHER\_SPEC** Change Cipher Spec

**GNUTLS\_HANDSHAKE\_CLIENT\_HELLO\_V2** SSLv2 Client Hello.

**enum gnutls\_certificate\_status\_t**

```
typedef enum  
{  
    GNUTLS_CERT_INVALID = 2,  
    GNUTLS_CERT_REVOKED = 32,  
    GNUTLS_CERT_SIGNER_NOT_FOUND = 64,  
    GNUTLS_CERT_SIGNER_NOT_CA = 128,  
    GNUTLS_CERT_INSECURE_ALGORITHM = 256,  
    GNUTLS_CERT_NOT_ACTIVATED = 512,  
    GNUTLS_CERT_EXPIRED = 1024  
} gnutls_certificate_status_t;
```

Enumeration of certificate status codes. Note that the status bits have different meanings in OpenPGP keys and X.509 certificate verification.

**GNUTLS\_CERT\_INVALID** The certificate is not signed by one of the known authorities or the signature is invalid.

**GNUTLS\_CERT\_REVOKED** Certificate is revoked by its authority. In X.509 this will be set only if CRLs are checked.

**GNUTLS\_CERT\_SIGNER\_NOT\_FOUND** The certificate's issuer is not known. This is the case if the issuer is not included in the trusted certificate list. not found.

**GNUTLS\_CERT\_SIGNER\_NOT\_CA** The certificate's signer was not a CA. This may happen if this was a version 1 certificate, which is common with some CAs, or a version 3 certificate without the basic constraints extension.

**GNUTLS\_CERT\_INSECURE\_ALGORITHM** The certificate was signed using an insecure algorithm such as MD2 or MD5. These algorithms have been broken and should not be trusted.

**GNUTLS\_CERT\_NOT\_ACTIVATED** The certificate is not yet activated.

**GNUTLS\_CERT\_EXPIRED** The certificate has expired.

#### enum gnutls\_certificate\_request\_t

```
typedef enum
{
    GNUTLS_CERT_IGNORE = 0,
    GNUTLS_CERT_REQUEST = 1,
    GNUTLS_CERT_REQUIRE = 2
} gnutls_certificate_request_t;
```

Enumeration of certificate request types.

**GNUTLS\_CERT\_IGNORE** Ignore certificate.

**GNUTLS\_CERT\_REQUEST** Request certificate.

**GNUTLS\_CERT\_REQUIRE** Require certificate.

#### enum gnutls\_openpgp\_cert\_status\_t

```
typedef enum
{
    GNUTLS_OPENPGP_CERT = 0,
    GNUTLS_OPENPGP_CERT_FINGERPRINT = 1
} gnutls_openpgp_cert_status_t;
```

Enumeration of ways to send OpenPGP certificate.

**GNUTLS\_OPENPGP\_CERT** Send entire certificate.

**GNUTLS\_OPENPGP\_CERT\_FINGERPRINT** Send only certificate fingerprint.

#### enum gnutls\_close\_request\_t

```
typedef enum
{
    GNUTLS_SHUT_RDWR = 0,
    GNUTLS_SHUT_WR = 1
} gnutls_close_request_t;
```

Enumeration of how TLS session should be terminated. See [gnutls\\_bye\(\)](#).

**GNUTLS\_SHUT\_RDWR** Disallow further receives/sends.

**GNUTLS\_SHUT\_WR** Disallow further sends.

**enum gnutls\_protocol\_t**

```
typedef enum
{
    GNUTLS_SSL3 = 1,
    GNUTLS_TLS1_0 = 2,
    GNUTLS_TLS1 = GNUTLS_TLS1_0,
    GNUTLS_TLS1_1 = 3,
    GNUTLS_TLS1_2 = 4,
    GNUTLS_DTLS1_0 = 5,
    GNUTLS_VERSION_MAX = GNUTLS_DTLS1_0,
    GNUTLS_VERSION_UNKNOWN = 0xff
} gnutls_protocol_t;
```

Enumeration of different SSL/TLS protocol versions.

**GNUTLS\_SSL3** SSL version 3.0.

**GNUTLS\_TLS1\_0** TLS version 1.0.

**GNUTLS\_TLS1** Same as **GNUTLS\_TLS1\_0**.

**GNUTLS\_TLS1\_1** TLS version 1.1.

**GNUTLS\_TLS1\_2** TLS version 1.2.

**GNUTLS\_DTLS1\_0** DTLS version 1.0.

**GNUTLS\_VERSION\_MAX** Maps to the highest supported TLS version.

**GNUTLS\_VERSION\_UNKNOWN** Unknown SSL/TLS version.

**enum gnutls\_certificate\_type\_t**

```
typedef enum
{
    GNUTLS_CRT_UNKNOWN = 0,
    GNUTLS_CRT_X509 = 1,
    GNUTLS_CRT_OPENPGP = 2
} gnutls_certificate_type_t;
```

Enumeration of different certificate types.

**GNUTLS\_CRT\_UNKNOWN** Unknown certificate type.

**GNUTLS\_CRT\_X509** X.509 Certificate.

**GNUTLS\_CRT\_OPENPGP** OpenPGP certificate.

**enum gnutls\_x509\_crt\_fmt\_t**

```
typedef enum
{
    GNUTLS_X509_FMT_DER = 0,
    GNUTLS_X509_FMT_PEM = 1
} gnutls_x509_crt_fmt_t;
```

Enumeration of different certificate encoding formats.

**GNUTLS\_X509\_FMT\_DER** X.509 certificate in DER format (binary).

**GNUTLS\_X509\_FMT\_PEM** X.509 certificate in PEM format (text).

**enum gnutls\_certificate\_print\_formats\_t**

```
typedef enum gnutls_certificate_print_formats
{
    GNUTLS_CERT_PRINT_FULL = 0,
    GNUTLS_CERT_PRINT_ONELINE = 1,
    GNUTLS_CERT_PRINT_UNSIGNED_FULL = 2
} gnutls_certificate_print_formats_t;
```

Enumeration of different certificate printing variants.

**GNUTLS\_CERT\_PRINT\_FULL** Full information about certificate.

**GNUTLS\_CERT\_PRINT\_ONELINE** Information about certificate in one line.

**GNUTLS\_CERT\_PRINT\_UNSIGNED\_FULL** All info for an unsigned certificate.

**GNUTLS\_PK\_ECC**

```
#define GNUTLS_PK_ECC GNUTLS_PK_EC
```

**enum gnutls\_pk\_algorithm\_t**

```
typedef enum
{
    GNUTLS_PK_UNKNOWN = 0,
    GNUTLS_PK_RSA = 1,
    GNUTLS_PK_DSA = 2,
    GNUTLS_PK_DH = 3,
    GNUTLS_PK_EC = 4,
} gnutls_pk_algorithm_t;
```

Enumeration of different public-key algorithms.

**GNUTLS\_PK\_UNKNOWN** Unknown public-key algorithm.

**GNUTLS\_PK\_RSA** RSA public-key algorithm.

**GNUTLS\_PK\_DSA** DSA public-key algorithm.

**GNUTLS\_PK\_DH** Diffie-Hellman algorithm. Used to generate parameters.

**GNUTLS\_PK\_EC** Elliptic curve algorithm. Used to generate parameters.

**gnutls\_pk\_algorithm\_get\_name ()**

```
const char * gnutls_pk_algorithm_get_name (gnutls_pk_algorithm_t algorithm);
```

Convert a **gnutls\_pk\_algorithm\_t** value to a string.

**algorithm**: is a pk algorithm

**Returns**: a string that contains the name of the specified public key algorithm, or **NULL**.

**enum gnutls\_sign\_algorithm\_t**

```
typedef enum
{
    GNUTLS_SIGN_UNKNOWN = 0,
    GNUTLS_SIGN_RSA_SHA1 = 1,
    GNUTLS_SIGN_RSA_SHA = GNUTLS_SIGN_RSA_SHA1,
    GNUTLS_SIGN_DSA_SHA1 = 2,
    GNUTLS_SIGN_DSA_SHA = GNUTLS_SIGN_DSA_SHA1,
    GNUTLS_SIGN_RSA_MD5 = 3,
    GNUTLS_SIGN_RSA_MD2 = 4,
    GNUTLS_SIGN_RSA_RMD160 = 5,
    GNUTLS_SIGN_RSA_SHA256 = 6,
    GNUTLS_SIGN_RSA_SHA384 = 7,
    GNUTLS_SIGN_RSA_SHA512 = 8,
    GNUTLS_SIGN_RSA_SHA224 = 9,
    GNUTLS_SIGN_DSA_SHA224 = 10,
    GNUTLS_SIGN_DSA_SHA256 = 11,
    GNUTLS_SIGN_ECDSA_SHA1 = 12,
    GNUTLS_SIGN_ECDSA_SHA224 = 13,
    GNUTLS_SIGN_ECDSA_SHA256 = 14,
    GNUTLS_SIGN_ECDSA_SHA384 = 15,
    GNUTLS_SIGN_ECDSA_SHA512 = 16,
} gnutls_sign_algorithm_t;
```

Enumeration of different digital signature algorithms.

**GNUTLS\_SIGN\_UNKNOWN** Unknown signature algorithm.

**GNUTLS\_SIGN\_RSA\_SHA1** Digital signature algorithm RSA with SHA-1

**GNUTLS\_SIGN\_RSA\_SHA** Same as **GNUTLS\_SIGN\_RSA\_SHA1**.

**GNUTLS\_SIGN\_DSA\_SHA1** Digital signature algorithm DSA with SHA-1

**GNUTLS\_SIGN\_DSA\_SHA** Same as **GNUTLS\_SIGN\_DSA\_SHA1**.

**GNUTLS\_SIGN\_RSA\_MD5** Digital signature algorithm RSA with MD5.

**GNUTLS\_SIGN\_RSA\_MD2** Digital signature algorithm RSA with MD2.

**GNUTLS\_SIGN\_RSA\_RMD160** Digital signature algorithm RSA with RMD-160.

**GNUTLS\_SIGN\_RSA\_SHA256** Digital signature algorithm RSA with SHA-256.

**GNUTLS\_SIGN\_RSA\_SHA384** Digital signature algorithm RSA with SHA-384.

**GNUTLS\_SIGN\_RSA\_SHA512** Digital signature algorithm RSA with SHA-512.

**GNUTLS\_SIGN\_RSA\_SHA224** Digital signature algorithm RSA with SHA-224.

**GNUTLS\_SIGN\_DSA\_SHA224** Digital signature algorithm DSA with SHA-224

**GNUTLS\_SIGN\_DSA\_SHA256** Digital signature algorithm DSA with SHA-256

**GNUTLS\_SIGN\_ECDSA\_SHA1** ECDSA with SHA1.

**GNUTLS\_SIGN\_ECDSA\_SHA224** Digital signature algorithm ECDSA with SHA-224.

**GNUTLS\_SIGN\_ECDSA\_SHA256** Digital signature algorithm ECDSA with SHA-256.

**GNUTLS\_SIGN\_ECDSA\_SHA384** Digital signature algorithm ECDSA with SHA-384.

**GNUTLS\_SIGN\_ECDSA\_SHA512** Digital signature algorithm ECDSA with SHA-512.

**enum gnutls\_ecc\_curve\_t**

```
typedef enum
{
    GNUTLS_ECC_CURVE_INVALID=0,
    GNUTLS_ECC_CURVE_SECP224R1,
    GNUTLS_ECC_CURVE_SECP256R1,
    GNUTLS_ECC_CURVE_SECP384R1,
    GNUTLS_ECC_CURVE_SECP521R1,
    GNUTLS_ECC_CURVE_SECP192R1,
} gnutls_ecc_curve_t;
```

Enumeration of ECC curves.

**GNUTLS\_ECC\_CURVE\_INVALID** Cannot be known

**GNUTLS\_ECC\_CURVE\_SECP224R1** the SECP224R1 curve

**GNUTLS\_ECC\_CURVE\_SECP256R1** the SECP256R1 curve

**GNUTLS\_ECC\_CURVE\_SECP384R1** the SECP384R1 curve

**GNUTLS\_ECC\_CURVE\_SECP521R1** the SECP521R1 curve

**GNUTLS\_ECC\_CURVE\_SECP192R1** the SECP192R1 curve

**enum gnutls\_sec\_param\_t**

```
typedef enum
{
    GNUTLS_SEC_PARAM_UNKNOWN,
    GNUTLS_SEC_PARAM_WEAK,
    GNUTLS_SEC_PARAM_LOW,
    GNUTLS_SEC_PARAM_NORMAL,
    GNUTLS_SEC_PARAM_HIGH,
    GNUTLS_SEC_PARAM_ULTRA
} gnutls_sec_param_t;
```

Enumeration of security parameters for passive attacks

**GNUTLS\_SEC\_PARAM\_UNKNOWN** Cannot be known

**GNUTLS\_SEC\_PARAM\_WEAK** 50 or less bits of security

**GNUTLS\_SEC\_PARAM\_LOW** 80 bits of security

**GNUTLS\_SEC\_PARAM\_NORMAL** 112 bits of security

**GNUTLS\_SEC\_PARAM\_HIGH** 128 bits of security

**GNUTLS\_SEC\_PARAM\_ULTRA** 192 bits of security

**enum gnutls\_channel\_binding\_t**

```
typedef enum
{
    GNUTLS_CB_TLS_UNIQUE
} gnutls_channel_binding_t;
```

Enumeration of support channel binding types.

**GNUTLS\_CB\_TLS\_UNIQUE** "tls-unique" (RFC 5929) channel binding

**gnutls\_transport\_ptr\_t**

```
typedef void *gnutls_transport_ptr_t;
```

**struct gnutls\_session\_int**

```
struct gnutls_session_int;
```

**gnutls\_session\_t**

```
typedef struct gnutls_session_int *gnutls_session_t;
```

**struct gnutls\_dh\_params\_int**

```
struct gnutls_dh_params_int;
```

**gnutls\_dh\_params\_t**

```
typedef struct gnutls_dh_params_int *gnutls_dh_params_t;
```

**struct gnutls\_ecdh\_params\_int**

```
struct gnutls_ecdh_params_int;
```

**gnutls\_ecdh\_params\_t**

```
typedef struct gnutls_ecdh_params_int *gnutls_ecdh_params_t;
```

**struct gnutls\_x509\_privkey\_int**

```
struct gnutls_x509_privkey_int;
```

**gnutls\_rsa\_params\_t**

```
typedef struct gnutls_x509_privkey_int *gnutls_rsa_params_t;
```

**struct gnutls\_priority\_st**

```
struct gnutls_priority_st;
```

**gnutls\_priority\_t**

```
typedef struct gnutls_priority_st *gnutls_priority_t;
```



**gnutls\_init ()**

```
int gnutls_init (gnutls_session_t *session, unsigned int flags);
```

This function initializes the current session to null. Every session must be initialized before use, so internal structures can be allocated. This function allocates structures which can only be free'd by calling **gnutls\_deinit()**. Returns **GNUTLS\_E\_SUCCESS** (0) on success.

*flags* can be one of **GNUTLS\_CLIENT** and **GNUTLS\_SERVER**. For a DTLS entity, the flags **GNUTLS\_DATAGRAM** and **GNUTLS\_NONBLOCK** are also available. The latter flag will enable a non-blocking operation of the DTLS timers.

**session** : is a pointer to a **gnutls\_session\_t** structure.

**flags** : indicate if this session is to be used for server or client.

**Returns** : **GNUTLS\_E\_SUCCESS** on success, or an error code.

**gnutls\_deinit ()**

```
void gnutls_deinit (gnutls_session_t session);
```

This function clears all buffers associated with the *session*. This function will also remove session data from the session database if the session was terminated abnormally.

**session** : is a **gnutls\_session\_t** structure.

**gnutls\_bye ()**

```
int gnutls_bye (gnutls_session_t session, gnutls_close_request_t how);
```

Terminates the current TLS/SSL connection. The connection should have been initiated using **gnutls\_handshake()**. *how* should be one of **GNUTLS\_SHUT\_RDWR**, **GNUTLS\_SHUT\_WR**.

In case of **GNUTLS\_SHUT\_RDWR** the TLS session gets terminated and further receives and sends will be disallowed. If the return value is zero you may continue using the underlying transport layer. **GNUTLS\_SHUT\_RDWR** sends an alert containing a close request and waits for the peer to reply with the same message.

In case of **GNUTLS\_SHUT\_WR** the TLS session gets terminated and further sends will be disallowed. In order to reuse the connection you should wait for an EOF from the peer. **GNUTLS\_SHUT\_WR** sends an alert containing a close request.

Note that not all implementations will properly terminate a TLS connection. Some of them, usually for performance reasons, will terminate only the underlying transport layer, and thus not distinguishing between a malicious party prematurely terminating the connection and normal termination.

This function may also return **GNUTLS\_E\_AGAIN** or **GNUTLS\_E\_INTERRUPTED**; cf. **gnutls\_record\_get\_direction()**.

**session** : is a **gnutls\_session\_t** structure.

**how** : is an integer

**Returns** : **GNUTLS\_E\_SUCCESS** on success, or an error code, see function documentation for entire semantics.

**gnutls\_handshake ()**

```
int gnutls_handshake (gnutls_session_t session);
```

This function does the handshake of the TLS/SSL protocol, and initializes the TLS connection.

This function will fail if any problem is encountered, and will return a negative error code. In case of a client, if the client has asked to resume a session, but the server couldn't, then a full handshake will be performed.

The non-fatal errors such as **GNUTLS\_E\_AGAIN** and **GNUTLS\_E\_INTERRUPTED** interrupt the handshake procedure, which should be resumed later. Call this function again, until it returns 0; cf. **gnutls\_record\_get\_direction()** and **gnutls\_error\_is\_fatal()**.

If this function is called by a server after a rehandshake request then **GNUTLS\_E\_GOT\_APPLICATION\_DATA** or **GNUTLS\_E\_WARNING\_ALERT\_RECEIVED** may be returned. Note that these are non fatal errors, only in the specific case of a rehandshake. Their meaning is that the client rejected the rehandshake request or in the case of **GNUTLS\_E\_GOT\_APPLICATION\_DATA** it might also mean that some data were pending.

**session** : is a **gnutls\_session\_t** structure.

**Returns** : **GNUTLS\_E\_SUCCESS** on success, otherwise a negative error code.

**gnutls\_rehandshake ()**

```
int gnutls_rehandshake (gnutls_session_t session);
```

This function will renegotiate security parameters with the client. This should only be called in case of a server.

This message informs the peer that we want to renegotiate parameters (perform a handshake).

If this function succeeds (returns 0), you must call the **gnutls\_handshake()** function in order to negotiate the new parameters.

Since TLS is full duplex some application data might have been sent during peer's processing of this message. In that case one should call **gnutls\_record\_recv()** until **GNUTLS\_E\_REHANDSHAKE** is returned to clear any pending data. Care must be taken if rehandshake is mandatory to terminate if it does not start after some threshold.

If the client does not wish to renegotiate parameters he will should with an alert message, thus the return code will be **GNUTLS\_E\_WARNING\_ALERT\_RECEIVED** and the alert will be **GNUTLS\_A\_NO\_RENEGOTIATION**. A client may also choose to ignore this message.

**session** : is a **gnutls\_session\_t** structure.

**Returns** : **GNUTLS\_E\_SUCCESS** on success, otherwise a negative error code.

**gnutls\_alert\_get ()**

```
gnutls_alert_description_t gnutls_alert_get (gnutls_session_t session);
```

This function will return the last alert number received. This function should be called when **GNUTLS\_E\_WARNING\_ALERT\_RECEIVED** or **GNUTLS\_E\_FATAL\_ALERT\_RECEIVED** errors are returned by a gnutls function. The peer may send alerts if he encounters an error. If no alert has been received the returned value is undefined.

**session** : is a **gnutls\_session\_t** structure.

**Returns** : the last alert received, a **gnutls\_alert\_description\_t** value.

**gnutls\_alert\_send ()**

```
int gnutls_alert_send (gnutls_session_t session,
                      gnutls_alert_level_t level,
                      gnutls_alert_description_t desc);
```

This function will send an alert to the peer in order to inform him of something important (eg. his Certificate could not be verified). If the alert level is Fatal then the peer is expected to close the connection, otherwise he may ignore the alert and continue.

The error code of the underlying record send function will be returned, so you may also receive **GNUTLS\_E\_INTERRUPTED** or **GNUTLS\_E\_AGAIN** as well.

**session** : is a **gnutls\_session\_t** structure.

**level** : is the level of the alert

**desc** : is the alert description

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise an error code is returned.

**gnutls\_alert\_send\_appropriate ()**

```
int gnutls_alert_send_appropriate (gnutls_session_t session,
                                   int err);
```

Sends an alert to the peer depending on the error code returned by a gnutls function. This function will call **gnutls\_error\_to\_alert()** to determine the appropriate alert to send.

This function may also return **GNUTLS\_E\_AGAIN**, or **GNUTLS\_E\_INTERRUPTED**.

If the return value is **GNUTLS\_E\_INVALID\_REQUEST**, then no alert has been sent to the peer.

**session** : is a **gnutls\_session\_t** structure.

**err** : is an integer

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise an error code is returned.

**gnutls\_alert\_get\_name ()**

```
const char * gnutls_alert_get_name (gnutls_alert_description_t alert);
```

This function will return a string that describes the given alert number, or **NULL**. See **gnutls\_alert\_get()**.

**alert** : is an alert number.

**Returns** : string corresponding to **gnutls\_alert\_description\_t** value.

**gnutls\_alert\_get\_strerror ()**

```
const char * gnutls_alert_get_strerror (gnutls_alert_description_t alert);
```

This function will return a string of the name of the alert.

**alert** : is an alert number.

**Returns** : string corresponding to **gnutls\_alert\_description\_t** value.

Since 3.0.0

**gnutls\_pk\_bits\_to\_sec\_param ()**

```
gnutls_sec_param_t  gnutls_pk_bits_to_sec_param      (gnutls_pk_algorithm_t algo,  
                                                    unsigned int bits);
```

This is the inverse of [gnutls\\_sec\\_param\\_to\\_pk\\_bits\(\)](#). Given an algorithm and the number of bits, it will return the security parameter. This is a rough indication.

**algo** : is a public key algorithm

**bits** : is the number of bits

**Returns** : The security parameter.

Since 2.12.0

**gnutls\_sec\_param\_get\_name ()**

```
const char *        gnutls_sec_param_get_name      (gnutls_sec_param_t param);
```

Convert a [gnutls\\_sec\\_param\\_t](#) value to a string.

**param** : is a security parameter

**Returns** : a pointer to a string that contains the name of the specified security level, or **NULL**.

Since 2.12.0

**gnutls\_sec\_param\_to\_pk\_bits ()**

```
unsigned int        gnutls_sec_param_to_pk_bits     (gnutls_pk_algorithm_t algo,  
                                                    gnutls_sec_param_t param);
```

When generating private and public key pairs a difficult question is which size of "bits" the modulus will be in RSA and the group size in DSA. The easy answer is 1024, which is also wrong. This function will convert a human understandable security parameter to an appropriate size for the specific algorithm.

**algo** : is a public key algorithm

**param** : is a security parameter

**Returns** : The number of bits, or (0).

Since 2.12.0

**gnutls\_ecc\_curve\_get\_name ()**

```
const char *        gnutls_ecc_curve_get_name     (gnutls_ecc_curve_t curve);
```

Convert a [gnutls\\_ecc\\_curve\\_t](#) value to a string.

**curve** : is an ECC curve

**Returns** : a string that contains the name of the specified curve or **NULL**.

Since 3.0.0

**gnutls\_ecc\_curve\_get\_size ()**

```
int gnutls_ecc_curve_get_size (gnutls_ecc_curve_t curve);
```

Returns the size in bytes of the curve.

**curve** : is an ECC curve

**Returns** : a the size or (0).

Since 3.0.0

**gnutls\_ecc\_curve\_get ()**

```
gnutls_ecc_curve_t gnutls_ecc_curve_get (gnutls_session_t session);
```

Returns the currently used elliptic curve. Only valid when using an elliptic curve ciphersuite.

**session** : is a [gnutls\\_session\\_t](#) structure.

**Returns** : the currently used curve, a [gnutls\\_ecc\\_curve\\_t](#) type.

Since 3.0.0

**gnutls\_cipher\_get ()**

```
gnutls_cipher_algorithm_t gnutls_cipher_get (gnutls_session_t session);
```

Get currently used cipher.

**session** : is a [gnutls\\_session\\_t](#) structure.

**Returns** : the currently used cipher, a [gnutls\\_cipher\\_algorithm\\_t](#) type.

**gnutls\_kx\_get ()**

```
gnutls_kx_algorithm_t gnutls_kx_get (gnutls_session_t session);
```

Get currently used key exchange algorithm.

**session** : is a [gnutls\\_session\\_t](#) structure.

**Returns** : the key exchange algorithm used in the last handshake, a [gnutls\\_kx\\_algorithm\\_t](#) value.

**gnutls\_mac\_get ()**

```
gnutls_mac_algorithm_t gnutls_mac_get (gnutls_session_t session);
```

Get currently used MAC algorithm.

**session** : is a [gnutls\\_session\\_t](#) structure.

**Returns** : the currently used mac algorithm, a [gnutls\\_mac\\_algorithm\\_t](#) value.

**gnutls\_compression\_get ()**

```
gnutls_compression_method_t gnutls_compression_get (gnutls_session_t session);
```

Get currently used compression algorithm.

**session** : is a `gnutls_session_t` structure.

**Returns** : the currently used compression method, a `gnutls_compression_method_t` value.

**gnutls\_certificate\_type\_get ()**

```
gnutls_certificate_type_t gnutls_certificate_type_get (gnutls_session_t session);
```

The certificate type is by default X.509, unless it is negotiated as a TLS extension.

**session** : is a `gnutls_session_t` structure.

**Returns** : the currently used `gnutls_certificate_type_t` certificate type.

**gnutls\_sign\_algorithm\_get\_requested ()**

```
int gnutls_sign_algorithm_get_requested (gnutls_session_t session,
                                         size_t indx,
                                         gnutls_sign_algorithm_t *algo);
```

Returns the signature algorithm specified by index that was requested by the peer. If the specified index has no data available this function returns `GNUTLS_E_REQUESTED_DATA_NOT_AVAILABLE`. If the negotiated TLS version does not support signature algorithms then `GNUTLS_E_REQUESTED_DATA_NOT_AVAILABLE` will be returned even for the first index. The first index is 0.

This function is useful in the certificate callback functions to assist in selecting the correct certificate.

**session** : is a `gnutls_session_t` structure.

**indx** : is an index of the signature algorithm to return

**algo** : the returned certificate type will be stored there

**Returns** : On success, `GNUTLS_E_SUCCESS` (0) is returned, otherwise an error code is returned.

Since 2.10.0

**gnutls\_cipher\_get\_key\_size ()**

```
size_t gnutls_cipher_get_key_size (gnutls_cipher_algorithm_t cipher_algorithm);
```

Get key size for cipher.

**algorithm** : is an encryption algorithm

**Returns** : length (in bytes) of the given cipher's key size, or 0 if the given cipher is invalid.

**gnutls\_mac\_get\_key\_size ()**

```
size_t          gnutls_mac_get_key_size          (gnutls_mac_algorithm_t algorithm);
```

Get size of MAC key.

**algorithm** : is an encryption algorithm

**Returns** : length (in bytes) of the given MAC key size, or 0 if the given MAC algorithm is invalid.

**gnutls\_cipher\_get\_name ()**

```
const char *    gnutls_cipher_get_name          (gnutls_cipher_algorithm_t ↔  
algorithm);
```

Convert a **gnutls\_cipher\_algorithm\_t** type to a string.

**algorithm** : is an encryption algorithm

**Returns** : a pointer to a string that contains the name of the specified cipher, or **NULL**.

**gnutls\_mac\_get\_name ()**

```
const char *    gnutls_mac_get_name            (gnutls_mac_algorithm_t algorithm);
```

Convert a **gnutls\_mac\_algorithm\_t** value to a string.

**algorithm** : is a MAC algorithm

**Returns** : a string that contains the name of the specified MAC algorithm, or **NULL**.

**gnutls\_compression\_get\_name ()**

```
const char *    gnutls_compression_get_name    (gnutls_compression_method_t ↔  
algorithm);
```

Convert a **gnutls\_compression\_method\_t** value to a string.

**algorithm** : is a Compression algorithm

**Returns** : a pointer to a string that contains the name of the specified compression algorithm, or **NULL**.

**gnutls\_kx\_get\_name ()**

```
const char *    gnutls_kx_get_name            (gnutls_kx_algorithm_t algorithm);
```

Convert a **gnutls\_kx\_algorithm\_t** value to a string.

**algorithm** : is a key exchange algorithm

**Returns** : a pointer to a string that contains the name of the specified key exchange algorithm, or **NULL**.

---

**gnutls\_certificate\_type\_get\_name ()**

```
const char *      gnutls_certificate_type_get_name      (gnutls_certificate_type_t type);
```

Convert a **gnutls\_certificate\_type\_t** type to a string.

**type** : is a certificate type

**Returns** : a string that contains the name of the specified certificate type, or **NULL** in case of unknown types.

**gnutls\_pk\_get\_name ()**

```
const char *      gnutls_pk_get_name                    (gnutls_pk_algorithm_t algorithm);
```

Convert a **gnutls\_pk\_algorithm\_t** value to a string.

**algorithm** : is a public key algorithm

**Returns** : a pointer to a string that contains the name of the specified public key algorithm, or **NULL**.

Since 2.6.0

**gnutls\_sign\_get\_name ()**

```
const char *      gnutls_sign_get_name                  (gnutls_sign_algorithm_t algorithm) ↵  
;
```

Convert a **gnutls\_sign\_algorithm\_t** value to a string.

**algorithm** : is a sign algorithm

**Returns** : a string that contains the name of the specified sign algorithm, or **NULL**.

**gnutls\_sign\_algorithm\_get\_name**

```
#define gnutls_sign_algorithm_get_name gnutls_sign_get_name
```

**gnutls\_mac\_get\_id ()**

```
gnutls_mac_algorithm_t gnutls_mac_get_id                (const char *name);
```

Convert a string to a **gnutls\_mac\_algorithm\_t** value. The names are compared in a case insensitive way.

**name** : is a MAC algorithm name

**Returns** : a **gnutls\_mac\_algorithm\_t** id of the specified MAC algorithm string, or **GNUTLS\_MAC\_UNKNOWN** on failures.

**gnutls\_compression\_get\_id ()**

```
gnutls_compression_method_t gnutls_compression_get_id   (const char *name);
```

The names are compared in a case insensitive way.

**name** : is a compression method name

**Returns** : an id of the specified in a string compression method, or **GNUTLS\_COMP\_UNKNOWN** on error.



**gnutls\_cipher\_get\_id ()**

```
gnutls_cipher_algorithm_t gnutls_cipher_get_id (const char *name);
```

The names are compared in a case insensitive way.

**name** : is a cipher algorithm name

**Returns** : return a `gnutls_cipher_algorithm_t` value corresponding to the specified cipher, or `GNUTLS_CIPHER_UNKNOWN` on error.

**gnutls\_kx\_get\_id ()**

```
gnutls_kx_algorithm_t gnutls_kx_get_id (const char *name);
```

Convert a string to a `gnutls_kx_algorithm_t` value. The names are compared in a case insensitive way.

**name** : is a KX name

**Returns** : an id of the specified KX algorithm, or `GNUTLS_KX_UNKNOWN` on error.

**gnutls\_protocol\_get\_id ()**

```
gnutls_protocol_t gnutls_protocol_get_id (const char *name);
```

The names are compared in a case insensitive way.

**name** : is a protocol name

**Returns** : an id of the specified protocol, or `GNUTLS_VERSION_UNKNOWN` on error.

**gnutls\_certificate\_type\_get\_id ()**

```
gnutls_certificate_type_t gnutls_certificate_type_get_id (const char *name);
```

The names are compared in a case insensitive way.

**name** : is a certificate type name

**Returns** : a `gnutls_certificate_type_t` for the specified in a string certificate type, or `GNUTLS_CERT_UNKNOWN` on error.

**gnutls\_pk\_get\_id ()**

```
gnutls_pk_algorithm_t gnutls_pk_get_id (const char *name);
```

Convert a string to a `gnutls_pk_algorithm_t` value. The names are compared in a case insensitive way. For example, `gnutls_pk_get_id("RSA")` will return `GNUTLS_PK_RSA`.

**name** : is a string containing a public key algorithm name.

**Returns** : a `gnutls_pk_algorithm_t` id of the specified public key algorithm string, or `GNUTLS_PK_UNKNOWN` on failures.

Since 2.6.0

**gnutls\_sign\_get\_id ()**

```
gnutls_sign_algorithm_t gnutls_sign_get_id (const char *name);
```

The names are compared in a case insensitive way.

**name** : is a MAC algorithm name

**Returns** : return a `gnutls_sign_algorithm_t` value corresponding to the specified cipher, or `GNUTLS_SIGN_UNKNOWN` on error.

**gnutls\_cipher\_list ()**

```
const gnutls_cipher_algorithm_t * gnutls_cipher_list (void);
```

Get a list of supported cipher algorithms. Note that not necessarily all ciphers are supported as TLS cipher suites. For example, DES is not supported as a cipher suite, but is supported for other purposes (e.g., PKCS#8 or similar).

This function is not thread safe.

**Returns** : a (0)-terminated list of `gnutls_cipher_algorithm_t` integers indicating the available ciphers.

**gnutls\_mac\_list ()**

```
const gnutls_mac_algorithm_t * gnutls_mac_list (void);
```

Get a list of hash algorithms for use as MACs. Note that not necessarily all MACs are supported in TLS cipher suites. For example, MD2 is not supported as a cipher suite, but is supported for other purposes (e.g., X.509 signature verification or similar).

This function is not thread safe.

**Returns** : Return a (0)-terminated list of `gnutls_mac_algorithm_t` integers indicating the available MACs.

**gnutls\_compression\_list ()**

```
const gnutls_compression_method_t * gnutls_compression_list  
                                     (void);
```

Get a list of compression methods.

**Returns** : a zero-terminated list of `gnutls_compression_method_t` integers indicating the available compression methods.

**gnutls\_protocol\_list ()**

```
const gnutls_protocol_t * gnutls_protocol_list (void);
```

Get a list of supported protocols, e.g. SSL 3.0, TLS 1.0 etc.

This function is not thread safe.

**Returns** : a (0)-terminated list of `gnutls_protocol_t` integers indicating the available protocols.

**gnutls\_certificate\_type\_list ()**

```
const gnutls_certificate_type_t * gnutls_certificate_type_list
                                   (void);
```

Get a list of certificate types. Note that to be able to use OpenPGP certificates, you must link to libgnutls-extra and call [gnutls\\_global\\_init\\_extra\(\)](#).

**Returns :** a (0)-terminated list of [gnutls\\_certificate\\_type\\_t](#) integers indicating the available certificate types.

**gnutls\_kx\_list ()**

```
const gnutls_kx_algorithm_t * gnutls_kx_list          (void);
```

Get a list of supported key exchange algorithms.

This function is not thread safe.

**Returns :** a (0)-terminated list of [gnutls\\_kx\\_algorithm\\_t](#) integers indicating the available key exchange algorithms.

**gnutls\_pk\_list ()**

```
const gnutls_pk_algorithm_t * gnutls_pk_list          (void);
```

Get a list of supported public key algorithms.

This function is not thread safe.

**Returns :** a (0)-terminated list of [gnutls\\_pk\\_algorithm\\_t](#) integers indicating the available ciphers.

Since 2.6.0

**gnutls\_sign\_list ()**

```
const gnutls_sign_algorithm_t * gnutls_sign_list      (void);
```

Get a list of supported public key signature algorithms.

**Returns :** a (0)-terminated list of [gnutls\\_sign\\_algorithm\\_t](#) integers indicating the available ciphers.

**gnutls\_cipher\_suite\_info ()**

```
const char *          gnutls_cipher_suite_info      (size_t idx,
                                                    unsigned char *cs_id,
                                                    gnutls_kx_algorithm_t *kx,
                                                    gnutls_cipher_algorithm_t *cipher,
                                                    gnutls_mac_algorithm_t *mac,
                                                    gnutls_protocol_t *min_version);
```

Get information about supported cipher suites. Use the function iteratively to get information about all supported cipher suites. Call with `idx=0` to get information about first cipher suite, then `idx=1` and so on until the function returns NULL.

**idx :** index of cipher suite to get information about, starts on 0.

---

**cs\_id** : output buffer with room for 2 bytes, indicating cipher suite value

**kx** : output variable indicating key exchange algorithm, or **NULL**.

**cipher** : output variable indicating cipher, or **NULL**.

**mac** : output variable indicating MAC algorithm, or **NULL**.

**min\_version** : output variable indicating TLS protocol version, or **NULL**.

**Returns** : the name of *idx* cipher suite, and set the information about the cipher suite in the output variables. If *idx* is out of bounds, **NULL** is returned.

### gnutls\_error\_is\_fatal ()

```
int gnutls_error_is_fatal (int error);
```

If a GnuTLS function returns a negative error code you may feed that value to this function to see if the error condition is fatal. Note that you may also want to check the error code manually, since some non-fatal errors to the protocol (such as a warning alert or a rehandshake request) may be fatal for your program.

This function is only useful if you are dealing with errors from the record layer or the handshake layer.

**error** : is a GnuTLS error code, a negative error code

**Returns** : 1 if the error code is fatal, for positive *error* values, 0 is returned. For unknown *error* values, -1 is returned.

### gnutls\_error\_to\_alert ()

```
int gnutls_error_to_alert (int err, int *level);
```

Get an alert depending on the error code returned by a gnutls function. All alerts sent by this function should be considered fatal. The only exception is when *err* is **GNUTLS\_E\_REHANDSHAKE**, where a warning alert should be sent to the peer indicating that no renegotiation will be performed.

If there is no mapping to a valid alert the alert to indicate internal error is returned.

**err** : is a negative integer

**level** : the alert level will be stored there

**Returns** : the alert code to use for a particular error code.

### gnutls\_perror ()

```
void gnutls_perror (int error);
```

This function is like **fprintf(stderr, "GnuTLS error: %s", gnutls\_strerror(-error))**. The only difference is that it accepts an error number returned by a gnutls function.

**error** : is a GnuTLS error code, a negative error code

**gnutls\_strerror ()**

```
const char *      gnutls_strerror      (int error);
```

This function is similar to `strerror`. The difference is that it accepts an error number returned by a gnutls function; In case of an unknown error a descriptive string is sent instead of `NULL`.

Error codes are always a negative error code.

**error** : is a GnuTLS error code, a negative error code

**Returns** : A string explaining the GnuTLS error message.

**gnutls\_strerror\_name ()**

```
const char *      gnutls_strerror_name (int error);
```

Return the GnuTLS error code define as a string. For example, `gnutls_strerror_name (GNUTLS_E_DH_PRIME_UNACCEPTABLE)` will return the string "GNUTLS\_E\_DH\_PRIME\_UNACCEPTABLE".

**error** : is an error returned by a gnutls function.

**Returns** : A string corresponding to the symbol name of the error code.

Since 2.6.0

**gnutls\_handshake\_set\_private\_extensions ()**

```
void              gnutls_handshake_set_private_extensions
                  (gnutls_session_t session,
                   int allow);
```

This function will enable or disable the use of private cipher suites (the ones that start with 0xFF). By default or if `allow` is 0 then these cipher suites will not be advertized nor used.

Currently GnuTLS does not include such cipher-suites or compression algorithms.

Enabling the private ciphersuites when talking to other than gnutls servers and clients may cause interoperability problems.

**session** : is a `gnutls_session_t` structure.

**allow** : is an integer (0 or 1)

**gnutls\_handshake\_get\_last\_out ()**

```
gnutls_handshake_description_t  gnutls_handshake_get_last_out
                                (gnutls_session_t session);
```

This function is only useful to check where the last performed handshake failed. If the previous handshake succeed or was not performed at all then no meaningful value will be returned.

Check `gnutls_handshake_description_t` in `gnutls.h` for the available handshake descriptions.

**session** : is a `gnutls_session_t` structure.

**Returns** : the last handshake message type sent, a `gnutls_handshake_description_t`.

**gnutls\_handshake\_get\_last\_in ()**

```
gnutls_handshake_description_t gnutls_handshake_get_last_in
                                (gnutls_session_t session);
```

This function is only useful to check where the last performed handshake failed. If the previous handshake succeed or was not performed at all then no meaningful value will be returned.

Check [gnutls\\_handshake\\_description\\_t](#) in gnutls.h for the available handshake descriptions.

**session** : is a [gnutls\\_session\\_t](#) structure.

**Returns** : the last handshake message type received, a [gnutls\\_handshake\\_description\\_t](#).

**gnutls\_record\_send ()**

```
ssize_t gnutls_record_send (gnutls_session_t session,
                             const void *data,
                             size_t data_size);
```

This function has the similar semantics with [send\(\)](#). The only difference is that it accepts a GnuTLS session, and uses different error codes. Note that if the send buffer is full, [send\(\)](#) will block this function. See the [send\(\)](#) documentation for full information. You can replace the default push function by using [gnutls\\_transport\\_set\\_ptr2\(\)](#) with a call to [send\(\)](#) with a MSG\_DONTWAIT flag if blocking is a problem. If the EINTR is returned by the internal push function (the default is [send\(\)](#)) then [GNUTLS\\_E\\_INTERRUPTED](#) will be returned. If [GNUTLS\\_E\\_INTERRUPTED](#) or [GNUTLS\\_E\\_AGAIN](#) is returned, you must call this function again, with the same parameters; alternatively you could provide a [NULL](#) pointer for data, and 0 for size. cf. [gnutls\\_record\\_get\\_direction\(\)](#).

**session** : is a [gnutls\\_session\\_t](#) structure.

**data** : contains the data to send

**data\_size** : is the length of the data

**Returns** : The number of bytes sent, or a negative error code. The number of bytes sent might be less than *data\_size*. The maximum number of bytes this function can send in a single call depends on the negotiated maximum record size.

**gnutls\_record\_rcv ()**

```
ssize_t gnutls_record_rcv (gnutls_session_t session,
                            void *data,
                            size_t data_size);
```

This function has the similar semantics with [recv\(\)](#). The only difference is that it accepts a GnuTLS session, and uses different error codes. In the special case that a server requests a renegotiation, the client may receive an error code of [GNUTLS\\_E\\_REHANDSHAKE](#). This message may be simply ignored, replied with an alert [GNUTLS\\_A\\_NO\\_RENEGOTIATION](#), or replied with a new handshake, depending on the client's will. If [EINTR](#) is returned by the internal push function (the default is [recv\(\)](#)) then [GNUTLS\\_E\\_INTERRUPTED](#) will be returned. If [GNUTLS\\_E\\_INTERRUPTED](#) or [GNUTLS\\_E\\_AGAIN](#) is returned, you must call this function again to get the data. See also [gnutls\\_record\\_get\\_direction\(\)](#). A server may also receive [GNUTLS\\_E\\_REHANDSHAKE](#) when a client has initiated a handshake. In that case the server can only initiate a handshake or terminate the connection.

**session** : is a [gnutls\\_session\\_t](#) structure.

**data** : the buffer that the data will be read into

**data\_size** : the number of requested bytes

**Returns** : The number of bytes received and zero on EOF (for stream connections). A negative error code is returned in case of an error. The number of bytes received might be less than the requested *data\_size*.

## gnutls\_read

```
#define gnutls_read gnutls_record_rcv
```

## gnutls\_write

```
#define gnutls_write gnutls_record_send
```

## gnutls\_record\_rcv\_seq ()

```
ssize_t          gnutls_record_rcv_seq          (gnutls_session_t session,  
                                                void *data,  
                                                size_t data_size,  
                                                unsigned char *seq);
```

This function is the same as [gnutls\\_record\\_rcv\(\)](#), except that it returns in addition to data, the sequence number of the data. This is useful in DTLS where record packets might be received out-of-order. The returned 8-byte sequence number is an integer in big-endian format and should be treated as a unique message identification.

**session** : is a [gnutls\\_session\\_t](#) structure.

**data** : the buffer that the data will be read into

**data\_size** : the number of requested bytes

**seq** : is the packet's 64-bit sequence number. Should have space for 8 bytes.

**Returns** : The number of bytes received and zero on EOF. A negative error code is returned in case of an error. The number of bytes received might be less than *data\_size*.

Since 3.0.0

## gnutls\_session\_enable\_compatibility\_mode ()

```
void          gnutls_session_enable_compatibility_mode  
                                                (gnutls_session_t session);
```

This function can be used to disable certain (security) features in TLS in order to maintain maximum compatibility with buggy clients. It is equivalent to calling: [gnutls\\_record\\_disable\\_padding\(\)](#)

Normally only servers that require maximum compatibility with everything out there, need to call this function.

**session** : is a [gnutls\\_session\\_t](#) structure.

## gnutls\_record\_disable\_padding ()

```
void          gnutls_record_disable_padding          (gnutls_session_t session);
```

Used to disabled padding in TLS 1.0 and above. Normally you do not need to use this function, but there are buggy clients that complain if a server pads the encrypted data. This of course will disable protection against statistical attacks on the data.

Normally only servers that require maximum compatibility with everything out there, need to call this function.

**session** : is a [gnutls\\_session\\_t](#) structure.

**gnutls\_record\_get\_direction ()**

```
int gnutls_record_get_direction (gnutls_session_t session);
```

This function provides information about the internals of the record protocol and is only useful if a prior gnutls function call (e.g. `gnutls_handshake()`) was interrupted for some reason, that is, if a function returned `GNUTLS_E_INTERRUPTED` or `GNUTLS_E_AGAIN`. In such a case, you might want to call `select()` or `poll()` before calling the interrupted gnutls function again. To tell you whether a file descriptor should be selected for either reading or writing, `gnutls_record_get_direction()` returns 0 if the interrupted function was trying to read data, and 1 if it was trying to write data.

**session** : is a `gnutls_session_t` structure.

**Returns** : 0 if trying to read data, 1 if trying to write data.

**gnutls\_record\_get\_max\_size ()**

```
size_t gnutls_record_get_max_size (gnutls_session_t session);
```

Get the record size. The maximum record size is negotiated by the client after the first handshake message.

**session** : is a `gnutls_session_t` structure.

**Returns** : The maximum record packet size in this connection.

**gnutls\_record\_set\_max\_size ()**

```
ssize_t gnutls_record_set_max_size (gnutls_session_t session,  
                                     size_t size);
```

This function sets the maximum record packet size in this connection. This property can only be set to clients. The server may choose not to accept the requested size.

Acceptable values are 512(=2<sup>9</sup>), 1024(=2<sup>10</sup>), 2048(=2<sup>11</sup>) and 4096(=2<sup>12</sup>). The requested record size does get in effect immediately only while sending data. The receive part will take effect after a successful handshake.

This function uses a TLS extension called 'max record size'. Not all TLS implementations use or even understand this extension.

**session** : is a `gnutls_session_t` structure.

**size** : is the new size

**Returns** : On success, `GNUTLS_E_SUCCESS` (0) is returned, otherwise a negative error code is returned.

**gnutls\_record\_check\_pending ()**

```
size_t gnutls_record_check_pending (gnutls_session_t session);
```

This function checks if there are unread data in the gnutls buffers. If the return value is non-zero the next call to `gnutls_record_recv()` is guaranteed not to block.

**session** : is a `gnutls_session_t` structure.

**Returns** : Returns the size of the data or zero.



**gnutls\_prf ()**

```
int                gnutls_prf                (gnutls_session_t session,
                                              size_t label_size,
                                              const char *label,
                                              int server_random_first,
                                              size_t extra_size,
                                              const char *extra,
                                              size_t outsize,
                                              char *out);
```

Apply the TLS Pseudo-Random-Function (PRF) using the master secret on some data, seeded with the client and server random fields.

The *label* variable usually contain a string denoting the purpose for the generated data. The *server\_random\_first* indicate whether the client random field or the server random field should be first in the seed. Non-0 indicate that the server random field is first, 0 that the client random field is first.

The *extra* variable can be used to add more data to the seed, after the random variables. It can be used to tie make sure the generated output is strongly connected to some additional data (e.g., a string used in user authentication).

The output is placed in *out*, which must be pre-allocated.

**session** : is a [gnutls\\_session\\_t](#) structure.

**label\_size** : length of the *label* variable.

**label** : label used in PRF computation, typically a short string.

**server\_random\_first** : non-0 if server random field should be first in seed

**extra\_size** : length of the *extra* variable.

**extra** : optional extra data to seed the PRF with.

**outsize** : size of pre-allocated output buffer to hold the output.

**out** : pre-allocate buffer to hold the generated data.

**Returns** : [GNUTLS\\_E\\_SUCCESS](#) on success, or an error code.

**gnutls\_prf\_raw ()**

```
int                gnutls_prf_raw            (gnutls_session_t session,
                                              size_t label_size,
                                              const char *label,
                                              size_t seed_size,
                                              const char *seed,
                                              size_t outsize,
                                              char *out);
```

Apply the TLS Pseudo-Random-Function (PRF) using the master secret on some data.

The *label* variable usually contain a string denoting the purpose for the generated data. The *seed* usually contain data such as the client and server random, perhaps together with some additional data that is added to guarantee uniqueness of the output for a particular purpose.

Because the output is not guaranteed to be unique for a particular session unless *seed* include the client random and server random fields (the PRF would output the same data on another connection resumed from the first one), it is not recommended to use this function directly. The [gnutls\\_prf\(\)](#) function seed the PRF with the client and server random fields directly, and is recommended if you want to generate pseudo random data unique for each session.

**session** : is a `gnutls_session_t` structure.

**label\_size** : length of the `label` variable.

**label** : label used in PRF computation, typically a short string.

**seed\_size** : length of the `seed` variable.

**seed** : optional extra data to seed the PRF with.

**outsize** : size of pre-allocated output buffer to hold the output.

**out** : pre-allocate buffer to hold the generated data.

**Returns** : `GNUTLS_E_SUCCESS` on success, or an error code.

### enum gnutls\_server\_name\_type\_t

```
typedef enum
{
    GNUTLS_NAME_DNS = 1
} gnutls_server_name_type_t;
```

Enumeration of different server name types.

**GNUTLS\_NAME\_DNS** Domain Name System name type.

### gnutls\_server\_name\_set ()

```
int gnutls_server_name_set (gnutls_session_t session,
                           gnutls_server_name_type_t type,
                           const void *name,
                           size_t name_length);
```

This function is to be used by clients that want to inform (via a TLS extension mechanism) the server of the name they connected to. This should be used by clients that connect to servers that do virtual hosting.

The value of `name` depends on the `type` type. In case of `GNUTLS_NAME_DNS`, an ASCII (0)-terminated domain name string, without the trailing dot, is expected. IPv4 or IPv6 addresses are not permitted.

**session** : is a `gnutls_session_t` structure.

**type** : specifies the indicator type

**name** : is a string that contains the server name.

**name\_length** : holds the length of name

**Returns** : On success, `GNUTLS_E_SUCCESS` (0) is returned, otherwise a negative error code is returned.

### gnutls\_server\_name\_get ()

```
int gnutls_server_name_get (gnutls_session_t session,
                           void *data,
                           size_t *data_length,
                           unsigned int *type,
                           unsigned int idx);
```

This function will allow you to get the name indication (if any), a client has sent. The name indication may be any of the enumeration `gnutls_server_name_type_t`.

If *type* is `GNUTLS_NAME_DNS`, then this function is to be used by servers that support virtual hosting, and the data will be a null terminated UTF-8 string.

If *data* has not enough size to hold the server name `GNUTLS_E_SHORT_MEMORY_BUFFER` is returned, and *data\_length* will hold the required size.

*index* is used to retrieve more than one server names (if sent by the client). The first server name has an index of 0, the second 1 and so on. If no name with the given index exists `GNUTLS_E_REQUESTED_DATA_NOT_AVAILABLE` is returned.

**session** : is a `gnutls_session_t` structure.

**data** : will hold the data

**data\_length** : will hold the data length. Must hold the maximum size of data.

**type** : will hold the server name indicator type

**indx** : is the index of the server\_name

**Returns** : On success, `GNUTLS_E_SUCCESS` (0) is returned, otherwise a negative error code is returned.

### **gnutls\_safe\_renegotiation\_status ()**

```
int gnutls_safe_renegotiation_status (gnutls_session_t session);
```

Can be used to check whether safe renegotiation is being used in the current session.

**session** : is a `gnutls_session_t` structure.

**Returns** : 0 when safe renegotiation is not used and non (0) when safe renegotiation is used.

Since 2.10.0

### **enum gnutls\_supplemental\_data\_format\_type\_t**

```
typedef enum
{
    GNUTLS_SUPPLEMENTAL_USER_MAPPING_DATA = 0
} gnutls_supplemental_data_format_type_t;
```

Enumeration of different supplemental data types (RFC 4680).

**GNUTLS\_SUPPLEMENTAL\_USER\_MAPPING\_DATA** Supplemental user mapping data.

### **gnutls\_session\_ticket\_key\_generate ()**

```
int gnutls_session_ticket_key_generate (gnutls_datum_t *key);
```

Generate a random key to encrypt security parameters within SessionTicket.

**key** : is a pointer to a `gnutls_datum_t` which will contain a newly created key.

**Returns** : On success, `GNUTLS_E_SUCCESS` (0) is returned, or an error code.

Since 2.10.0

**gnutls\_session\_ticket\_enable\_client ()**

```
int gnutls_session_ticket_enable_client (gnutls_session_t session);
```

Request that the client should attempt session resumption using SessionTicket.

**session** : is a `gnutls_session_t` structure.

**Returns** : On success, `GNUTLS_E_SUCCESS` (0) is returned, or an error code.

Since 2.10.0

**gnutls\_session\_ticket\_enable\_server ()**

```
int gnutls_session_ticket_enable_server (gnutls_session_t session,  
                                         const gnutls_datum_t *key);
```

Request that the server should attempt session resumption using SessionTicket. *key* must be initialized with `gnutls_session_ticket_key_g`.

**session** : is a `gnutls_session_t` structure.

**key** : key to encrypt session parameters.

**Returns** : On success, `GNUTLS_E_SUCCESS` (0) is returned, or an error code.

Since 2.10.0

**gnutls\_key\_generate ()**

```
int gnutls_key_generate (gnutls_datum_t *key,  
                        unsigned int key_size);
```

Generates a random key of *key\_bytes* size.

**key** : is a pointer to a `gnutls_datum_t` which will contain a newly created key.

**key\_size** : The number of bytes of the key.

**Returns** : On success, `GNUTLS_E_SUCCESS` (0) is returned, or an error code.

Since 3.0.0

**gnutls\_priority\_init ()**

```
int gnutls_priority_init (gnutls_priority_t *priority_cache,  
                         const char *priorities,  
                         const char **err_pos);
```

Sets priorities for the ciphers, key exchange methods, macs and compression methods.

The `priorities` option allows you to specify a colon separated list of the cipher priorities to enable. Some keywords are defined to provide quick access to common preferences.

"PERFORMANCE" means all the "secure" ciphersuites are enabled, limited to 128 bit ciphers and sorted by terms of speed performance.

"NORMAL" means all "secure" ciphersuites. The 256-bit ciphers are included as a fallback only. The ciphers are sorted by security margin.

"SECURE128" means all "secure" ciphersuites of security level 128-bit or more.

"SECURE192" means all "secure" ciphersuites of security level 192-bit or more.

"SUITEB128" means all the NSA SuiteB ciphersuites with security level of 128.

"SUITEB192" means all the NSA SuiteB ciphersuites with security level of 192.

"EXPORT" means all ciphersuites are enabled, including the low-security 40 bit ciphers.

"NONE" means nothing is enabled. This disables even protocols and compression methods.

Special keywords are "!", "-", and "+". "!" or "-" appended with an algorithm will remove this algorithm. "+" appended with an algorithm will add this algorithm.

Check the GnuTLS manual section "Priority strings" for detailed information.

Examples:

"NONE:+VERS-TLS-ALL:+MAC-ALL:+RSA:+AES-128-CBC:+SIGN-ALL:+COMP-NULL"

"NORMAL:-ARCFOUR-128" means normal ciphers except for ARCFOUR-128.

"SECURE:-VERS-SSL3.0:+COMP-DEFLATE" means that only secure ciphers are enabled, SSL3.0 is disabled, and libz compression enabled.

"NONE:+VERS-TLS-ALL:+AES-128-CBC:+RSA:+SHA1:+COMP-NULL:+SIGN-RSA-SHA1",

"NONE:+VERS-TLS-ALL:+AES-128-CBC:+ECDHE-RSA:+SHA1:+COMP-NULL:+SIGN-RSA-SHA1:+CURVE-SECP256R1",

"NORMAL:COMPAT" is the most compatible mode.

**priority\_cache** : is a `gnutls_priority_t` structure.

**priorities** : is a string describing priorities

**err\_pos** : In case of an error this will have the position in the string the error occurred

**Returns** : On syntax error `GNUTLS_E_INVALID_REQUEST` is returned, `GNUTLS_E_SUCCESS` on success, or an error code.

### **gnutls\_priority\_deinit ()**

```
void gnutls_priority_deinit (gnutls_priority_t priority_cache);
```

Deinitializes the priority cache.

**priority\_cache** : is a `gnutls_priority_t` structure.

### **gnutls\_priority\_get\_cipher\_suite\_index ()**

```
int gnutls_priority_get_cipher_suite_index (gnutls_priority_t pcache,
                                           unsigned int idx,
                                           unsigned int *sidx);
```

**pcache** :

**idx** :

**sidx** :

**Returns** :



Note that the full cipher suite name must be prepended by TLS or SSL depending of the protocol in use.

***kx\_algorithm***: is a Key exchange algorithm

***cipher\_algorithm***: is a cipher algorithm

***mac\_algorithm***: is a MAC algorithm

**Returns** : a string that contains the name of a TLS cipher suite, specified by the given algorithms, or **NULL**.

### **gnutls\_protocol\_get\_version ()**

```
gnutls_protocol_t    gnutls_protocol_get_version    (gnutls_session_t session);
```

Get TLS version, a **gnutls\_protocol\_t** value.

**session** : is a **gnutls\_session\_t** structure.

**Returns** : The version of the currently used protocol.

### **gnutls\_protocol\_get\_name ()**

```
const char *         gnutls_protocol_get_name      (gnutls_protocol_t version);
```

Convert a **gnutls\_protocol\_t** value to a string.

**version** : is a (gnutls) version number

**Returns** : a string that contains the name of the specified TLS version (e.g., "TLS1.0"), or **NULL**.

### **gnutls\_session\_set\_data ()**

```
int                  gnutls_session_set_data      (gnutls_session_t session,  
                                                  const void *session_data,  
                                                  size_t session_data_size);
```

Sets all session parameters, in order to resume a previously established session. The session data given must be the one returned by **gnutls\_session\_get\_data()**. This function should be called before **gnutls\_handshake()**.

Keep in mind that session resuming is advisory. The server may choose not to resume the session, thus a full handshake will be performed.

**session** : is a **gnutls\_session\_t** structure.

**session\_data** : is a pointer to space to hold the session.

**session\_data\_size** : is the session's size

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise an error code is returned.

**gnutls\_session\_get\_data ()**

```
int gnutls_session_get_data (gnutls_session_t session,
                             void *session_data,
                             size_t *session_data_size);
```

Returns all session parameters, in order to support resuming. The client should call this, and keep the returned session, if he wants to resume that current version later by calling **gnutls\_session\_set\_data()**. This function must be called after a successful handshake.

Resuming sessions is really useful and speedsups connections after a successful one.

**session** : is a **gnutls\_session\_t** structure.

**session\_data** : is a pointer to space to hold the session.

**session\_data\_size** : is the session\_data's size, or it will be set by the function.

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise an error code is returned.

**gnutls\_session\_get\_data2 ()**

```
int gnutls_session_get_data2 (gnutls_session_t session,
                              gnutls_datum_t *data);
```

Returns all session parameters, in order to support resuming. The client should call this, and keep the returned session, if he wants to resume that current version later by calling **gnutls\_session\_set\_data()**. This function must be called after a successful handshake. The returned datum must be freed with **gnutls\_free()**.

Resuming sessions is really useful and speedsups connections after a successful one.

**session** : is a **gnutls\_session\_t** structure.

**data** : is a pointer to a datum that will hold the session.

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise an error code is returned.

**GNUTLS\_MAX\_SESSION\_ID**

```
#define GNUTLS_MAX_SESSION_ID 32
```

**gnutls\_session\_get\_id ()**

```
int gnutls_session_get_id (gnutls_session_t session,
                           void *session_id,
                           size_t *session_id_size);
```

Returns the current session id. This can be used if you want to check if the next session you tried to resume was actually resumed. This is because resumed sessions have the same sessionID with the original session.

Session id is some data set by the server, that identify the current session. In TLS 1.0 and SSL 3.0 session id is always less than 32 bytes.

**session** : is a **gnutls\_session\_t** structure.

**session\_id** : is a pointer to space to hold the session id.

**session\_id\_size** : is the session id's size, or it will be set by the function.

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise an error code is returned.



**gnutls\_session\_channel\_binding ()**

```
int gnutls_session_channel_binding (gnutls_session_t session,
                                   gnutls_channel_binding_t cbtype,
                                   gnutls_datum_t *cb);
```

Extract given channel binding data of the *cbtype* (e.g., **GNUTLS\_CB\_TLS\_UNIQUE**) type.

**session** : is a **gnutls\_session\_t** structure.

**cbtype** : an **gnutls\_channel\_binding\_t** enumeration type

**cb** : output buffer array with data

**Returns** : **GNUTLS\_E\_SUCCESS** on success, **GNUTLS\_E\_UNIMPLEMENTED\_FEATURE** if the *cbtype* is unsupported, **GNUTLS\_E\_CHANNEL\_BINDING\_NOT\_AVAILABLE** if the data is not currently available, or an error code.

Since 2.12.0

**gnutls\_session\_is\_resumed ()**

```
int gnutls_session_is_resumed (gnutls_session_t session);
```

Check whether session is resumed or not.

**session** : is a **gnutls\_session\_t** structure.

**Returns** : non zero if this session is resumed, or a zero if this is a new session.

**gnutls\_session\_resumption\_requested ()**

```
int gnutls_session_resumption_requested (gnutls_session_t session);
```

Check whether the client has asked for session resumption. This function is valid only on server side.

**session** : is a **gnutls\_session\_t** structure.

**Returns** : non zero if session resumption was asked, or a zero if not.

**gnutls\_db\_store\_func ()**

```
int (*gnutls_db_store_func) (void *Param1,
                              gnutls_datum_t key,
                              gnutls_datum_t data);
```

**Param1** :

**key** :

**data** :

**Returns** :

**gnutls\_db\_remove\_func ()**

```
int (*gnutls_db_remove_func) (void *Param1,
                               gnutls_datum_t key);
```

**Param1 :**

**key :**

**Returns :**

**gnutls\_db\_retr\_func ()**

```
gnutls_datum_t (*gnutls_db_retr_func) (void *Param1,
                                         gnutls_datum_t key);
```

**Param1 :**

**key :**

**Returns :**

**gnutls\_db\_set\_cache\_expiration ()**

```
void gnutls_db_set_cache_expiration (gnutls_session_t session,
                                      int seconds);
```

Set the expiration time for resumed sessions. The default is 3600 (one hour) at the time of this writing.

**session :** is a [gnutls\\_session\\_t](#) structure.

**seconds :** is the number of seconds.

**gnutls\_db\_remove\_session ()**

```
void gnutls_db_remove_session (gnutls_session_t session);
```

This function will remove the current session data from the session database. This will prevent future handshakes reusing these session data. This function should be called if a session was terminated abnormally, and before [gnutls\\_deinit\(\)](#) is called.

Normally [gnutls\\_deinit\(\)](#) will remove abnormally terminated sessions.

**session :** is a [gnutls\\_session\\_t](#) structure.

**gnutls\_db\_set\_retrieve\_function ()**

```
void gnutls_db_set_retrieve_function (gnutls_session_t session,
                                       gnutls_db_retr_func retr_func);
```

Sets the function that will be used to retrieve data from the resumed sessions database. This function must return a [gnutls\\_datum\\_t](#) containing the data on success, or a [gnutls\\_datum\\_t](#) containing null and 0 on failure.

The datum's data must be allocated using the function [gnutls\\_malloc\(\)](#).

The first argument to *retr\_func* will be null unless [gnutls\\_db\\_set\\_ptr\(\)](#) has been called.

**session :** is a [gnutls\\_session\\_t](#) structure.

**retr\_func :** is the function.

**gnutls\_db\_set\_remove\_function ()**

```
void gnutls_db_set_remove_function (gnutls_session_t session,
                                   gnutls_db_remove_func rem_func);
```

Sets the function that will be used to remove data from the resumed sessions database. This function must return 0 on success. The first argument to *rem\_func* will be null unless **gnutls\_db\_set\_ptr()** has been called.

**session** : is a **gnutls\_session\_t** structure.

**rem\_func** : is the function.

**gnutls\_db\_set\_store\_function ()**

```
void gnutls_db_set_store_function (gnutls_session_t session,
                                   gnutls_db_store_func store_func);
```

Sets the function that will be used to store data in the resumed sessions database. This function must return 0 on success. The first argument to *store\_func* will be null unless **gnutls\_db\_set\_ptr()** has been called.

**session** : is a **gnutls\_session\_t** structure.

**store\_func** : is the function

**gnutls\_db\_set\_ptr ()**

```
void gnutls_db_set_ptr (gnutls_session_t session,
                        void *ptr);
```

Sets the pointer that will be provided to db store, retrieve and delete functions, as the first argument.

**session** : is a **gnutls\_session\_t** structure.

**ptr** : is the pointer

**gnutls\_db\_get\_ptr ()**

```
void * gnutls_db_get_ptr (gnutls_session_t session);
```

Get db function pointer.

**session** : is a **gnutls\_session\_t** structure.

**Returns** : the pointer that will be sent to db store, retrieve and delete functions, as the first argument.

**gnutls\_db\_check\_entry ()**

```
int gnutls_db_check_entry (gnutls_session_t session,
                           gnutls_datum_t session_entry);
```

Check if database entry has expired. This function is to be used when you want to clear unnecessary sessions which occupy space in your backend.

**session** : is a **gnutls\_session\_t** structure.

**session\_entry** : is the session data (not key)

**Returns** : Returns **GNUTLS\_E\_EXPIRED**, if the database entry has expired or 0 otherwise.

**gnutls\_handshake\_post\_client\_hello\_func ()**

```
int (*gnutls_handshake_post_client_hello_func)
(gnutls_session_t Param1);
```

**Param1 :****Returns :****gnutls\_handshake\_set\_post\_client\_hello\_function ()**

```
void gnutls_handshake_set_post_client_hello_function
(gnutls_session_t session,
 gnutls_handshake_post_client_hello_func func);
```

This function will set a callback to be called after the client hello has been received (callback valid in server side only). This allows the server to adjust settings based on received extensions.

Those settings could be ciphersuites, requesting certificate, or anything else except for version negotiation (this is done before the hello message is parsed).

This callback must return 0 on success or a gnutls error code to terminate the handshake.

Warning: You should not use this function to terminate the handshake based on client input unless you know what you are doing. Before the handshake is finished there is no way to know if there is a man-in-the-middle attack being performed.

**session :** is a [gnutls\\_session\\_t](#) structure.

**func :** is the function to be called

**gnutls\_handshake\_set\_max\_packet\_length ()**

```
void gnutls_handshake_set_max_packet_length
(gnutls_session_t session,
 size_t max);
```

This function will set the maximum size of all handshake messages. Handshakes over this size are rejected with [GNUTLS\\_E\\_HANDSHAKE\\_TOO\\_LARGE](#) error code. The default value is 48kb which is typically large enough. Set this to 0 if you do not want to set an upper limit.

The reason for restricting the handshake message sizes are to limit Denial of Service attacks.

**session :** is a [gnutls\\_session\\_t](#) structure.

**max :** is the maximum number.

**gnutls\_check\_version ()**

```
const char * gnutls_check_version (const char *req_version);
```

Check GnuTLS Library version.

See [GNUTLS\\_VERSION](#) for a suitable *req\_version* string.

**req\_version :** version string to compare with, or [NULL](#).

**Returns :** Check that the version of the library is at minimum the one given as a string in *req\_version* and return the actual version string of the library; return [NULL](#) if the condition is not met. If [NULL](#) is passed to this function no check is done and only the version string is returned.

**gnutls\_credentials\_clear ()**

```
void gnutls_credentials_clear (gnutls_session_t session);
```

Clears all the credentials previously set in this session.

**session** : is a [gnutls\\_session\\_t](#) structure.

**gnutls\_credentials\_set ()**

```
int gnutls_credentials_set (gnutls_session_t session,
                           gnutls_credentials_type_t type,
                           void *cred);
```

Sets the needed credentials for the specified type. Eg username, password - or public and private keys etc. The *cred* parameter is a structure that depends on the specified type and on the current session (client or server).

In order to minimize memory usage, and share credentials between several threads gnutls keeps a pointer to cred, and not the whole cred structure. Thus you will have to keep the structure allocated until you call [gnutls\\_deinit\(\)](#).

For [GNUTLS\\_CRD\\_ANON](#), *cred* should be [gnutls\\_anon\\_client\\_credentials\\_t](#) in case of a client. In case of a server it should be [gnutls\\_anon\\_server\\_credentials\\_t](#).

For [GNUTLS\\_CRD\\_SRP](#), *cred* should be [gnutls\\_srp\\_client\\_credentials\\_t](#) in case of a client, and [gnutls\\_srp\\_server\\_credentials\\_t](#), in case of a server.

For [GNUTLS\\_CRD\\_CERTIFICATE](#), *cred* should be [gnutls\\_certificate\\_credentials\\_t](#).

**session** : is a [gnutls\\_session\\_t](#) structure.

**type** : is the type of the credentials

**cred** : is a pointer to a structure.

**Returns** : On success, [GNUTLS\\_E\\_SUCCESS](#) (0) is returned, otherwise a negative error code is returned.

**gnutls\_cred\_set**

```
#define gnutls_cred_set~gnutls_credentials_set
```

**gnutls\_x509\_privkey\_t**

```
typedef struct gnutls_x509_privkey_int *gnutls_x509_privkey_t;
```

**struct gnutls\_x509\_crl\_int**

```
struct gnutls_x509_crl_int;
```

**gnutls\_x509\_crl\_t**

```
typedef struct gnutls_x509_crl_int *gnutls_x509_crl_t;
```

**struct gnutls\_x509\_crt\_int**

```
struct gnutls_x509_crt_int;
```

**gnutls\_x509\_crt\_t**

```
typedef struct gnutls_x509_crt_int *gnutls_x509_crt_t;
```

**struct gnutls\_x509\_crq\_int**

```
struct gnutls_x509_crq_int;
```

**gnutls\_x509\_crq\_t**

```
typedef struct gnutls_x509_crq_int *gnutls_x509_crq_t;
```

**struct gnutls\_openpgp\_keyring\_int**

```
struct gnutls_openpgp_keyring_int;
```

**gnutls\_openpgp\_keyring\_t**

```
typedef struct gnutls_openpgp_keyring_int *gnutls_openpgp_keyring_t;
```

**struct gnutls\_certificate\_credentials\_st**

```
struct gnutls_certificate_credentials_st;
```

**gnutls\_anon\_free\_server\_credentials ()**

```
void gnutls_anon_free_server_credentials (gnutls_anon_server_credentials_t sc);
```

This structure is complex enough to manipulate directly thus this helper function is provided in order to free (deallocate) it.

**sc** : is a [gnutls\\_anon\\_server\\_credentials\\_t](#) structure.

**gnutls\_anon\_allocate\_server\_credentials ()**

```
int gnutls_anon_allocate_server_credentials (gnutls_anon_server_credentials_t * sc);
```

This structure is complex enough to manipulate directly thus this helper function is provided in order to allocate it.

**sc** : is a pointer to a [gnutls\\_anon\\_server\\_credentials\\_t](#) structure.

**Returns** : [GNUTLS\\_E\\_SUCCESS](#) on success, or an error code.

**gnutls\_anon\_set\_server\_dh\_params ()**

```
void gnutls_anon_set_server_dh_params (gnutls_anon_server_credentials_t ↵  
    res,                               gnutls_dh_params_t dh_params);
```

This function will set the Diffie-Hellman parameters for an anonymous server to use. These parameters will be used in Anonymous Diffie-Hellman cipher suites.

**res** : is a `gnutls_anon_server_credentials_t` structure

**dh\_params** : is a structure that holds Diffie-Hellman parameters.

**gnutls\_anon\_set\_server\_params\_function ()**

```
void gnutls_anon_set_server_params_function (gnutls_anon_server_credentials_t ↵  
    res,                                   gnutls_params_function *func);
```

This function will set a callback in order for the server to get the Diffie-Hellman parameters for anonymous authentication. The callback should return `GNUTLS_E_SUCCESS` (0) on success.

**res** : is a `gnutls_certificate_credentials_t` structure

**func** : is the function to be called

**gnutls\_anon\_free\_client\_credentials ()**

```
void gnutls_anon_free_client_credentials (gnutls_anon_client_credentials_t ↵  
    sc);
```

This structure is complex enough to manipulate directly thus this helper function is provided in order to free (deallocate) it.

**sc** : is a `gnutls_anon_client_credentials_t` structure.

**gnutls\_anon\_allocate\_client\_credentials ()**

```
int gnutls_anon_allocate_client_credentials (gnutls_anon_client_credentials_t * ↵  
    sc);
```

This structure is complex enough to manipulate directly thus this helper function is provided in order to allocate it.

**sc** : is a pointer to a `gnutls_anon_client_credentials_t` structure.

**Returns** : `GNUTLS_E_SUCCESS` on success, or an error code.

**gnutls\_certificate\_free\_credentials ()**

```
void gnutls_certificate_free_credentials (gnutls_certificate_credentials_t ↵  
    sc);
```

This structure is complex enough to manipulate directly thus this helper function is provided in order to free (deallocate) it.

This function does not free any temporary parameters associated with this structure (ie RSA and DH parameters are not freed by this function).

**sc** : is a `gnutls_certificate_credentials_t` structure.

**gnutls\_certificate\_allocate\_credentials ()**

```
int gnutls_certificate_allocate_credentials
                                     (gnutls_certificate_credentials_t * ↵
                                     res);
```

This structure is complex enough to manipulate directly thus this helper function is provided in order to allocate it.

**res** : is a pointer to a [gnutls\\_certificate\\_credentials\\_t](#) structure.

**Returns** : [GNUTLS\\_E\\_SUCCESS](#) on success, or an error code.

**gnutls\_certificate\_get\_issuer ()**

```
int gnutls_certificate_get_issuer (gnutls_certificate_credentials_t ↵
    sc,                             gnutls_x509_crt_t cert,
                                   gnutls_x509_crt_t *issuer,
                                   unsigned int flags);
```

This function will return the issuer of a given certificate.

**sc** : is a [gnutls\\_certificate\\_credentials\\_t](#) structure.

**cert** : is the certificate to find issuer for

**issuer** : Will hold the issuer if any. Should be treated as constant.

**flags** : Use zero.

**Returns** : On success, [GNUTLS\\_E\\_SUCCESS](#) (0) is returned, otherwise a negative error value.

Since 3.0.0

**gnutls\_certificate\_free\_keys ()**

```
void gnutls_certificate_free_keys (gnutls_certificate_credentials_t ↵
    sc);
```

This function will delete all the keys and the certificates associated with the given credentials. This function must not be called when a TLS negotiation that uses the credentials is in progress.

**sc** : is a [gnutls\\_certificate\\_credentials\\_t](#) structure.

**gnutls\_certificate\_free\_cas ()**

```
void gnutls_certificate_free_cas (gnutls_certificate_credentials_t ↵
    sc);
```

This function will delete all the CAs associated with the given credentials. Servers that do not use [gnutls\\_certificate\\_verify\\_peers2\(\)](#) may call this to save some memory.

**sc** : is a [gnutls\\_certificate\\_credentials\\_t](#) structure.



**gnutls\_certificate\_free\_ca\_names ()**

```
void          gnutls_certificate_free_ca_names    (gnutls_certificate_credentials_t  ↵  
    sc);
```

This function will delete all the CA name in the given credentials. Clients may call this to save some memory since in client side the CA names are not used. Servers might want to use this function if a large list of trusted CAs is present and sending the names of it would just consume bandwidth without providing information to client.

CA names are used by servers to advertise the CAs they support to clients.

**sc** : is a [gnutls\\_certificate\\_credentials\\_t](#) structure.

**gnutls\_certificate\_free\_crls ()**

```
void          gnutls_certificate_free_crls      (gnutls_certificate_credentials_t  ↵  
    sc);
```

This function will delete all the CRLs associated with the given credentials.

**sc** : is a [gnutls\\_certificate\\_credentials\\_t](#) structure.

**gnutls\_certificate\_set\_dh\_params ()**

```
void          gnutls_certificate_set_dh_params  (gnutls_certificate_credentials_t  ↵  
    res,  
                                              gnutls_dh_params_t dh_params);
```

This function will set the Diffie-Hellman parameters for a certificate server to use. These parameters will be used in Ephemeral Diffie-Hellman cipher suites. Note that only a pointer to the parameters are stored in the certificate handle, so if you deallocate the parameters before the certificate is deallocated, you must change the parameters stored in the certificate first.

**res** : is a [gnutls\\_certificate\\_credentials\\_t](#) structure

**dh\_params** : is a structure that holds Diffie-Hellman parameters.

**gnutls\_certificate\_set\_verify\_flags ()**

```
void          gnutls_certificate_set_verify_flags (gnutls_certificate_credentials_t  ↵  
    res,  
                                              unsigned int flags);
```

This function will set the flags to be used at verification of the certificates. Flags must be OR of the [gnutls\\_certificate\\_verify\\_flags](#) enumerations.

**res** : is a [gnutls\\_certificate\\_credentials\\_t](#) structure

**flags** : are the flags

**gnutls\_certificate\_set\_verify\_limits ()**

```
void gnutls_certificate_set_verify_limits
                                         (gnutls_certificate_credentials_t  ←
                                         res,
                                         unsigned int max_bits,
                                         unsigned int max_depth);
```

This function will set some upper limits for the default verification function, [gnutls\\_certificate\\_verify\\_peers2\(\)](#), to avoid denial of service attacks. You can set them to zero to disable limits.

**res** : is a [gnutls\\_certificate\\_credentials](#) structure

**max\_bits** : is the number of bits of an acceptable certificate (default 8200)

**max\_depth** : is maximum depth of the verification of a certificate chain (default 5)

**gnutls\_certificate\_set\_x509\_trust\_file ()**

```
int gnutls_certificate_set_x509_trust_file
                                         (gnutls_certificate_credentials_t  ←
                                         cred,
                                         const char *cafile,
                                         gnutls_x509_crt_fmt_t type);
```

This function adds the trusted CAs in order to verify client or server certificates. In case of a client this is not required to be called if the certificates are not verified using [gnutls\\_certificate\\_verify\\_peers2\(\)](#). This function may be called multiple times.

In case of a server the names of the CAs set here will be sent to the client if a certificate request is sent. This can be disabled using [gnutls\\_certificate\\_send\\_x509\\_rdn\\_sequence\(\)](#).

This function can also accept PKCS 11 URLs. In that case it will import all certificates that are marked as trusted.

**cred** : is a [gnutls\\_certificate\\_credentials\\_t](#) structure.

**cafile** : is a file containing the list of trusted CAs (DER or PEM list)

**type** : is PEM or DER

**Returns** : number of certificates processed, or a negative error code on error.

**gnutls\_certificate\_set\_x509\_trust\_mem ()**

```
int gnutls_certificate_set_x509_trust_mem
                                         (gnutls_certificate_credentials_t  ←
                                         res,
                                         const gnutls_datum_t *ca,
                                         gnutls_x509_crt_fmt_t type);
```

This function adds the trusted CAs in order to verify client or server certificates. In case of a client this is not required to be called if the certificates are not verified using [gnutls\\_certificate\\_verify\\_peers2\(\)](#). This function may be called multiple times.

In case of a server the CAs set here will be sent to the client if a certificate request is sent. This can be disabled using [gnutls\\_certificate\\_send\\_x509\\_rdn\\_sequence\(\)](#).

**res** : is a [gnutls\\_certificate\\_credentials\\_t](#) structure.

**ca** : is a list of trusted CAs or a DER certificate

**type** : is DER or PEM

**Returns** : the number of certificates processed or a negative error code on error.

**gnutls\_certificate\_set\_x509\_crl\_file ()**

```
int gnutls_certificate_set_x509_crl_file (gnutls_certificate_credentials_t <-
    res,
    const char *crlfile,
    gnutls_x509_crt_fmt_t type);
```

This function adds the trusted CRLs in order to verify client or server certificates. In case of a client this is not required to be called if the certificates are not verified using [gnutls\\_certificate\\_verify\\_peers2\(\)](#). This function may be called multiple times.

**res** : is a [gnutls\\_certificate\\_credentials\\_t](#) structure.

**crlfile** : is a file containing the list of verified CRLs (DER or PEM list)

**type** : is PEM or DER

**Returns** : number of CRLs processed or a negative error code on error.

**gnutls\_certificate\_set\_x509\_crl\_mem ()**

```
int gnutls_certificate_set_x509_crl_mem (gnutls_certificate_credentials_t <-
    res,
    const gnutls_datum_t *CRL,
    gnutls_x509_crt_fmt_t type);
```

This function adds the trusted CRLs in order to verify client or server certificates. In case of a client this is not required to be called if the certificates are not verified using [gnutls\\_certificate\\_verify\\_peers2\(\)](#). This function may be called multiple times.

**res** : is a [gnutls\\_certificate\\_credentials\\_t](#) structure.

**CRL** : is a list of trusted CRLs. They should have been verified before.

**type** : is DER or PEM

**Returns** : number of CRLs processed, or a negative error code on error.

**gnutls\_certificate\_set\_x509\_key\_file ()**

```
int gnutls_certificate_set_x509_key_file (gnutls_certificate_credentials_t <-
    res,
    const char *certfile,
    const char *keyfile,
    gnutls_x509_crt_fmt_t type);
```

This function sets a certificate/private key pair in the `gnutls_certificate_credentials_t` structure. This function may be called more than once, in case multiple keys/certificates exist for the server. For clients that need to send more than its own end entity certificate, e.g., also an intermediate CA cert, then the *certfile* must contain the ordered certificate chain.

This function can also accept PKCS [11](#) URLs at *keyfile* and *certfile*. In that case it will import the private key and certificate indicated by the URLs.

**res** : is a [gnutls\\_certificate\\_credentials\\_t](#) structure.

**certfile** : is a file that containing the certificate list (path) for the specified private key, in PKCS7 format, or a list of certificates

**keyfile** : is a file that contains the private key

**type** : is PEM or DER

**Returns** : [GNUTLS\\_E\\_SUCCESS](#) (0) on success, or a negative error code.

**gnutls\_certificate\_set\_x509\_key\_mem ()**

```
int gnutls_certificate_set_x509_key_mem (gnutls_certificate_credentials_t ↵
    res,
                                     const gnutls_datum_t *cert,
                                     const gnutls_datum_t *key,
                                     gnutls_x509_crt_fmt_t type);
```

This function sets a certificate/private key pair in the `gnutls_certificate_credentials_t` structure. This function may be called more than once, in case multiple keys/certificates exist for the server.

Note that the keyUsage (2.5.29.15) PKIX extension in X.509 certificates is supported. This means that certificates intended for signing cannot be used for ciphersuites that require encryption.

If the certificate and the private key are given in PEM encoding then the strings that hold their values must be null terminated.

The `key` may be `NULL` if you are using a sign callback, see `gnutls_sign_callback_set()`.

**res** : is a `gnutls_certificate_credentials_t` structure.

**cert** : contains a certificate list (path) for the specified private key

**key** : is the private key, or `NULL`

**type** : is PEM or DER

**Returns** : `GNUTLS_E_SUCCESS` (0) on success, or a negative error code.

**gnutls\_certificate\_send\_x509\_rdn\_sequence ()**

```
void gnutls_certificate_send_x509_rdn_sequence
    (gnutls_session_t session,
     int status);
```

If status is non zero, this function will order gnutls not to send the `rdnSequence` in the certificate request message. That is the server will not advertise its trusted CAs to the peer. If status is zero then the default behaviour will take effect, which is to advertise the server's trusted CAs.

This function has no effect in clients, and in authentication methods other than certificate with X.509 certificates.

**session** : is a pointer to a `gnutls_session_t` structure.

**status** : is 0 or 1

**gnutls\_certificate\_set\_x509\_simple\_pkcs12\_file ()**

```
int gnutls_certificate_set_x509_simple_pkcs12_file
    (gnutls_certificate_credentials_t ↵
    res,
    const char *pkcs12file,
    gnutls_x509_crt_fmt_t type,
    const char *password);
```

This function sets a certificate/private key pair and/or a CRL in the `gnutls_certificate_credentials_t` structure. This function may be called more than once (in case multiple keys/certificates exist for the server).

PKCS#12 files with a MAC, encrypted bags and PKCS #8 private keys are supported. However, only password based security, and the same password for all operations, are supported.

PKCS#12 file may contain many keys and/or certificates, and there is no way to identify which key/certificate pair you want. You should make sure the PKCS#12 file only contain one key/certificate pair and/or one CRL.

It is believed that the limitations of this function is acceptable for most usage, and that any more flexibility would introduce complexity that would make it harder to use this functionality at all.

**res** : is a `gnutls_certificate_credentials_t` structure.

**pkcs12file** : filename of file containing PKCS12 blob.

**type** : is PEM or DER of the `pkcs12file`.

**password** : optional password used to decrypt PKCS12 file, bags and keys.

**Returns** : `GNUTLS_E_SUCCESS` (0) on success, or a negative error code.

#### `gnutls_certificate_set_x509_simple_pkcs12_mem ()`

```
int gnutls_certificate_set_x509_simple_pkcs12_mem
                                     (gnutls_certificate_credentials_t ←
                                     res,
                                     const gnutls_datum_t *p12blob,
                                     gnutls_x509_crt_fmt_t type,
                                     const char *password);
```

This function sets a certificate/private key pair and/or a CRL in the `gnutls_certificate_credentials_t` structure. This function may be called more than once (in case multiple keys/certificates exist for the server).

MAC:ed PKCS12 files are supported. Encrypted PKCS12 bags are supported. Encrypted PKCS#8 private keys are supported. However, only password based security, and the same password for all operations, are supported.

PKCS12 file may contain many keys and/or certificates, and there is no way to identify which key/certificate pair you want. You should make sure the PKCS12 file only contain one key/certificate pair and/or one CRL.

It is believed that the limitations of this function is acceptable for most usage, and that any more flexibility would introduce complexity that would make it harder to use this functionality at all.

**res** : is a `gnutls_certificate_credentials_t` structure.

**p12blob** : the PKCS12 blob.

**type** : is PEM or DER of the `pkcs12file`.

**password** : optional password used to decrypt PKCS12 file, bags and keys.

**Returns** : `GNUTLS_E_SUCCESS` (0) on success, or a negative error code.

Since 2.8.0

#### `gnutls_certificate_set_x509_key ()`

```
int gnutls_certificate_set_x509_key (gnutls_certificate_credentials_t ←
    res,
                                     gnutls_x509_crt_t *cert_list,
                                     int cert_list_size,
                                     gnutls_x509_privkey_t key);
```

This function sets a certificate/private key pair in the `gnutls_certificate_credentials_t` structure. This function may be called more than once, in case multiple keys/certificates exist for the server. For clients that wants to send more than its own end entity certificate (e.g., also an intermediate CA cert) then put the certificate chain in `cert_list`.

**res** : is a `gnutls_certificate_credentials_t` structure.

**cert\_list** : contains a certificate list (path) for the specified private key

**cert\_list\_size** : holds the size of the certificate list

**key** : is a `gnutls_x509_privkey_t` key

**Returns** : `GNUTLS_E_SUCCESS` (0) on success, or a negative error code.

Since 2.4.0

**gnutls\_certificate\_set\_x509\_trust ()**

```
int          gnutls_certificate_set_x509_trust  (gnutls_certificate_credentials_t  ↵  
    res,                                           gnutls_x509_crt_t *ca_list,  
                                           int ca_list_size);
```

This function adds the trusted CAs in order to verify client or server certificates. In case of a client this is not required to be called if the certificates are not verified using [gnutls\\_certificate\\_verify\\_peers2\(\)](#). This function may be called multiple times.

In case of a server the CAs set here will be sent to the client if a certificate request is sent. This can be disabled using [gnutls\\_certificate\\_send\\_x509\\_rdn\\_sequence\(\)](#).

**res** : is a [gnutls\\_certificate\\_credentials\\_t](#) structure.

**ca\_list** : is a list of trusted CAs

**ca\_list\_size** : holds the size of the CA list

**Returns** : the number of certificates processed or a negative error code on error.

Since 2.4.0

**gnutls\_certificate\_set\_x509\_crl ()**

```
int          gnutls_certificate_set_x509_crl    (gnutls_certificate_credentials_t  ↵  
    res,                                           gnutls_x509_crl_t *crl_list,  
                                           int crl_list_size);
```

This function adds the trusted CRLs in order to verify client or server certificates. In case of a client this is not required to be called if the certificates are not verified using [gnutls\\_certificate\\_verify\\_peers2\(\)](#). This function may be called multiple times.

**res** : is a [gnutls\\_certificate\\_credentials\\_t](#) structure.

**crl\_list** : is a list of trusted CRLs. They should have been verified before.

**crl\_list\_size** : holds the size of the crl\_list

**Returns** : [GNUTLS\\_E\\_SUCCESS](#) (0) on success, or a negative error code.

Since 2.4.0

**gnutls\_certificate\_get\_openpgp\_keyring ()**

```
void          gnutls_certificate_get_openpgp_keyring  
                                           (gnutls_certificate_credentials_t  ↵  
    sc,                                           gnutls_openpgp_keyring_t *keyring) ↵  
                                           ;
```

**sc** :

**keyring** :

**gnutls\_global\_init ()**

```
int gnutls_global_init (void);
```

This function initializes the global data to defaults. Every gnutls application has a global data which holds common parameters shared by gnutls session structures. You should call **gnutls\_global\_deinit()** when gnutls usage is no longer needed

Note that this function will also initialize the underlying crypto backend, if it has not been initialized before.

This function increments a global counter, so that **gnutls\_global\_deinit()** only releases resources when it has been called as many times as **gnutls\_global\_init()**. This is useful when GnuTLS is used by more than one library in an application. This function can be called many times, but will only do something the first time.

Note! This function is not thread safe. If two threads call this function simultaneously, they can cause a race between checking the global counter and incrementing it, causing both threads to execute the library initialization code. That would lead to a memory leak. To handle this, your application could invoke this function after acquiring a thread mutex. To ignore the potential memory leak is also an option.

**Returns :** On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error code is returned.

**gnutls\_global\_deinit ()**

```
void gnutls_global_deinit (void);
```

This function deinitializes the global data, that were initialized using **gnutls\_global\_init()**.

Note! This function is not thread safe. See the discussion for **gnutls\_global\_init()** for more information.

**gnutls\_time\_func ()**

```
time_t (*gnutls_time_func) (time_t *t);
```

Function prototype for **time()**-like function. Set with **gnutls\_global\_set\_time\_function()**.

**t :** where to store time.

**Returns :** Number of seconds since the epoch, or (time\_t)-1 on errors.

**mutex\_init\_func ()**

```
int (*mutex_init_func) (void **mutex);
```

**mutex :**

**Returns :**

**mutex\_lock\_func ()**

```
int (*mutex_lock_func) (void **mutex);
```

**mutex :**

**Returns :**

**mutex\_unlock\_func ()**

```
int (*mutex_unlock_func) (void **mutex);
```

**mutex :**

**Returns :**

**mutex\_deinit\_func ()**

```
int (*mutex_deinit_func) (void **mutex);
```

**mutex :**

**Returns :**

**gnutls\_global\_set\_mutex ()**

```
void gnutls_global_set_mutex (mutex_init_func init,  
                              mutex_deinit_func deinit,  
                              mutex_lock_func lock,  
                              mutex_unlock_func unlock);
```

With this function you are allowed to override the default mutex locks used in some parts of gnutls and dependent libraries. This function should be used if you have complete control of your program and libraries. Do not call this function from a library. Instead only initialize gnutls and the default OS mutex locks will be used.

This function must be called before [gnutls\\_global\\_init\(\)](#).

**init :** mutex initialization function

**deinit :** mutex deinitialization function

**lock :** mutex locking function

**unlock :** mutex unlocking function

Since 2.12.0

**gnutls\_alloc\_function ()**

```
void * (*gnutls_alloc_function) (size_t Param1);
```

**Param1 :**

**Returns :**

**gnutls\_calloc\_function ()**

```
void * (*gnutls_calloc_function) (size_t Param1,  
                                  size_t Param2);
```

**Param1 :**

**Param2 :**

**Returns :**



**gnutls\_is\_secure\_function ()**

```
int (*gnutls_is_secure_function) (const void *Param1);
```

**Param1 :**

**Returns :**

**gnutls\_free\_function ()**

```
void (*gnutls_free_function) (void *Param1);
```

**Param1 :**

**gnutls\_realloc\_function ()**

```
void * (*gnutls_realloc_function) (void *Param1,  
size_t Param2);
```

**Param1 :**

**Param2 :**

**Returns :**

**gnutls\_global\_set\_mem\_functions ()**

```
void gnutls_global_set_mem_functions (gnutls_alloc_function alloc_func,  
gnutls_alloc_function ↵  
secure_alloc_func,  
gnutls_is_secure_function ↵  
is_secure_func,  
gnutls_realloc_function ↵  
realloc_func,  
gnutls_free_function free_func);
```

This is the function where you set the memory allocation functions gnutls is going to use. By default the libc's allocation functions (**malloc()**, **free()**), are used by gnutls, to allocate both sensitive and not sensitive data. This function is provided to set the memory allocation functions to something other than the defaults

This function must be called before **gnutls\_global\_init()** is called. This function is not thread safe.

**alloc\_func :** it's the default memory allocation function. Like **malloc()**.

**secure\_alloc\_func :** This is the memory allocation function that will be used for sensitive data.

**is\_secure\_func :** a function that returns 0 if the memory given is not secure. May be NULL.

**realloc\_func :** A realloc function

**free\_func :** The function that frees allocated data. Must accept a NULL pointer.

**gnutls\_global\_set\_time\_function ()**

```
void gnutls_global_set_time_function (gnutls_time_func time_func);
```

This is the function where you can override the default system time function. The application provided function should behave the same as the standard function.

**time\_func** : it's the system time function, a [gnutls\\_time\\_func\(\)](#) callback.

Since 2.12.0

**gnutls\_malloc**

```
extern gnutls_alloc_function gnutls_malloc;
```

This function will allocate 's' bytes data, and return a pointer to memory. This function is supposed to be used by callbacks. The allocation function used is the one set by [gnutls\\_global\\_set\\_mem\\_functions\(\)](#).

**gnutls\_secure\_malloc**

```
extern gnutls_alloc_function gnutls_secure_malloc;
```

**gnutls\_realloc**

```
extern gnutls_realloc_function gnutls_realloc;
```

**gnutls\_calloc**

```
extern gnutls_calloc_function gnutls_calloc;
```

**gnutls\_free**

```
extern gnutls_free_function gnutls_free;
```

This function will free data pointed by ptr.

The deallocation function used is the one set by [gnutls\\_global\\_set\\_mem\\_functions\(\)](#).

**gnutls\_strdup ()**

```
char * (*gnutls_strdup) (const char *Param1);
```

**Param1** :

**Returns** :

**gnutls\_log\_func ()**

```
void (*gnutls_log_func) (...,  
                          const char *Param2);
```

...:

**Param2:**

**gnutls\_audit\_log\_func ()**

```
void (*gnutls_audit_log_func) (gnutls_session_t Param1,  
                               const char *Param2);
```

**Param1:**

**Param2:**

**gnutls\_global\_set\_log\_function ()**

```
void gnutls_global_set_log_function (gnutls_log_func log_func);
```

This is the function where you set the logging function gnutls is going to use. This function only accepts a character array. Normally you may not use this function since it is only used for debugging purposes.

*gnutls\_log\_func* is of the form, void (\*gnutls\_log\_func)( int level, const char\*);

**log\_func:** it's a log function

**gnutls\_global\_set\_audit\_log\_function ()**

```
void gnutls_global_set_audit_log_function  
      (gnutls_audit_log_func log_func);
```

This is the function where you set the logging function gnutls is going to use. This is different from [gnutls\\_global\\_set\\_log\\_function\(\)](#) because it will report the session of the event if any. Note that that session might be null if there is no corresponding TLS session.

*gnutls\_audit\_log\_func* is of the form, void (\*gnutls\_audit\_log\_func)( gnutls\_session\_t, int level, const char\*);

**log\_func:** it is the audit log function

Since 3.0.0

**gnutls\_global\_set\_log\_level ()**

```
void gnutls_global_set_log_level (int level);
```

This is the function that allows you to set the log level. The level is an integer between 0 and 9. Higher values mean more verbosity. The default value is 0. Larger values should only be used with care, since they may reveal sensitive information.

Use a log level over 10 to enable all debugging options.

**level:** it's an integer from 0 to 9.

**gnutls\_dh\_params\_init ()**

```
int gnutls_dh_params_init (gnutls_dh_params_t *dh_params);
```

This function will initialize the DH parameters structure.

**dh\_params** : Is a structure that will hold the prime numbers

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error code is returned.

**gnutls\_dh\_params\_deinit ()**

```
void gnutls_dh_params_deinit (gnutls_dh_params_t dh_params);
```

This function will deinitialize the DH parameters structure.

**dh\_params** : Is a structure that holds the prime numbers

**gnutls\_dh\_params\_import\_raw ()**

```
int gnutls_dh_params_import_raw (gnutls_dh_params_t dh_params,  
                                const gnutls_datum_t *prime,  
                                const gnutls_datum_t *generator);
```

This function will replace the pair of prime and generator for use in the Diffie-Hellman key exchange. The new parameters should be stored in the appropriate gnutls\_datum.

**dh\_params** : Is a structure that will hold the prime numbers

**prime** : holds the new prime

**generator** : holds the new generator

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error code is returned.

**gnutls\_dh\_params\_import\_pkcs3 ()**

```
int gnutls_dh_params_import_pkcs3 (gnutls_dh_params_t params,  
                                   const gnutls_datum_t *pkcs3_params ←  
                                   ' ,  
                                   gnutls_x509_crt_fmt_t format);
```

This function will extract the DHParams found in a PKCS3 formatted structure. This is the format generated by "openssl dhparam" tool.

If the structure is PEM encoded, it should have a header of "BEGIN DH PARAMETERS".

**params** : A structure where the parameters will be copied to

**pkcs3\_params** : should contain a PKCS3 DHParams structure PEM or DER encoded

**format** : the format of params. PEM or DER.

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error code is returned.

**gnutls\_dh\_params\_generate2 ()**

```
int gnutls_dh_params_generate2 (gnutls_dh_params_t params,
                                unsigned int bits);
```

This function will generate a new pair of prime and generator for use in the Diffie-Hellman key exchange. The new parameters will be allocated using `gnutls_malloc()` and will be stored in the appropriate datum. This function is normally slow.

Do not set the number of bits directly, use `gnutls_sec_param_to_pk_bits()` to get bits for `GNUTLS_PK_DSA`. Also note that the DH parameters are only useful to servers. Since clients use the parameters sent by the server, it's of no use to call this in client side.

**params** : Is the structure that the DH parameters will be stored

**bits** : is the prime's number of bits

**Returns** : On success, `GNUTLS_E_SUCCESS` (0) is returned, otherwise a negative error code is returned.

**gnutls\_dh\_params\_export\_pkcs3 ()**

```
int gnutls_dh_params_export_pkcs3 (gnutls_dh_params_t params,
                                    gnutls_x509_crt_fmt_t format,
                                    unsigned char *params_data,
                                    size_t *params_data_size);
```

This function will export the given dh parameters to a PKCS3 DHParams structure. This is the format generated by "openssl dhparam" tool. If the buffer provided is not long enough to hold the output, then `GNUTLS_E_SHORT_MEMORY_BUFFER` will be returned.

If the structure is PEM encoded, it will have a header of "BEGIN DH PARAMETERS".

**params** : Holds the DH parameters

**format** : the format of output params. One of PEM or DER.

**params\_data** : will contain a PKCS3 DHParams structure PEM or DER encoded

**params\_data\_size** : holds the size of params\_data (and will be replaced by the actual size of parameters)

**Returns** : On success, `GNUTLS_E_SUCCESS` (0) is returned, otherwise a negative error code is returned.

**gnutls\_dh\_params\_export\_raw ()**

```
int gnutls_dh_params_export_raw (gnutls_dh_params_t params,
                                  gnutls_datum_t *prime,
                                  gnutls_datum_t *generator,
                                  unsigned int *bits);
```

This function will export the pair of prime and generator for use in the Diffie-Hellman key exchange. The new parameters will be allocated using `gnutls_malloc()` and will be stored in the appropriate datum.

**params** : Holds the DH parameters

**prime** : will hold the new prime

**generator** : will hold the new generator

**bits** : if non null will hold the secret key's number of bits

**Returns** : On success, `GNUTLS_E_SUCCESS` (0) is returned, otherwise a negative error code is returned.

**gnutls\_dh\_params\_cpy ()**

```
int gnutls_dh_params_cpy (gnutls_dh_params_t dst,
                          gnutls_dh_params_t src);
```

This function will copy the DH parameters structure from source to destination.

**dst** : Is the destination structure, which should be initialized.

**src** : Is the source structure

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error code is returned.

**gnutls\_pull\_func ()**

```
ssize_t (*gnutls_pull_func) (gnutls_transport_ptr_t Param1,
                             void *Param2,
                             size_t Param3);
```

**Param1** :

**Param2** :

**Param3** :

**Returns** :

**gnutls\_push\_func ()**

```
ssize_t (*gnutls_push_func) (gnutls_transport_ptr_t Param1,
                             const void *Param2,
                             size_t Param3);
```

**Param1** :

**Param2** :

**Param3** :

**Returns** :

**gnutls\_pull\_timeout\_func ()**

```
int (*gnutls_pull_timeout_func) (gnutls_transport_ptr_t Param1,
                                  unsigned int ms);
```

**Param1** :

**ms** :

**Returns** :

**gnutls\_vec\_push\_func ()**

```
ssize_t (*gnutls_vec_push_func) (gnutls_transport_ptr_t Param1,  
const giovec_t *iov,  
int iovcnt);
```

**Param1 :**

**iov :**

**iovcnt :**

**Returns :**

**gnutls\_errno\_func ()**

```
int (*gnutls_errno_func) (gnutls_transport_ptr_t Param1);
```

**Param1 :**

**Returns :**

**gnutls\_transport\_set\_ptr ()**

```
void gnutls_transport_set_ptr (gnutls_session_t session,  
gnutls_transport_ptr_t ptr);
```

Used to set the first argument of the transport function (for push and pull callbacks). In berkeley style sockets this function will set the connection descriptor.

**session :** is a [gnutls\\_session\\_t](#) structure.

**ptr :** is the value.

**gnutls\_transport\_set\_ptr2 ()**

```
void gnutls_transport_set_ptr2 (gnutls_session_t session,  
gnutls_transport_ptr_t recv_ptr,  
gnutls_transport_ptr_t send_ptr);
```

Used to set the first argument of the transport function (for push and pull callbacks). In berkeley style sockets this function will set the connection descriptor. With this function you can use two different pointers for receiving and sending.

**session :** is a [gnutls\\_session\\_t](#) structure.

**recv\_ptr :** is the value for the pull function

**send\_ptr :** is the value for the push function

**gnutls\_transport\_get\_ptr ()**

```
gnutls_transport_ptr_t gnutls_transport_get_ptr (gnutls_session_t session);
```

Used to get the first argument of the transport function (like PUSH and PULL). This must have been set using [gnutls\\_transport\\_set\\_ptr\(\)](#).

**session :** is a [gnutls\\_session\\_t](#) structure.

**Returns :** The first argument of the transport function.

### gnutls\_transport\_get\_ptr2 ()

```
void gnutls_transport_get_ptr2 (gnutls_session_t session,
                                gnutls_transport_ptr_t *recv_ptr,
                                gnutls_transport_ptr_t *send_ptr);
```

Used to get the arguments of the transport functions (like PUSH and PULL). These should have been set using [gnutls\\_transport\\_set\\_ptr2\(\)](#).

**session** : is a [gnutls\\_session\\_t](#) structure.

**recv\_ptr** : will hold the value for the pull function

**send\_ptr** : will hold the value for the push function

### gnutls\_transport\_set\_vec\_push\_function ()

```
void gnutls_transport_set_vec_push_function (gnutls_session_t session,
                                              gnutls_vec_push_func vec_func);
```

Using this function you can override the default `writv(2)` function for gnutls to send data. Setting this callback instead of [gnutls\\_transport\\_set\\_push\\_function\(\)](#) is recommended since it introduces less overhead in the TLS handshake process.

*vec\_func* is of the form, `ssize_t (*gnutls_vec_push_func) (gnutls_transport_ptr_t, const iovect_t * iov, int iovcnt);`

**session** : is a [gnutls\\_session\\_t](#) structure.

**vec\_func** : a callback function similar to [writv\(\)](#)

Since 2.12.0

### gnutls\_transport\_set\_push\_function ()

```
void gnutls_transport_set_push_function (gnutls_session_t session,
                                         gnutls_push_func push_func);
```

This is the function where you set a push function for gnutls to use in order to send data. If you are going to use berkeley style sockets, you do not need to use this function since the default `send(2)` will probably be ok. Otherwise you should specify this function for gnutls to be able to send data. The callback should return a positive number indicating the bytes sent, and -1 on error.

*push\_func* is of the form, `ssize_t (*gnutls_push_func)(gnutls_transport_ptr_t, const void*, size_t);`

**session** : is a [gnutls\\_session\\_t](#) structure.

**push\_func** : a callback function similar to [write\(\)](#)

### gnutls\_transport\_set\_pull\_function ()

```
void gnutls_transport_set_pull_function (gnutls_session_t session,
                                         gnutls_pull_func pull_func);
```

This is the function where you set a function for gnutls to receive data. Normally, if you use berkeley style sockets, do not need to use this function since the default `recv(2)` will probably be ok. The callback should return 0 on connection termination, a positive number indicating the number of bytes received, and -1 on error.

*gnutls\_pull\_func* is of the form, `ssize_t (*gnutls_pull_func)(gnutls_transport_ptr_t, void*, size_t);`

**session** : is a [gnutls\\_session\\_t](#) structure.

**pull\_func** : a callback function similar to [read\(\)](#)



**gnutls\_transport\_set\_pull\_timeout\_function ()**

```
void gnutls_transport_set_pull_timeout_function
                                         (gnutls_session_t session,
                                          gnutls_pull_timeout_func func);
```

This is the function where you set a function for gnutls to know whether data are ready to be received. It should wait for data a given time frame in milliseconds. The callback should return 0 on timeout, a positive number if data can be received, and -1 on error. You'll need to override this function if **select()** is not suitable for the provided transport calls. The callback function is used in DTLS only.

*gnutls\_pull\_timeout\_func* is of the form, `ssize_t (*gnutls_pull_timeout_func)(gnutls_transport_ptr_t, unsigned int ms);`

**session** : is a **gnutls\_session\_t** structure.

**func** : a callback function

Since 3.0.0

**gnutls\_transport\_set\_errno\_function ()**

```
void gnutls_transport_set_errno_function (gnutls_session_t session,
                                          gnutls_errno_func errno_func);
```

This is the function where you set a function to retrieve errno after a failed push or pull operation.

*errno\_func* is of the form, `int (*gnutls_errno_func)(gnutls_transport_ptr_t);` and should return the errno.

**session** : is a **gnutls\_session\_t** structure.

**errno\_func** : a callback function similar to **write()**

Since 2.12.0

**gnutls\_transport\_set\_errno ()**

```
void gnutls_transport_set_errno (gnutls_session_t session,
                                 int err);
```

Store *err* in the session-specific errno variable. Useful values for *err* is EAGAIN and EINTR, other values are treated will be treated as real errors in the push/pull function.

This function is useful in replacement push and pull functions set by **gnutls\_transport\_set\_push\_function()** and **gnutls\_transport\_set\_pull\_function()** under Windows, where the replacements may not have access to the same *errno* variable that is used by GnuTLS (e.g., the application is linked to msvcrt71.dll and gnutls is linked to msvcrt.dll).

**session** : is a **gnutls\_session\_t** structure.

**err** : error value to store in session-specific errno variable.

**gnutls\_session\_set\_ptr ()**

```
void gnutls_session_set_ptr (gnutls_session_t session,
                             void *ptr);
```

This function will set (associate) the user given pointer *ptr* to the session structure. This is pointer can be accessed with **gnutls\_session\_get\_ptr()**.

**session** : is a **gnutls\_session\_t** structure.

**ptr** : is the user pointer

**gnutls\_session\_get\_ptr ()**

```
void *          gnutls_session_get_ptr          (gnutls_session_t session);
```

Get user pointer for session. Useful in callbacks. This is the pointer set with **gnutls\_session\_set\_ptr()**.

**session** : is a **gnutls\_session\_t** structure.

**Returns** : the user given pointer from the session structure, or **NULL** if it was never set.

**gnutls\_openpgp\_send\_cert ()**

```
void          gnutls_openpgp_send_cert          (gnutls_session_t session,  
                                                gnutls_openpgp_cert_status_t status ←  
                                                );
```

This function will order gnutls to send the key fingerprint instead of the key in the initial handshake procedure. This should be used with care and only when there is indication or knowledge that the server can obtain the client's key.

**session** : is a pointer to a **gnutls\_session\_t** structure.

**status** : is one of GNUTLS\_OPENPGP\_CERT, or GNUTLS\_OPENPGP\_CERT\_FINGERPRINT

**gnutls\_fingerprint ()**

```
int          gnutls_fingerprint          (gnutls_digest_algorithm_t algo,  
                                         const gnutls_datum_t *data,  
                                         void *result,  
                                         size_t *result_size);
```

This function will calculate a fingerprint (actually a hash), of the given data. The result is not printable data. You should convert it to hex, or to something else printable.

This is the usual way to calculate a fingerprint of an X.509 DER encoded certificate. Note however that the fingerprint of an OpenPGP is not just a hash and cannot be calculated with this function.

**algo** : is a digest algorithm

**data** : is the data

**result** : is the place where the result will be copied (may be null).

**result\_size** : should hold the size of the result. The actual size of the returned result will also be copied there.

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise an error code is returned.

**enum gnutls\_random\_art\_t**

```
typedef enum gnutls_random_art  
{  
    GNUTLS_RANDOM_ART_OPENSSSH=1,  
} gnutls_random_art_t;
```

Enumeration of different random art types.

**GNUTLS\_RANDOM\_ART\_OPENSSSH** OpenSSH-style random art.

**gnutls\_random\_art ()**

```
int gnutls_random_art (gnutls_random_art_t type,
                      const char *key_type,
                      unsigned int key_size,
                      void *fpr,
                      size_t fpr_size,
                      gnutls_datum_t *art);
```

This function will convert a given fingerprint to an "artistic" image. The returned image is allocated using **gnutls\_malloc()**

**type** : The type of the random art

**key\_type** : The type of the key (RSA, DSA etc.)

**key\_size** : The size of the key in bits

**fpr** : The fingerprint of the key

**fpr\_size** : The size of the fingerprint

**art** : The returned random art

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise an error code is returned.

**gnutls\_srp\_free\_client\_credentials ()**

```
void gnutls_srp_free_client_credentials (gnutls_srp_client_credentials_t sc ↵
);
```

This structure is complex enough to manipulate directly thus this helper function is provided in order to free (deallocate) it.

**sc** : is a **gnutls\_srp\_client\_credentials\_t** structure.

**gnutls\_srp\_allocate\_client\_credentials ()**

```
int gnutls_srp_allocate_client_credentials (gnutls_srp_client_credentials_t * ↵
sc);
```

This structure is complex enough to manipulate directly thus this helper function is provided in order to allocate it.

**sc** : is a pointer to a **gnutls\_srp\_server\_credentials\_t** structure.

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, or an error code.

**gnutls\_srp\_set\_client\_credentials ()**

```
int gnutls_srp_set_client_credentials (gnutls_srp_client_credentials_t ↵
res,
                                     const char *username,
                                     const char *password);
```

This function sets the username and password, in a **gnutls\_srp\_client\_credentials\_t** structure. Those will be used in SRP authentication. *username* and *password* should be ASCII strings or UTF-8 strings prepared using the "SASLprep" profile of "stringprep".

**res** : is a `gnutls_srp_client_credentials_t` structure.

**username** : is the user's userid

**password** : is the user's password

**Returns** : On success, `GNUTLS_E_SUCCESS` (0) is returned, or an error code.

#### `gnutls_srp_free_server_credentials ()`

```
void gnutls_srp_free_server_credentials (gnutls_srp_server_credentials_t sc ↵  
);
```

This structure is complex enough to manipulate directly thus this helper function is provided in order to free (deallocate) it.

**sc** : is a `gnutls_srp_server_credentials_t` structure.

#### `gnutls_srp_allocate_server_credentials ()`

```
int gnutls_srp_allocate_server_credentials  
                                     (gnutls_srp_server_credentials_t * ↵  
                                     sc);
```

This structure is complex enough to manipulate directly thus this helper function is provided in order to allocate it.

**sc** : is a pointer to a `gnutls_srp_server_credentials_t` structure.

**Returns** : On success, `GNUTLS_E_SUCCESS` (0) is returned, or an error code.

#### `gnutls_srp_set_server_credentials_file ()`

```
int gnutls_srp_set_server_credentials_file  
                                     (gnutls_srp_server_credentials_t ↵  
                                     res,  
                                     const char *password_file,  
                                     const char *password_conf_file);
```

This function sets the password files, in a `gnutls_srp_server_credentials_t` structure. Those password files hold usernames and verifiers and will be used for SRP authentication.

**res** : is a `gnutls_srp_server_credentials_t` structure.

**password\_file** : is the SRP password file (tpasswd)

**password\_conf\_file** : is the SRP password conf file (tpasswd.conf)

**Returns** : On success, `GNUTLS_E_SUCCESS` (0) is returned, or an error code.

#### `gnutls_srp_server_get_username ()`

```
const char * gnutls_srp_server_get_username (gnutls_session_t session);
```

This function will return the username of the peer. This should only be called in case of SRP authentication and in case of a server. Returns NULL in case of an error.

**session** : is a gnutls session

**Returns** : SRP username of the peer, or NULL in case of error.

**gnutls\_srp\_set\_prime\_bits ()**

```
void gnutls_srp_set_prime_bits (gnutls_session_t session,
                                unsigned int bits);
```

This function sets the minimum accepted number of bits, for use in an SRP key exchange. If zero, the default 2048 bits will be used.

In the client side it sets the minimum accepted number of bits. If a server sends a prime with less bits than that **GNUTLS\_E\_RECEIVED** will be returned by the handshake.

This function has no effect in server side.

**session** : is a **gnutls\_session\_t** structure.

**bits** : is the number of bits

Since 2.6.0

**gnutls\_srp\_verifier ()**

```
int gnutls_srp_verifier (const char *username,
                         const char *password,
                         const gnutls_datum_t *salt,
                         const gnutls_datum_t *generator,
                         const gnutls_datum_t *prime,
                         gnutls_datum_t *res);
```

This function will create an SRP verifier, as specified in RFC2945. The *prime* and *generator* should be one of the static parameters defined in `gnutls/gnutls.h` or may be generated.

The verifier will be allocated with `@gnutls_malloc()` and will be stored in *res* using binary format.

**username** : is the user's name

**password** : is the user's password

**salt** : should be some randomly generated bytes

**generator** : is the generator of the group

**prime** : is the group's prime

**res** : where the verifier will be stored.

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, or an error code.

**gnutls\_srp\_4096\_group\_prime**

```
extern const gnutls_datum_t gnutls_srp_4096_group_prime;
```

**gnutls\_srp\_4096\_group\_generator**

```
extern const gnutls_datum_t gnutls_srp_4096_group_generator;
```

**gnutls\_srp\_3072\_group\_prime**

```
extern const gnutls_datum_t gnutls_srp_3072_group_prime;
```

**gnutls\_srp\_3072\_group\_generator**

```
extern const gnutls_datum_t gnutls_srp_3072_group_generator;
```

**gnutls\_srp\_2048\_group\_prime**

```
extern const gnutls_datum_t gnutls_srp_2048_group_prime;
```

**gnutls\_srp\_2048\_group\_generator**

```
extern const gnutls_datum_t gnutls_srp_2048_group_generator;
```

**gnutls\_srp\_1536\_group\_prime**

```
extern const gnutls_datum_t gnutls_srp_1536_group_prime;
```

**gnutls\_srp\_1536\_group\_generator**

```
extern const gnutls_datum_t gnutls_srp_1536_group_generator;
```

**gnutls\_srp\_1024\_group\_prime**

```
extern const gnutls_datum_t gnutls_srp_1024_group_prime;
```

**gnutls\_srp\_1024\_group\_generator**

```
extern const gnutls_datum_t gnutls_srp_1024_group_generator;
```

**gnutls\_srp\_set\_server\_credentials\_function ()**

```
void gnutls_srp_set_server_credentials_function
                                         (gnutls_srp_server_credentials_t cred,
                                         gnutls_srp_server_credentials_function func);
```

This function can be used to set a callback to retrieve the user's SRP credentials. The callback's function form is:

```
int (*callback)(gnutls_session_t, const char* username, gnutls_datum_t* salt, gnutls_datum_t *verifier, gnutls_datum_t* g,
gnutls_datum_t* n);
```

*username* contains the actual username. The *salt*, *verifier*, *generator* and *prime* must be filled in using the **gnutls\_malloc()**. For convenience *prime* and *generator* may also be one of the static parameters defined in gnutls.h.

In case the callback returned a negative number then gnutls will assume that the username does not exist.

In order to prevent attackers from guessing valid usernames, if a user does not exist, *g* and *n* values should be filled in using a random user's parameters. In that case the callback must return the special value (1).

The callback function will only be called once per handshake. The callback function should return 0 on success, while -1 indicates an error.

**cred** : is a [gnutls\\_srp\\_server\\_credentials\\_t](#) structure.

**func** : is the callback function

### gnutls\_srp\_set\_client\_credentials\_function ()

```
void                gnutls_srp_set_client_credentials_function
                                (gnutls_srp_client_credentials_t  cred,
                                gnutls_srp_client_credentials_function  *func);
```

This function can be used to set a callback to retrieve the username and password for client SRP authentication. The callback's function form is:

```
int (*callback)(gnutls_session_t, char** username, char**password);
```

The *username* and *password* must be allocated using [gnutls\\_malloc\(\)](#). *username* and *password* should be ASCII strings or UTF-8 strings prepared using the "SASLprep" profile of "stringprep".

The callback function will be called once per handshake before the initial hello message is sent.

The callback should not return a negative error code the second time called, since the handshake procedure will be aborted.

The callback function should return 0 on success. -1 indicates an error.

**cred** : is a [gnutls\\_srp\\_server\\_credentials\\_t](#) structure.

**func** : is the callback function

### gnutls\_srp\_base64\_encode ()

```
int                gnutls_srp_base64_encode
                                (const gnutls_datum_t *data,
                                char *result,
                                size_t *result_size);
```

This function will convert the given data to printable data, using the base64 encoding, as used in the libsrp. This is the encoding used in SRP password files. If the provided buffer is not long enough GNUTLS\_E\_SHORT\_MEMORY\_BUFFER is returned.

Warning! This base64 encoding is not the "standard" encoding, so do not use it for non-SRP purposes.

**data** : contain the raw data

**result** : the place where base64 data will be copied

**result\_size** : holds the size of the result

**Returns** : [GNUTLS\\_E\\_SHORT\\_MEMORY\\_BUFFER](#) if the buffer given is not long enough, or 0 on success.

**gnutls\_srp\_base64\_encode\_alloc ()**

```
int gnutls_srp_base64_encode_alloc (const gnutls_datum_t *data,
                                   gnutls_datum_t *result);
```

This function will convert the given data to printable data, using the base64 encoding. This is the encoding used in SRP password files. This function will allocate the required memory to hold the encoded data.

You should use **gnutls\_free()** to free the returned data.

Warning! This base64 encoding is not the "standard" encoding, so do not use it for non-SRP purposes.

**data** : contains the raw data

**result** : will hold the newly allocated encoded data

**Returns** : 0 on success, or an error code.

**gnutls\_srp\_base64\_decode ()**

```
int gnutls_srp_base64_decode (const gnutls_datum_t *b64_data,
                              char *result,
                              size_t *result_size);
```

This function will decode the given encoded data, using the base64 encoding found in libsrp.

Note that *b64\_data* should be null terminated.

Warning! This base64 encoding is not the "standard" encoding, so do not use it for non-SRP purposes.

**b64\_data** : contain the encoded data

**result** : the place where decoded data will be copied

**result\_size** : holds the size of the result

**Returns** : **GNUTLS\_E\_SHORT\_MEMORY\_BUFFER** if the buffer given is not long enough, or 0 on success.

**gnutls\_srp\_base64\_decode\_alloc ()**

```
int gnutls_srp_base64_decode_alloc (const gnutls_datum_t *b64_data,
                                   gnutls_datum_t *result);
```

This function will decode the given encoded data. The decoded data will be allocated, and stored into result. It will decode using the base64 algorithm as used in libsrp.

You should use **gnutls\_free()** to free the returned data.

Warning! This base64 encoding is not the "standard" encoding, so do not use it for non-SRP purposes.

**b64\_data** : contains the encoded data

**result** : the place where decoded data lie

**Returns** : 0 on success, or an error code.



**enum gnutls\_psk\_key\_flags**

```
typedef enum gnutls_psk_key_flags
{
    GNUTLS_PSK_KEY_RAW = 0,
    GNUTLS_PSK_KEY_HEX
} gnutls_psk_key_flags;
```

Enumeration of different PSK key flags.

**GNUTLS\_PSK\_KEY\_RAW** PSK-key in raw format.

**GNUTLS\_PSK\_KEY\_HEX** PSK-key in hex format.

**gnutls\_psk\_free\_client\_credentials ()**

```
void gnutls_psk_free_client_credentials (gnutls_psk_client_credentials_t sc ↵
);
```

This structure is complex enough to manipulate directly thus this helper function is provided in order to free (deallocate) it.

**sc** : is a **gnutls\_psk\_client\_credentials\_t** structure.

**gnutls\_psk\_allocate\_client\_credentials ()**

```
int gnutls_psk_allocate_client_credentials (gnutls_psk_client_credentials_t * ↵
sc);
```

This structure is complex enough to manipulate directly thus this helper function is provided in order to allocate it.

**sc** : is a pointer to a **gnutls\_psk\_server\_credentials\_t** structure.

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise an error code is returned.

**gnutls\_psk\_set\_client\_credentials ()**

```
int gnutls_psk_set_client_credentials (gnutls_psk_client_credentials_t ↵
res,
const char *username,
const gnutls_datum_t *key,
gnutls_psk_key_flags flags);
```

This function sets the username and password, in a **gnutls\_psk\_client\_credentials\_t** structure. Those will be used in PSK authentication. *username* should be an ASCII string or UTF-8 strings prepared using the "SASLprep" profile of "stringprep". The key can be either in raw byte format or in Hex format (without the 0x prefix).

**res** : is a **gnutls\_psk\_client\_credentials\_t** structure.

**username** : is the user's zero-terminated userid

**key** : is the user's key

**flags** : indicate the format of the key, either **GNUTLS\_PSK\_KEY\_RAW** or **GNUTLS\_PSK\_KEY\_HEX**.

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise an error code is returned.

**gnutls\_psk\_free\_server\_credentials ()**

```
void gnutls_psk_free_server_credentials (gnutls_psk_server_credentials_t sc ↵);
```

This structure is complex enough to manipulate directly thus this helper function is provided in order to free (deallocate) it.

**sc** : is a [gnutls\\_psk\\_server\\_credentials\\_t](#) structure.

**gnutls\_psk\_allocate\_server\_credentials ()**

```
int gnutls_psk_allocate_server_credentials (gnutls_psk_server_credentials_t * ↵  
sc);
```

This structure is complex enough to manipulate directly thus this helper function is provided in order to allocate it.

**sc** : is a pointer to a [gnutls\\_psk\\_server\\_credentials\\_t](#) structure.

**Returns** : On success, [GNUTLS\\_E\\_SUCCESS](#) (0) is returned, otherwise an error code is returned.

**gnutls\_psk\_set\_server\_credentials\_file ()**

```
int gnutls_psk_set_server_credentials_file (gnutls_psk_server_credentials_t ↵  
res,  
const char *password_file);
```

This function sets the password file, in a [gnutls\\_psk\\_server\\_credentials\\_t](#) structure. This password file holds usernames and keys and will be used for PSK authentication.

**res** : is a [gnutls\\_psk\\_server\\_credentials\\_t](#) structure.

**password\_file** : is the PSK password file (passwd.psk)

**Returns** : On success, [GNUTLS\\_E\\_SUCCESS](#) (0) is returned, otherwise an error code is returned.

**gnutls\_psk\_set\_server\_credentials\_hint ()**

```
int gnutls_psk_set_server_credentials_hint (gnutls_psk_server_credentials_t ↵  
res,  
const char *hint);
```

This function sets the identity hint, in a [gnutls\\_psk\\_server\\_credentials\\_t](#) structure. This hint is sent to the client to help it chose a good PSK credential (i.e., username and password).

**res** : is a [gnutls\\_psk\\_server\\_credentials\\_t](#) structure.

**hint** : is the PSK identity hint string

**Returns** : On success, [GNUTLS\\_E\\_SUCCESS](#) (0) is returned, otherwise an error code is returned.

Since 2.4.0

**gnutls\_psk\_server\_get\_username ()**

```
const char *      gnutls_psk_server_get_username      (gnutls_session_t session);
```

This should only be called in case of PSK authentication and in case of a server.

**session** : is a gnutls session

**Returns** : the username of the peer, or **NULL** in case of an error.

**gnutls\_psk\_client\_get\_hint ()**

```
const char *      gnutls_psk_client_get_hint          (gnutls_session_t session);
```

The PSK identity hint may give the client help in deciding which username to use. This should only be called in case of PSK authentication and in case of a client.

**session** : is a gnutls session

**Returns** : the identity hint of the peer, or **NULL** in case of an error.

Since 2.4.0

**gnutls\_psk\_set\_server\_credentials\_function ()**

```
void              gnutls_psk_set_server_credentials_function
                  (gnutls_psk_server_credentials_t cred,
                   gnutls_psk_server_credentials_function func);
```

This function can be used to set a callback to retrieve the user's PSK credentials. The callback's function form is: `int (*callback)(gnutls_session_t, const char* username, gnutls_datum_t* key);`

*username* contains the actual username. The *key* must be filled in using the **gnutls\_malloc()**.

In case the callback returned a negative number then gnutls will assume that the username does not exist.

The callback function will only be called once per handshake. The callback function should return 0 on success, while -1 indicates an error.

**cred** : is a **gnutls\_psk\_server\_credentials\_t** structure.

**func** : is the callback function

**gnutls\_psk\_set\_client\_credentials\_function ()**

```
void              gnutls_psk_set_client_credentials_function
                  (gnutls_psk_client_credentials_t cred,
                   gnutls_psk_client_credentials_function func);
```

This function can be used to set a callback to retrieve the username and password for client PSK authentication. The callback's function form is: `int (*callback)(gnutls_session_t, char** username, gnutls_datum_t* key);`

The *username* and *key*->data must be allocated using **gnutls\_malloc()**. *username* should be ASCII strings or UTF-8 strings prepared using the "SASLprep" profile of "stringprep".

The callback function will be called once per handshake.

The callback function should return 0 on success. -1 indicates an error.

**cred** : is a `gnutls_psk_server_credentials_t` structure.

**func** : is the callback function

### **gnutls\_hex\_encode ()**

```
int                gnutls_hex_encode                (const gnutls_datum_t *data,
                                                    char *result,
                                                    size_t *result_size);
```

This function will convert the given data to printable data, using the hex encoding, as used in the PSK password files.

**data** : contain the raw data

**result** : the place where hex data will be copied

**result\_size** : holds the size of the result

**Returns** : `GNUTLS_E_SHORT_MEMORY_BUFFER` if the buffer given is not long enough, or 0 on success.

### **gnutls\_hex\_decode ()**

```
int                gnutls_hex_decode                (const gnutls_datum_t *hex_data,
                                                    char *result,
                                                    size_t *result_size);
```

This function will decode the given encoded data, using the hex encoding used by PSK password files.

Note that `hex_data` should be null terminated.

**hex\_data** : contain the encoded data

**result** : the place where decoded data will be copied

**result\_size** : holds the size of the result

**Returns** : `GNUTLS_E_SHORT_MEMORY_BUFFER` if the buffer given is not long enough, or 0 on success.

### **gnutls\_psk\_set\_server\_dh\_params ()**

```
void                gnutls_psk_set_server_dh_params (gnutls_psk_server_credentials_t cred,
                                                    gnutls_dh_params_t dh_params);
```

This function will set the Diffie-Hellman parameters for an anonymous server to use. These parameters will be used in Diffie-Hellman exchange with PSK cipher suites.

**res** : is a `gnutls_psk_server_credentials_t` structure

**dh\_params** : is a structure that holds Diffie-Hellman parameters.

**gnutls\_psk\_set\_server\_params\_function ()**

```
void gnutls_psk_set_server_params_function (gnutls_psk_server_credentials_t res,
                                           gnutls_params_function *func);
```

This function will set a callback in order for the server to get the Diffie-Hellman parameters for PSK authentication. The callback should return **GNUTLS\_E\_SUCCESS** (0) on success.

**res** : is a **gnutls\_certificate\_credentials\_t** structure

**func** : is the function to be called

**enum gnutls\_x509\_subject\_alt\_name\_t**

```
typedef enum gnutls_x509_subject_alt_name_t
{
    GNUTLS_SAN_DNSNAME = 1,
    GNUTLS_SAN_RFC822NAME = 2,
    GNUTLS_SAN_URI = 3,
    GNUTLS_SAN_IPADDRESS = 4,
    GNUTLS_SAN_OTHERNAME = 5,
    GNUTLS_SAN_DN = 6,
    /* The following are "virtual" subject alternative name types, in
       that they are represented by an otherName value and an OID.
       Used by gnutls_x509_cert_get_subject_alt_othername_oid. */
    GNUTLS_SAN_OTHERNAME_XMPP = 1000
} gnutls_x509_subject_alt_name_t;
```

Enumeration of different subject alternative names types.

**GNUTLS\_SAN\_DNSNAME** DNS-name SAN.

**GNUTLS\_SAN\_RFC822NAME** E-mail address SAN.

**GNUTLS\_SAN\_URI** URI SAN.

**GNUTLS\_SAN\_IPADDRESS** IP address SAN.

**GNUTLS\_SAN\_OTHERNAME** OtherName SAN.

**GNUTLS\_SAN\_DN** DN SAN.

**GNUTLS\_SAN\_OTHERNAME\_XMPP** Virtual SAN, used by `gnutls_x509_cert_get_subject_alt_othername_oid`.

**struct gnutls\_openpgp\_cert\_int**

```
struct gnutls_openpgp_cert_int;
```

**gnutls\_openpgp\_cert\_t**

```
typedef struct gnutls_openpgp_cert_int *gnutls_openpgp_cert_t;
```

**struct gnutls\_openpgp\_privkey\_int**

```
struct gnutls_openpgp_privkey_int;
```

**gnutls\_openpgp\_privkey\_t**

```
typedef struct gnutls_openpgp_privkey_int *gnutls_openpgp_privkey_t;
```

**struct gnutls\_pkcs11\_privkey\_st**

```
struct gnutls_pkcs11_privkey_st;
```

**gnutls\_pkcs11\_privkey\_t**

```
typedef struct gnutls_pkcs11_privkey_st *gnutls_pkcs11_privkey_t;
```

**enum gnutls\_privkey\_type\_t**

```
typedef enum
{
    GNUTLS_PRIVKEY_X509,
    GNUTLS_PRIVKEY_OPENPGP,
    GNUTLS_PRIVKEY_PKCS11,
    GNUTLS_PRIVKEY_EXT
} gnutls_privkey_type_t;
```

Enumeration of different private key types.

**GNUTLS\_PRIVKEY\_X509** X.509 private key, [gnutls\\_x509\\_privkey\\_t](#).

**GNUTLS\_PRIVKEY\_OPENPGP** OpenPGP private key, [gnutls\\_openpgp\\_privkey\\_t](#).

**GNUTLS\_PRIVKEY\_PKCS11** PKCS11 private key, [gnutls\\_pkcs11\\_privkey\\_t](#).

**GNUTLS\_PRIVKEY\_EXT** External private key, operating using callbacks.

**gnutls\_auth\_get\_type ()**

```
gnutls_credentials_type_t gnutls_auth_get_type (gnutls_session_t session);
```

Returns type of credentials for the current authentication schema. The returned information is to be used to distinguish the function used to access authentication data.

Eg. for CERTIFICATE ciphersuites (key exchange algorithms: [GNUTLS\\_KX\\_RSA](#), [GNUTLS\\_KX\\_DHE\\_RSA](#)), the same function are to be used to access the authentication data.

**session** : is a [gnutls\\_session\\_t](#) structure.

**Returns** : The type of credentials for the current authentication schema, a [gnutls\\_credentials\\_type\\_t](#) type.

**gnutls\_auth\_server\_get\_type ()**

```
gnutls_credentials_type_t gnutls_auth_server_get_type (gnutls_session_t session);
```

Returns the type of credentials that were used for server authentication. The returned information is to be used to distinguish the function used to access authentication data.

**session** : is a [gnutls\\_session\\_t](#) structure.

**Returns** : The type of credentials for the server authentication schema, a [gnutls\\_credentials\\_type\\_t](#) type.

**gnutls\_auth\_client\_get\_type ()**

```
gnutls_credentials_type_t gnutls_auth_client_get_type (gnutls_session_t session);
```

Returns the type of credentials that were used for client authentication. The returned information is to be used to distinguish the function used to access authentication data.

**session** : is a [gnutls\\_session\\_t](#) structure.

**Returns** : The type of credentials for the client authentication schema, a [gnutls\\_credentials\\_type\\_t](#) type.

**gnutls\_dh\_set\_prime\_bits ()**

```
void gnutls_dh_set_prime_bits (gnutls_session_t session,  
                               unsigned int bits);
```

This function sets the number of bits, for use in a Diffie-Hellman key exchange. This is used both in DH ephemeral and DH anonymous cipher suites. This will set the minimum size of the prime that will be used for the handshake.

In the client side it sets the minimum accepted number of bits. If a server sends a prime with less bits than that [GNUTLS\\_E\\_DH\\_PRIME](#) will be returned by the handshake.

This function has no effect in server side.

**session** : is a [gnutls\\_session\\_t](#) structure.

**bits** : is the number of bits

**gnutls\_dh\_get\_secret\_bits ()**

```
int gnutls_dh_get_secret_bits (gnutls_session_t session);
```

This function will return the bits used in the last Diffie-Hellman key exchange with the peer. Should be used for both anonymous and ephemeral Diffie-Hellman.

**session** : is a gnutls session

**Returns** : On success, [GNUTLS\\_E\\_SUCCESS](#) (0) is returned, otherwise an error code is returned.

**gnutls\_dh\_get\_peers\_public\_bits ()**

```
int gnutls_dh_get_peers_public_bits (gnutls_session_t session);
```

Get the Diffie-Hellman public key bit size. Can be used for both anonymous and ephemeral Diffie-Hellman.

**session** : is a gnutls session

**Returns** : The public key bit size used in the last Diffie-Hellman key exchange with the peer, or a negative error code in case of error.

**gnutls\_dh\_get\_prime\_bits ()**

```
int gnutls_dh_get_prime_bits (gnutls_session_t session);
```

This function will return the bits of the prime used in the last Diffie-Hellman key exchange with the peer. Should be used for both anonymous and ephemeral Diffie-Hellman. Note that some ciphers, like RSA and DSA without DHE, do not use a Diffie-Hellman key exchange, and then this function will return 0.

**session** : is a gnutls session

**Returns** : The Diffie-Hellman bit strength is returned, or 0 if no Diffie-Hellman key exchange was done, or a negative error code on failure.

**gnutls\_dh\_get\_group ()**

```
int gnutls_dh_get_group (gnutls_session_t session,  
gnutls_datum_t *raw_gen,  
gnutls_datum_t *raw_prime);
```

This function will return the group parameters used in the last Diffie-Hellman key exchange with the peer. These are the prime and the generator used. This function should be used for both anonymous and ephemeral Diffie-Hellman. The output parameters must be freed with **gnutls\_free()**.

**session** : is a gnutls session

**raw\_gen** : will hold the generator.

**raw\_prime** : will hold the prime.

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise an error code is returned.

**gnutls\_dh\_get\_pubkey ()**

```
int gnutls_dh_get_pubkey (gnutls_session_t session,  
gnutls_datum_t *raw_key);
```

This function will return the peer's public key used in the last Diffie-Hellman key exchange. This function should be used for both anonymous and ephemeral Diffie-Hellman. The output parameters must be freed with **gnutls\_free()**.

**session** : is a gnutls session

**raw\_key** : will hold the public key.

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise an error code is returned.

**gnutls\_certificate\_set\_retrieve\_function ()**

```
void gnutls_certificate_set_retrieve_function (gnutls_certificate_credentials_t cred,  
gnutls_certificate_retrieve_function *func);
```



This function sets a callback to be called in order to retrieve the certificate to be used in the handshake. You are advised to use `gnutls_certificate_set_retrieve_function2()` because it is much more efficient in the processing it requires from gnutls.

The callback's function prototype is: `int (*callback)(gnutls_session_t, const gnutls_datum_t* req_ca_dn, int nreqs, const gnutls_pk_algo_t* pk_algos, int pk_algos_length, gnutls_retr2_st* st);`

`req_ca_cert` is only used in X.509 certificates. Contains a list with the CA names that the server considers trusted. Normally we should send a certificate that is signed by one of these CAs. These names are DER encoded. To get a more meaningful value use the function `gnutls_x509_rdn_get()`.

`pk_algos` contains a list with server's acceptable signature algorithms. The certificate returned should support the server's given algorithms.

$st$  should contain the certificates and private keys.

If the callback function is provided then gnutls will call it, in the handshake, after the certificate request message has been received.

In server side pk\_algos and req\_ca\_dn are NULL.

The callback function should set the certificate list to be sent, and return 0 on success. If no certificate was selected then the number of certificates should be set to zero. The value (-1) indicates error and the handshake will be terminated.

**cred**: is a `gnutls_certificate_credentials_t` structure.

**func** : is the callback function

Since 3.0.0

## gnutls\_certificate\_set\_verify\_function()

```
void gnutls_certificate_set_verify_function
                                     (gnutls_certificate_credentials_t <-
                                     cred,
                                     gnutls_certificate_verify_function <-
                                     *func);
```

This function sets a callback to be called when peer's certificate has been received in order to verify it on receipt rather than doing after the handshake is completed.

The callback's function prototype is: `int (*callback)(gnutls_session_t);`

If the callback function is provided then `gnutls` will call it, in the handshake, just after the certificate message has been received. To verify or obtain the certificate the `gnutls_certificate_verify_peers2()`, `gnutls_certificate_type_get()`, `gnutls_certificate_get_peers()` functions can be used.

The callback function should return 0 for the handshake to continue or non-zero to terminate.

**cred**: is a `gnutls_certificate_credentials_t` structure.

**func** : is the callback function

Since 2.10.0

**gnutls\_certificate\_server\_set\_request ()**[illegible]

This function specifies if we (in case of a server) are going to send a certificate request message to the client. If *req* is GNUTLS\_CERT\_REQUIRE then the server will return an error if the peer does not provide a certificate. If you do not call this function then the client will not be asked to send a certificate.

**session** : is a `gnutls_session_t` structure.

**req** : is one of GNUTLS\_CERT\_REQUEST, GNUTLS\_CERT\_REQUIRE

### `gnutls_certificate_get_peers ()`

```
const gnutls_datum_t * gnutls_certificate_get_peers    (gnutls_session_t session,
                                                         unsigned int *list_size);
```

Get the peer's raw certificate (chain) as sent by the peer. These certificates are in raw format (DER encoded for X.509). In case of a X.509 then a certificate list may be present. The first certificate in the list is the peer's certificate, following the issuer's certificate, then the issuer's issuer etc.

In case of OpenPGP keys a single key will be returned in raw format.

**session** : is a gnutls session

**list\_size** : is the length of the certificate list

**Returns** : a pointer to a `gnutls_datum_t` containing our certificates, or `NULL` in case of an error or if no certificate was used.

### `gnutls_certificate_get_ours ()`

```
const gnutls_datum_t * gnutls_certificate_get_ours    (gnutls_session_t session);
```

Gets the certificate as sent to the peer in the last handshake. The certificate is in raw (DER) format. No certificate list is being returned. Only the first certificate.

**session** : is a gnutls session

**Returns** : a pointer to a `gnutls_datum_t` containing our certificates, or `NULL` in case of an error or if no certificate was used.

### `gnutls_certificate_activation_time_peers ()`

```
time_t                gnutls_certificate_activation_time_peers
                                                                (gnutls_session_t session);
```



#### Warning

`gnutls_certificate_activation_time_peers` is deprecated and should not be used in newly-written code. `gnutls_certificate_verify_peers2()` now verifies activation times.

This function will return the peer's certificate activation time. This is the creation time for openpgp keys.

**session** : is a gnutls session

**Returns** : (time\_t)-1 on error.

**gnutls\_certificate\_expiration\_time\_peers ()**

```
time_t          gnutls_certificate_expiration_time_peers
                  (gnutls_session_t session);
```

**Warning**

`gnutls_certificate_expiration_time_peers` is deprecated and should not be used in newly-written code. `gnutls_certificate_verify_peers2()` now verifies expiration times.

This function will return the peer's certificate expiration time.

**session** : is a gnutls session

**Returns** : (time\_t)-1 on error.

**gnutls\_certificate\_client\_get\_request\_status ()**

```
int             gnutls_certificate_client_get_request_status
                  (gnutls_session_t session);
```

Get whether client certificate is requested or not.

**session** : is a gnutls session

**Returns** : 0 if the peer (server) did not request client authentication or 1 otherwise, or a negative error code in case of error.

**gnutls\_certificate\_verify\_peers2 ()**

```
int             gnutls_certificate_verify_peers2      (gnutls_session_t session,
                                                         unsigned int *status);
```

This function will try to verify the peer's certificate and return its status (trusted, invalid etc.). The value of *status* should be one or more of the `gnutls_certificate_status_t` enumerated elements bitwise or'd. To avoid denial of service attacks some default upper limits regarding the certificate key size and chain size are set. To override them use `gnutls_certificate_set_verify_limits()`.

Note that you must also check the peer's name in order to check if the verified certificate belongs to the actual peer.

This function uses `gnutls_x509_crt_list_verify()` with the CAs in the credentials as trusted CAs.

**session** : is a gnutls session

**status** : is the output of the verification

**Returns** : a negative error code on error and `GNUTLS_E_SUCCESS` (0) on success.

**gnutls\_pem\_base64\_encode ()**

```
int             gnutls_pem_base64_encode              (const char *msg,
                                                         const gnutls_datum_t *data,
                                                         char *result,
                                                         size_t *result_size);
```

This function will convert the given data to printable data, using the base64 encoding. This is the encoding used in PEM messages. The output string will be null terminated, although the size will not include the terminating null.



This function will decode the given encoded data. The decoded data will be allocated, and stored into result. If the header given is non null this function will search for "-----BEGIN header" and decode only this part. Otherwise it will decode the first PEM packet found.

You should use `gnutls_free()` to free the returned data.

**header** : The PEM header (eg. CERTIFICATE)

**b64\_data** : contains the encoded data

**result** : the place where decoded data lie

**Returns** : On success, `GNUTLS_E_SUCCESS` (0) is returned, otherwise an error code is returned.

## GNUTLS\_KEY\_DIGITAL\_SIGNATURE

```
#define GNUTLS_KEY_DIGITAL_SIGNATURE~128
```

## GNUTLS\_KEY\_NON\_REPUDIATION

```
#define GNUTLS_KEY_NON_REPUDIATION~64
```

## GNUTLS\_KEY\_KEY\_ENCIPHERMENT

```
#define GNUTLS_KEY_KEY_ENCIPHERMENT~32
```

## GNUTLS\_KEY\_DATA\_ENCIPHERMENT

```
#define GNUTLS_KEY_DATA_ENCIPHERMENT~16
```

## GNUTLS\_KEY\_KEY\_AGREEMENT

```
#define GNUTLS_KEY_KEY_AGREEMENT~8
```

## GNUTLS\_KEY\_KEY\_CERT\_SIGN

```
#define GNUTLS_KEY_KEY_CERT_SIGN~4
```

## GNUTLS\_KEY\_CRL\_SIGN

```
#define GNUTLS_KEY_CRL_SIGN    2
```

## GNUTLS\_KEY\_ENCIPHER\_ONLY

```
#define GNUTLS_KEY_ENCIPHER_ONLY~1
```

## GNUTLS\_KEY\_DECIPHER\_ONLY

```
#define GNUTLS_KEY_DECIPHER_ONLY~32768
```

### gnutls\_certificate\_set\_params\_function ()

```
void gnutls_certificate_set_params_function (gnutls_certificate_credentials_t ↵  
                                             res,  
                                             gnutls_params_function *func);
```

This function will set a callback in order for the server to get the Diffie-Hellman or RSA parameters for certificate authentication. The callback should return **GNUTLS\_E\_SUCCESS** (0) on success.

**res** : is a gnutls\_certificate\_credentials\_t structure

**func** : is the function to be called

### gnutls\_anon\_set\_params\_function ()

```
void gnutls_anon_set_params_function (gnutls_anon_server_credentials_t ↵  
    res,  
                                         gnutls_params_function *func);
```

This function will set a callback in order for the server to get the Diffie-Hellman or RSA parameters for anonymous authentication. The callback should return **GNUTLS\_E\_SUCCESS** (0) on success.

**res** : is a gnutls\_anon\_server\_credentials\_t structure

**func** : is the function to be called

### gnutls\_psk\_set\_params\_function ()

```
void gnutls_psk_set_params_function (gnutls_psk_server_credentials_t ↵  
    res,  
                                         gnutls_params_function *func);
```

This function will set a callback in order for the server to get the Diffie-Hellman or RSA parameters for PSK authentication. The callback should return **GNUTLS\_E\_SUCCESS** (0) on success.

**res** : is a gnutls\_psk\_server\_credentials\_t structure

**func** : is the function to be called

### gnutls\_hex2bin ()

```
int gnutls_hex2bin (const char *hex_data,  
                   size_t hex_size,  
                   char *bin_data,  
                   size_t *bin_size);
```

Convert a buffer with hex data to binary data.

**hex\_data** : string with data in hex format

**hex\_size**: size of hex data

**bin\_data**: output array with binary data

**bin\_size**: when calling should hold maximum size of *bin\_data*, on return will hold actual length of *bin\_data*.

**Returns**: **GNUTLS\_E\_SUCCESS** on success, otherwise a negative error code.

Since 2.4.0

## GNUTLS\_E\_SUCCESS

```
#define GNUTLS_E_SUCCESS 0
```

## GNUTLS\_E\_UNKNOWN\_COMPRESSION\_ALGORITHM

```
#define~GNUTLS_E_UNKNOWN_COMPRESSION_ALGORITHM -3
```

## GNUTLS\_E\_UNKNOWN\_CIPHER\_TYPE

```
#define~GNUTLS_E_UNKNOWN_CIPHER_TYPE -6
```

## GNUTLS\_E\_LARGE\_PACKET

```
#define~GNUTLS_E_LARGE_PACKET -7
```

## GNUTLS\_E\_UNSUPPORTED\_VERSION\_PACKET

```
#define GNUTLS_E_UNSUPPORTED_VERSION_PACKET -8 /* GNUTLS_A_PROTOCOL_VERSION */
```

## GNUTLS\_E\_UNEXPECTED\_PACKET\_LENGTH

```
#define GNUTLS_E_UNEXPECTED_PACKET_LENGTH -9 /* GNUTLS_A_RECORD_OVERFLOW */
```

## GNUTLS\_E\_INVALID\_SESSION

```
#define GNUTLS_E_INVALID_SESSION -10
```

## GNUTLS\_E\_FATAL\_ALERT\_RECEIVED

```
#define GNUTLS_E_FATAL_ALERT_RECEIVED -12
```

## GNUTLS\_E\_UNEXPECTED\_PACKET

```
#define GNUTLS_E_UNEXPECTED_PACKET -15 /* GNUTLS_A_UNEXPECTED_MESSAGE */
```

**GNUTLS\_E\_WARNING\_ALERT\_RECEIVED**

```
#define GNUTLS_E_WARNING_ALERT_RECEIVED -16
```

**GNUTLS\_E\_ERROR\_IN\_FINISHED\_PACKET**

```
#define GNUTLS_E_ERROR_IN_FINISHED_PACKET -18
```

**GNUTLS\_E\_UNEXPECTED\_HANDSHAKE\_PACKET**

```
#define GNUTLS_E_UNEXPECTED_HANDSHAKE_PACKET -19
```

**GNUTLS\_E\_UNKNOWN\_CIPHER\_SUITE**

```
#define~GNUTLS_E_UNKNOWN_CIPHER_SUITE -21 /* GNUTLS_A_HANDSHAKE_FAILURE */
```

**GNUTLS\_E\_UNWANTED\_ALGORITHM**

```
#define~GNUTLS_E_UNWANTED_ALGORITHM -22
```

**GNUTLS\_E\_MPI\_SCAN\_FAILED**

```
#define~GNUTLS_E_MPI_SCAN_FAILED -23
```

**GNUTLS\_E\_DECRYPTION\_FAILED**

```
#define GNUTLS_E_DECRYPTION_FAILED -24 /* GNUTLS_A_DECRYPTION_FAILED, ↔  
GNUTLS_A_BAD_RECORD_MAC */
```

**GNUTLS\_E\_MEMORY\_ERROR**

```
#define GNUTLS_E_MEMORY_ERROR -25
```

**GNUTLS\_E\_DECOMPRESSION\_FAILED**

```
#define GNUTLS_E_DECOMPRESSION_FAILED -26 /* GNUTLS_A_DECOMPRESSION_FAILURE */
```

**GNUTLS\_E\_COMPRESSION\_FAILED**

```
#define GNUTLS_E_COMPRESSION_FAILED -27
```



**GNUTLS\_E\_AGAIN**

```
#define GNUTLS_E_AGAIN -28
```

**GNUTLS\_E\_EXPIRED**

```
#define GNUTLS_E_EXPIRED -29
```

**GNUTLS\_E\_DB\_ERROR**

```
#define GNUTLS_E_DB_ERROR -30
```

**GNUTLS\_E\_SRP\_PWD\_ERROR**

```
#define GNUTLS_E_SRP_PWD_ERROR -31
```

**GNUTLS\_E\_INSUFFICIENT\_CREDENTIALS**

```
#define GNUTLS_E_INSUFFICIENT_CREDENTIALS -32
```

**GNUTLS\_E\_INSUFICIENT\_CREDENTIALS**

```
#define GNUTLS_E_INSUFICIENT_CREDENTIALS GNUTLS_E_INSUFFICIENT_CREDENTIALS /* for ↵  
backwards compatibility only */
```

**GNUTLS\_E\_INSUFFICIENT\_CRED**

```
#define GNUTLS_E_INSUFFICIENT_CRED GNUTLS_E_INSUFFICIENT_CREDENTIALS
```

**GNUTLS\_E\_INSUFICIENT\_CRED**

```
#define GNUTLS_E_INSUFICIENT_CRED GNUTLS_E_INSUFFICIENT_CREDENTIALS /* for backwards ↵  
compatibility only */
```

**GNUTLS\_E\_HASH\_FAILED**

```
#define GNUTLS_E_HASH_FAILED -33
```

**GNUTLS\_E\_BASE64\_DECODING\_ERROR**

```
#define GNUTLS_E_BASE64_DECODING_ERROR -34
```

**GNUTLS\_E\_MPI\_PRINT\_FAILED**

```
#define GNUTLS_E_MPI_PRINT_FAILED -35
```

**GNUTLS\_E\_REHANDSHAKE**

```
#define GNUTLS_E_REHANDSHAKE -37 /* GNUTLS_A_NO_RENEGOTIATION */
```

**GNUTLS\_E\_GOT\_APPLICATION\_DATA**

```
#define GNUTLS_E_GOT_APPLICATION_DATA -38
```

**GNUTLS\_E\_RECORD\_LIMIT\_REACHED**

```
#define GNUTLS_E_RECORD_LIMIT_REACHED -39
```

**GNUTLS\_E\_ENCRYPTION\_FAILED**

```
#define GNUTLS_E_ENCRYPTION_FAILED -40
```

**GNUTLS\_E\_PK\_ENCRYPTION\_FAILED**

```
#define GNUTLS_E_PK_ENCRYPTION_FAILED -44
```

**GNUTLS\_E\_PK\_DECRYPTION\_FAILED**

```
#define GNUTLS_E_PK_DECRYPTION_FAILED -45
```

**GNUTLS\_E\_PK\_SIGN\_FAILED**

```
#define GNUTLS_E_PK_SIGN_FAILED -46
```

**GNUTLS\_E\_X509\_UNSUPPORTED\_CRITICAL\_EXTENSION**

```
#define GNUTLS_E_X509_UNSUPPORTED_CRITICAL_EXTENSION -47
```

**GNUTLS\_E\_KEY\_USAGE\_VIOLATION**

```
#define GNUTLS_E_KEY_USAGE_VIOLATION -48
```

**GNUTLS\_E\_NO\_CERTIFICATE\_FOUND**

```
#define GNUTLS_E_NO_CERTIFICATE_FOUND -49 /* GNUTLS_A_BAD_CERTIFICATE */
```

**GNUTLS\_E\_INVALID\_REQUEST**

```
#define GNUTLS_E_INVALID_REQUEST -50
```

**GNUTLS\_E\_SHORT\_MEMORY\_BUFFER**

```
#define GNUTLS_E_SHORT_MEMORY_BUFFER -51
```

**GNUTLS\_E\_INTERRUPTED**

```
#define GNUTLS_E_INTERRUPTED -52
```

**GNUTLS\_E\_PUSH\_ERROR**

```
#define GNUTLS_E_PUSH_ERROR -53
```

**GNUTLS\_E\_PULL\_ERROR**

```
#define GNUTLS_E_PULL_ERROR -54
```

**GNUTLS\_E\_RECEIVED\_ILLEGAL\_PARAMETER**

```
#define GNUTLS_E_RECEIVED_ILLEGAL_PARAMETER -55 /* GNUTLS_A_ILLEGAL_PARAMETER */
```

**GNUTLS\_E\_REQUESTED\_DATA\_NOT\_AVAILABLE**

```
#define GNUTLS_E_REQUESTED_DATA_NOT_AVAILABLE -56
```

**GNUTLS\_E\_PKCS1\_WRONG\_PAD**

```
#define GNUTLS_E_PKCS1_WRONG_PAD -57
```

**GNUTLS\_E\_RECEIVED\_ILLEGAL\_EXTENSION**

```
#define GNUTLS_E_RECEIVED_ILLEGAL_EXTENSION -58
```

**GNUTLS\_E\_INTERNAL\_ERROR**

```
#define GNUTLS_E_INTERNAL_ERROR -59
```

**GNUTLS\_E\_DH\_PRIME\_UNACCEPTABLE**

```
#define GNUTLS_E_DH_PRIME_UNACCEPTABLE -63
```

**GNUTLS\_E\_FILE\_ERROR**

```
#define GNUTLS_E_FILE_ERROR -64
```

**GNUTLS\_E\_TOO\_MANY\_EMPTY\_PACKETS**

```
#define GNUTLS_E_TOO_MANY_EMPTY_PACKETS -78
```

**GNUTLS\_E\_UNKNOWN\_PK\_ALGORITHM**

```
#define GNUTLS_E_UNKNOWN_PK_ALGORITHM -80
```

**GNUTLS\_E\_TOO\_MANY\_HANDSHAKE\_PACKETS**

```
#define GNUTLS_E_TOO_MANY_HANDSHAKE_PACKETS -81
```

**GNUTLS\_E\_NO\_TEMPORARY\_RSA\_PARAMS**

```
#define GNUTLS_E_NO_TEMPORARY_RSA_PARAMS -84
```

**GNUTLS\_E\_NO\_COMPRESSION\_ALGORITHMS**

```
#define GNUTLS_E_NO_COMPRESSION_ALGORITHMS -86
```

**GNUTLS\_E\_NO\_CIPHER\_SUITES**

```
#define GNUTLS_E_NO_CIPHER_SUITES -87
```

**GNUTLS\_E\_OPENPGP\_GETKEY\_FAILED**

```
#define GNUTLS_E_OPENPGP_GETKEY_FAILED -88
```

**GNUTLS\_E\_PK\_SIG\_VERIFY\_FAILED**

```
#define GNUTLS_E_PK_SIG_VERIFY_FAILED -89
```

**GNUTLS\_E\_ILLEGAL\_SRP\_USERNAME**

```
#define GNUTLS_E_ILLEGAL_SRP_USERNAME -90
```

**GNUTLS\_E\_SRP\_PWD\_PARSING\_ERROR**

```
#define GNUTLS_E_SRP_PWD_PARSING_ERROR -91
```

**GNUTLS\_E\_NO\_TEMPORARY\_DH\_PARAMS**

```
#define GNUTLS_E_NO_TEMPORARY_DH_PARAMS -93
```

**GNUTLS\_E\_ASN1\_ELEMENT\_NOT\_FOUND**

```
#define GNUTLS_E_ASN1_ELEMENT_NOT_FOUND -67
```

**GNUTLS\_E\_ASN1\_IDENTIFIER\_NOT\_FOUND**

```
#define GNUTLS_E_ASN1_IDENTIFIER_NOT_FOUND -68
```

**GNUTLS\_E\_ASN1\_DER\_ERROR**

```
#define GNUTLS_E_ASN1_DER_ERROR -69
```

**GNUTLS\_E\_ASN1\_VALUE\_NOT\_FOUND**

```
#define GNUTLS_E_ASN1_VALUE_NOT_FOUND -70
```

**GNUTLS\_E\_ASN1\_GENERIC\_ERROR**

```
#define GNUTLS_E_ASN1_GENERIC_ERROR -71
```

**GNUTLS\_E\_ASN1\_VALUE\_NOT\_VALID**

```
#define GNUTLS_E_ASN1_VALUE_NOT_VALID -72
```

**GNUTLS\_E\_ASN1\_TAG\_ERROR**

```
#define GNUTLS_E_ASN1_TAG_ERROR -73
```

**GNUTLS\_E\_ASN1\_TAG\_IMPLICIT**

```
#define GNUTLS_E_ASN1_TAG_IMPLICIT -74
```

**GNUTLS\_E\_ASN1\_TYPE\_ANY\_ERROR**

```
#define GNUTLS_E_ASN1_TYPE_ANY_ERROR -75
```

**GNUTLS\_E\_ASN1\_SYNTAX\_ERROR**

```
#define GNUTLS_E_ASN1_SYNTAX_ERROR -76
```

**GNUTLS\_E\_ASN1\_DER\_OVERFLOW**

```
#define GNUTLS_E_ASN1_DER_OVERFLOW -77
```

**GNUTLS\_E\_OPENPGP\_UID\_REVOKED**

```
#define GNUTLS_E_OPENPGP_UID_REVOKED -79
```

**GNUTLS\_E\_CERTIFICATE\_ERROR**

```
#define GNUTLS_E_CERTIFICATE_ERROR -43
```

**GNUTLS\_E\_X509\_CERTIFICATE\_ERROR**

```
#define GNUTLS_E_X509_CERTIFICATE_ERROR GNUTLS_E_CERTIFICATE_ERROR
```

**GNUTLS\_E\_CERTIFICATE\_KEY\_MISMATCH**

```
#define GNUTLS_E_CERTIFICATE_KEY_MISMATCH -60
```

**GNUTLS\_E\_UNSUPPORTED\_CERTIFICATE\_TYPE**

```
#define GNUTLS_E_UNSUPPORTED_CERTIFICATE_TYPE -61      /* GNUTLS_A_UNSUPPORTED_CERTIFICATE ↔  
*/
```

**GNUTLS\_E\_X509\_UNKNOWN\_SAN**

```
#define GNUTLS_E_X509_UNKNOWN_SAN -62
```

**GNUTLS\_E\_OPENPGP\_FINGERPRINT\_UNSUPPORTED**

```
#define GNUTLS_E_OPENPGP_FINGERPRINT_UNSUPPORTED -94
```

**GNUTLS\_E\_X509\_UNSUPPORTED\_ATTRIBUTE**

```
#define GNUTLS_E_X509_UNSUPPORTED_ATTRIBUTE -95
```

**GNUTLS\_E\_UNKNOWN\_HASH\_ALGORITHM**

```
#define GNUTLS_E_UNKNOWN_HASH_ALGORITHM -96
```

**GNUTLS\_E\_UNKNOWN\_PKCS\_CONTENT\_TYPE**

```
#define GNUTLS_E_UNKNOWN_PKCS_CONTENT_TYPE -97
```

**GNUTLS\_E\_UNKNOWN\_PKCS\_BAG\_TYPE**

```
#define GNUTLS_E_UNKNOWN_PKCS_BAG_TYPE -98
```

**GNUTLS\_E\_INVALID\_PASSWORD**

```
#define GNUTLS_E_INVALID_PASSWORD -99
```

**GNUTLS\_E\_MAC\_VERIFY\_FAILED**

```
#define GNUTLS_E_MAC_VERIFY_FAILED -100 /* for PKCS #12 MAC */
```

**GNUTLS\_E\_CONSTRAINT\_ERROR**

```
#define GNUTLS_E_CONSTRAINT_ERROR -101
```

**GNUTLS\_E\_WARNING\_IA\_IPHF\_RECEIVED**

```
#define GNUTLS_E_WARNING_IA_IPHF_RECEIVED -102
```

**GNUTLS\_E\_WARNING\_IA\_FPHF\_RECEIVED**

```
#define GNUTLS_E_WARNING_IA_FPHF_RECEIVED -103
```

**GNUTLS\_E\_IA\_VERIFY\_FAILED**

```
#define GNUTLS_E_IA_VERIFY_FAILED -104
```

**GNUTLS\_E\_UNKNOWN\_ALGORITHM**

```
#define GNUTLS_E_UNKNOWN_ALGORITHM -105
```

**GNUTLS\_E\_UNSUPPORTED\_SIGNATURE\_ALGORITHM**

```
#define GNUTLS_E_UNSUPPORTED_SIGNATURE_ALGORITHM -106
```

**GNUTLS\_E\_SAFE\_RENEGOTIATION\_FAILED**

```
#define GNUTLS_E_SAFE_RENEGOTIATION_FAILED -107
```

**GNUTLS\_E\_UNSAFE\_RENEGOTIATION\_DENIED**

```
#define GNUTLS_E_UNSAFE_RENEGOTIATION_DENIED -108
```

**GNUTLS\_E\_UNKNOWN\_SRP\_USERNAME**

```
#define GNUTLS_E_UNKNOWN_SRP_USERNAME -109
```

**GNUTLS\_E\_PREMATURE\_TERMINATION**

```
#define GNUTLS_E_PREMATURE_TERMINATION -110
```

**GNUTLS\_E\_BASE64\_ENCODING\_ERROR**

```
#define GNUTLS_E_BASE64_ENCODING_ERROR -201
```

**GNUTLS\_E\_INCOMPATIBLE\_GCRYPT\_LIBRARY**

```
#define GNUTLS_E_INCOMPATIBLE_GCRYPT_LIBRARY -202      /* obsolete */
```

**GNUTLS\_E\_INCOMPATIBLE\_CRYPTOLIBRARY**

```
#define GNUTLS_E_INCOMPATIBLE_CRYPTOLIBRARY -202
```

**GNUTLS\_E\_INCOMPATIBLE\_LIBTASN1\_LIBRARY**

```
#define GNUTLS_E_INCOMPATIBLE_LIBTASN1_LIBRARY -203
```

**GNUTLS\_E\_OPENPGP\_KEYRING\_ERROR**

```
#define GNUTLS_E_OPENPGP_KEYRING_ERROR -204
```

**GNUTLS\_E\_X509\_UNSUPPORTED\_OID**

```
#define GNUTLS_E_X509_UNSUPPORTED_OID -205
```

**GNUTLS\_E\_RANDOM\_FAILED**

```
#define GNUTLS_E_RANDOM_FAILED -206
```

**GNUTLS\_E\_BASE64\_UNEXPECTED\_HEADER\_ERROR**

```
#define GNUTLS_E_BASE64_UNEXPECTED_HEADER_ERROR -207
```



**GNUTLS\_E\_OPENPGP\_SUBKEY\_ERROR**

```
#define GNUTLS_E_OPENPGP_SUBKEY_ERROR -208
```

**GNUTLS\_E\_CRYPTO\_ALREADY\_REGISTERED**

```
#define GNUTLS_E_CRYPTO_ALREADY_REGISTERED -209
```

**GNUTLS\_E\_HANDSHAKE\_TOO\_LARGE**

```
#define GNUTLS_E_HANDSHAKE_TOO_LARGE -210
```

**GNUTLS\_E\_CRYPTODEV\_IOCTL\_ERROR**

```
#define GNUTLS_E_CRYPTODEV_IOCTL_ERROR -211
```

**GNUTLS\_E\_CRYPTODEV\_DEVICE\_ERROR**

```
#define GNUTLS_E_CRYPTODEV_DEVICE_ERROR -212
```

**GNUTLS\_E\_CHANNEL\_BINDING\_NOT\_AVAILABLE**

```
#define GNUTLS_E_CHANNEL_BINDING_NOT_AVAILABLE -213
```

**GNUTLS\_E\_BAD\_COOKIE**

```
#define GNUTLS_E_BAD_COOKIE -214
```

**GNUTLS\_E\_OPENPGP\_PREFERRED\_KEY\_ERROR**

```
#define GNUTLS_E_OPENPGP_PREFERRED_KEY_ERROR -215
```

**GNUTLS\_E\_INCOMPAT\_DSA\_KEY\_WITH\_TLS\_PROTOCOL**

```
#define GNUTLS_E_INCOMPAT_DSA_KEY_WITH_TLS_PROTOCOL -216
```

**GNUTLS\_E\_PKCS11\_ERROR**

```
#define GNUTLS_E_PKCS11_ERROR -300
```

**GNUTLS\_E\_PKCS11\_LOAD\_ERROR**

```
#define GNUTLS_E_PKCS11_LOAD_ERROR -301
```

**GNUTLS\_E\_PARSING\_ERROR**

```
#define GNUTLS_E_PARSING_ERROR -302
```

**GNUTLS\_E\_PKCS11\_PIN\_ERROR**

```
#define GNUTLS_E_PKCS11_PIN_ERROR -303
```

**GNUTLS\_E\_PKCS11\_SLOT\_ERROR**

```
#define GNUTLS_E_PKCS11_SLOT_ERROR -305
```

**GNUTLS\_E\_LOCKING\_ERROR**

```
#define GNUTLS_E_LOCKING_ERROR -306
```

**GNUTLS\_E\_PKCS11\_ATTRIBUTE\_ERROR**

```
#define GNUTLS_E_PKCS11_ATTRIBUTE_ERROR -307
```

**GNUTLS\_E\_PKCS11\_DEVICE\_ERROR**

```
#define GNUTLS_E_PKCS11_DEVICE_ERROR -308
```

**GNUTLS\_E\_PKCS11\_DATA\_ERROR**

```
#define GNUTLS_E_PKCS11_DATA_ERROR -309
```

**GNUTLS\_E\_PKCS11\_UNSUPPORTED\_FEATURE\_ERROR**

```
#define GNUTLS_E_PKCS11_UNSUPPORTED_FEATURE_ERROR -310
```

**GNUTLS\_E\_PKCS11\_KEY\_ERROR**

```
#define GNUTLS_E_PKCS11_KEY_ERROR -311
```

**GNUTLS\_E\_PKCS11\_PIN\_EXPIRED**

```
#define GNUTLS_E_PKCS11_PIN_EXPIRED -312
```

**GNUTLS\_E\_PKCS11\_PIN\_LOCKED**

```
#define GNUTLS_E_PKCS11_PIN_LOCKED -313
```

**GNUTLS\_E\_PKCS11\_SESSION\_ERROR**

```
#define GNUTLS_E_PKCS11_SESSION_ERROR -314
```

**GNUTLS\_E\_PKCS11\_SIGNATURE\_ERROR**

```
#define GNUTLS_E_PKCS11_SIGNATURE_ERROR -315
```

**GNUTLS\_E\_PKCS11\_TOKEN\_ERROR**

```
#define GNUTLS_E_PKCS11_TOKEN_ERROR -316
```

**GNUTLS\_E\_PKCS11\_USER\_ERROR**

```
#define GNUTLS_E_PKCS11_USER_ERROR -317
```

**GNUTLS\_E\_CRYPTO\_INIT\_FAILED**

```
#define GNUTLS_E_CRYPTO_INIT_FAILED -318
```

**GNUTLS\_E\_TIMEDOUT**

```
#define GNUTLS_E_TIMEDOUT -319
```

**GNUTLS\_E\_USER\_ERROR**

```
#define GNUTLS_E_USER_ERROR -320
```

**GNUTLS\_E\_ECC\_NO\_SUPPORTED\_CURVES**

```
#define GNUTLS_E_ECC_NO_SUPPORTED_CURVES -321
```

**GNUTLS\_E\_ECC\_UNSUPPORTED\_CURVE**

```
#define GNUTLS_E_ECC_UNSUPPORTED_CURVE -322
```

**GNUTLS\_E\_PKCS11\_REQUESTED\_OBJECT\_NOT\_AVAILABLE**

```
#define GNUTLS_E_PKCS11_REQUESTED_OBJECT_NOT_AVAILABLE -323
```

**GNUTLS\_E\_CERTIFICATE\_LIST\_UNSORTED**

```
#define GNUTLS_E_CERTIFICATE_LIST_UNSORTED -324
```

**GNUTLS\_E\_ILLEGAL\_PARAMETER**

```
#define GNUTLS_E_ILLEGAL_PARAMETER -325
```

**GNUTLS\_E\_NO\_PRIORITIES\_WERE\_SET**

```
#define GNUTLS_E_NO_PRIORITIES_WERE_SET -326
```

**GNUTLS\_E\_UNIMPLEMENTED\_FEATURE**

```
#define GNUTLS_E_UNIMPLEMENTED_FEATURE -1250
```

**GNUTLS\_E\_APPLICATION\_ERROR\_MAX**

```
#define GNUTLS_E_APPLICATION_ERROR_MAX -65000
```

**GNUTLS\_E\_APPLICATION\_ERROR\_MIN**

```
#define GNUTLS_E_APPLICATION_ERROR_MIN -65500
```

## 1.2 abstract

abstract —

### Synopsis

```
struct          gnutls_pubkey_st;
typedef         gnutls_pubkey_t;
struct         gnutls_privkey_st;
typedef        gnutls_privkey_t;
int            (*gnutls_privkey_sign_func)
               (gnutls_privkey_t key,
                void *userdata,
                const gnutls_datum_t *raw_data,
                gnutls_datum_t *signature);

int            (*gnutls_privkey_decrypt_func)
               (gnutls_privkey_t key,
                void *userdata,
                const gnutls_datum_t *ciphertext,
                gnutls_datum_t *plaintext);

int            gnutls_pubkey_init
void           gnutls_pubkey_deinit
int            gnutls_pubkey_get_pk_algorithm
               (gnutls_pubkey_t key,
                unsigned int *bits);

int            gnutls_pubkey_import_x509
               (gnutls_pubkey_t key,
                gnutls_x509_crt_t crt,
                unsigned int flags);

int            gnutls_pubkey_import_pkcs11
               (gnutls_pubkey_t key,
                gnutls_pkcs11_obj_t obj,
                unsigned int flags);
```

---

int	gnutls_pubkey_import_openpgp	(gnutls_pubkey_t key, gnutls_openpgp_cert_t crt, unsigned int flags);
int	gnutls_pubkey_import_privkey	(gnutls_pubkey_t key, gnutls_privkey_t pkey, unsigned int usage, unsigned int flags);
int	gnutls_pubkey_get_preferred_hash_algorithm	(gnutls_pubkey_t key, gnutls_digest_algorithm_t *hash, unsigned int *mand);
int	gnutls_pubkey_get_pk_rsa_raw	(gnutls_pubkey_t key, gnutls_datum_t *m, gnutls_datum_t *e);
int	gnutls_pubkey_get_pk_dsa_raw	(gnutls_pubkey_t key, gnutls_datum_t *p, gnutls_datum_t *q, gnutls_datum_t *g, gnutls_datum_t *y);
int	gnutls_pubkey_get_pk_ecc_raw	(gnutls_pubkey_t key, gnutls_ecc_curve_t *curve, gnutls_datum_t *x, gnutls_datum_t *y);
int	gnutls_pubkey_get_pk_ecc_x962	(gnutls_pubkey_t key, gnutls_datum_t *parameters, gnutls_datum_t *ecpoint);
int	gnutls_pubkey_export	(gnutls_pubkey_t key, gnutls_x509_cert_fmt_t format, void *output_data, size_t *output_data_size);
int	gnutls_pubkey_get_key_id	(gnutls_pubkey_t key, unsigned int flags, unsigned char *output_data, size_t *output_data_size);
int	gnutls_pubkey_get_openpgp_key_id	(gnutls_pubkey_t key, unsigned int flags, unsigned char *output_data, size_t *output_data_size, unsigned int *subkey);
int	gnutls_pubkey_get_key_usage	(gnutls_pubkey_t key, unsigned int *usage);
int	gnutls_pubkey_set_key_usage	(gnutls_pubkey_t key, unsigned int usage);
int	gnutls_pubkey_import	(gnutls_pubkey_t key, const gnutls_datum_t *data, gnutls_x509_cert_fmt_t format);
int	gnutls_pubkey_import_pkcs11_url	(gnutls_pubkey_t key, const char *url, unsigned int flags);
int	gnutls_pubkey_import_dsa_raw	(gnutls_pubkey_t key, const gnutls_datum_t *p, const gnutls_datum_t *q, const gnutls_datum_t *g, const gnutls_datum_t *y);
int	gnutls_pubkey_import_rsa_raw	(gnutls_pubkey_t key, const gnutls_datum_t *m, const gnutls_datum_t *e);

---

---

int	gnutls_pubkey_import_ecc_x962	(gnutls_pubkey_t key, const gnutls_datum_t *parameters, const gnutls_datum_t *ecpoint);
int	gnutls_pubkey_import_ecc_raw	(gnutls_pubkey_t key, gnutls_ecc_curve_t curve, const gnutls_datum_t *x, const gnutls_datum_t *y);
int	gnutls_pubkey_encrypt_data	(gnutls_pubkey_t key, unsigned int flags, const gnutls_datum_t *plaintext, gnutls_datum_t *ciphertext);
int	gnutls_x509_crt_set_pubkey	(gnutls_x509_crt_t crt, gnutls_pubkey_t key);
int	gnutls_x509_crq_set_pubkey	(gnutls_x509_crq_t crq, gnutls_pubkey_t key);
#define	GNUTLS_PUBKEY_VERIFY_FLAG_TLS_RSA	
int	gnutls_pubkey_verify_hash	(gnutls_pubkey_t key, unsigned int flags, const gnutls_datum_t *hash, const gnutls_datum_t *signature);
int	gnutls_pubkey_get_verify_algorithm	(gnutls_pubkey_t key, const gnutls_datum_t *signature, gnutls_digest_algorithm_t *hash);
int	gnutls_pubkey_verify_data	(gnutls_pubkey_t pubkey, unsigned int flags, const gnutls_datum_t *data, const gnutls_datum_t *signature);
int	gnutls_pubkey_verify_data2	(gnutls_pubkey_t pubkey, gnutls_sign_algorithm_t algo, unsigned int flags, const gnutls_datum_t *data, const gnutls_datum_t *signature);
int	gnutls_privkey_init	(gnutls_privkey_t *key);
void	gnutls_privkey_deinit	(gnutls_privkey_t key);
int	gnutls_privkey_get_pk_algorithm	(gnutls_privkey_t key, unsigned int *bits);
gnutls_privkey_type_t	gnutls_privkey_get_type	(gnutls_privkey_t key);
#define	GNUTLS_PRIVKEY_IMPORT_AUTO_RELEASE	
#define	GNUTLS_PRIVKEY_IMPORT_COPY	
int	gnutls_privkey_import_pkcs11	(gnutls_privkey_t pkey, gnutls_pkcs11_privkey_t key, unsigned int flags);
int	gnutls_privkey_import_x509	(gnutls_privkey_t pkey, gnutls_x509_privkey_t key, unsigned int flags);
int	gnutls_privkey_import_openpgp	(gnutls_privkey_t pkey, gnutls_openpgp_privkey_t key, unsigned int flags);
int	gnutls_privkey_import_ext	(gnutls_privkey_t pkey, gnutls_pk_algorithm_t pk, void *userdata, gnutls_privkey_sign_func sign_func, gnutls_privkey_decrypt_func decrypt_func, unsigned int flags);
int	gnutls_privkey_sign_data	(gnutls_privkey_t signer, gnutls_digest_algorithm_t hash, unsigned int flags,

---

---

		const gnutls_datum_t *data, gnutls_datum_t *signature);
int	gnutls_privkey_sign_hash	(gnutls_privkey_t signer, gnutls_digest_algorithm_t hash_al, unsigned int flags, const gnutls_datum_t *hash_data, gnutls_datum_t *signature);
int	gnutls_privkey_decrypt_data	(gnutls_privkey_t key, unsigned int flags, const gnutls_datum_t *ciphertext, gnutls_datum_t *plaintext);
int	gnutls_x509_crt_privkey_sign	(gnutls_x509_crt_t crt, gnutls_x509_crt_t issuer, gnutls_privkey_t issuer_key, gnutls_digest_algorithm_t dig, unsigned int flags);
int	gnutls_x509_crl_privkey_sign	(gnutls_x509_crl_t crl, gnutls_x509_crt_t issuer, gnutls_privkey_t issuer_key, gnutls_digest_algorithm_t dig, unsigned int flags);
int	gnutls_x509_crq_privkey_sign	(gnutls_x509_crq_t crq, gnutls_privkey_t key, gnutls_digest_algorithm_t dig, unsigned int flags);
#define	GNUTLS_PCERT_NO_CERT	
int	gnutls_pcert_import_x509	(gnutls_pcert_st *pcert, gnutls_x509_crt_t crt, unsigned int flags);
int	gnutls_pcert_list_import_x509_raw	(gnutls_pcert_st *pcerts, unsigned int *pcert_max, const gnutls_datum_t *data, gnutls_x509_crt_fmt_t format, unsigned int flags);
int	gnutls_pcert_import_x509_raw	(gnutls_pcert_st *pcert, const gnutls_datum_t *cert, gnutls_x509_crt_fmt_t format, unsigned int flags);
int	gnutls_pcert_import_openpgp_raw	(gnutls_pcert_st *pcert, const gnutls_datum_t *cert, gnutls_openpgp_crt_fmt_t format, gnutls_openpgp_keyid_t keyid, unsigned int flags);
int	gnutls_pcert_import_openpgp	(gnutls_pcert_st *pcert, gnutls_openpgp_crt_t crt, unsigned int flags);
void	gnutls_pcert_deinit	(gnutls_pcert_st *pcert);
void	gnutls_certificate_set_retrieve_function2	(gnutls_certificate_credentials_t gnutls_certificate_retrieve_func_t func);
int	gnutls_certificate_set_key	(gnutls_certificate_credentials_t const char **names, int names_size, gnutls_pcert_st *pcert_list, int pcert_list_size, gnutls_privkey_t key);

---

## Description

## Details

### struct gnutls\_pubkey\_st

```
struct gnutls_pubkey_st;
```

### gnutls\_pubkey\_t

```
typedef struct gnutls_pubkey_st *gnutls_pubkey_t;
```

### struct gnutls\_privkey\_st

```
struct gnutls_privkey_st;
```

### gnutls\_privkey\_t

```
typedef struct gnutls_privkey_st *gnutls_privkey_t;
```

### gnutls\_privkey\_sign\_func ()

int	(*gnutls_privkey_sign_func)	(gnutls_privkey_t key, void *userdata, const gnutls_datum_t *raw_data, gnutls_datum_t *signature);
-----	-----------------------------	---

**key :**

**userdata :**

**raw\_data :**

**signature :**

**Returns :**

### gnutls\_privkey\_decrypt\_func ()

int	(*gnutls_privkey_decrypt_func)	(gnutls_privkey_t key, void *userdata, const gnutls_datum_t *ciphertext, gnutls_datum_t *plaintext);
-----	--------------------------------	---

**key :**

**userdata :**

**ciphertext :**

**plaintext :**

**Returns :**



**gnutls\_pubkey\_init ()**

```
int gnutls_pubkey_init (gnutls_pubkey_t *key);
```

This function will initialize an public key structure.

**key** : The structure to be initialized

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

Since 2.12.0

**gnutls\_pubkey\_deinit ()**

```
void gnutls_pubkey_deinit (gnutls_pubkey_t key);
```

This function will deinitialize a public key structure.

**key** : The structure to be deinitialized

Since 2.12.0

**gnutls\_pubkey\_get\_pk\_algorithm ()**

```
int gnutls_pubkey_get_pk_algorithm (gnutls_pubkey_t key,  
                                   unsigned int *bits);
```

This function will return the public key algorithm of a public key and if possible will return a number of bits that indicates the security parameter of the key.

**key** : should contain a **gnutls\_pubkey\_t** structure

**bits** : If set will return the number of bits of the parameters (may be NULL)

**Returns** : a member of the **gnutls\_pk\_algorithm\_t** enumeration on success, or a negative error code on error.

Since 2.12.0

**gnutls\_pubkey\_import\_x509 ()**

```
int gnutls_pubkey_import_x509 (gnutls_pubkey_t key,  
                               gnutls_x509_crt_t crt,  
                               unsigned int flags);
```

This function will import the given public key to the abstract **gnutls\_pubkey\_t** structure.

**key** : The public key

**crt** : The certificate to be imported

**flags** : should be zero

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

Since 2.12.0

**gnutls\_pubkey\_import\_pkcs11 ()**

```
int          gnutls_pubkey_import_pkcs11      (gnutls_pubkey_t key,  
                                                gnutls_pkcs11_obj_t obj,  
                                                unsigned int flags);
```

Imports a public key from a pkcs11 key. This function will import the given public key to the abstract **gnutls\_pubkey\_t** structure.

**key** : The public key

**obj** : The parameters to be imported

**flags** : should be zero

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

Since 2.12.0

**gnutls\_pubkey\_import\_openpgp ()**

```
int          gnutls_pubkey_import_openpgp     (gnutls_pubkey_t key,  
                                                gnutls_openpgp_cert_t crt,  
                                                unsigned int flags);
```

Imports a public key from an openpgp key. This function will import the given public key to the abstract **gnutls\_pubkey\_t** structure. The subkey set as preferred will be imported or the master key otherwise.

**key** : The public key

**crt** : The certificate to be imported

**flags** : should be zero

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

Since 2.12.0

**gnutls\_pubkey\_import\_privkey ()**

```
int          gnutls_pubkey_import_privkey     (gnutls_pubkey_t key,  
                                                gnutls_privkey_t pkey,  
                                                unsigned int usage,  
                                                unsigned int flags);
```

Imports the public key from a private. This function will import the given public key to the abstract **gnutls\_pubkey\_t** structure.

**key** : The public key

**pkey** : The private key

**usage** : GNUTLS\_KEY\_\* key usage flags.

**flags** : should be zero

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

Since 2.12.0

**gnutls\_pubkey\_get\_preferred\_hash\_algorithm ()**

```
int gnutls_pubkey_get_preferred_hash_algorithm
                                     (gnutls_pubkey_t key,
                                      gnutls_digest_algorithm_t *hash,
                                      unsigned int *mand);
```

This function will read the certificate and return the appropriate digest algorithm to use for signing with this certificate. Some certificates (i.e. DSA might not be able to sign without the preferred algorithm).

**key** : Holds the certificate

**hash** : The result of the call with the hash algorithm used for signature

**mand** : If non zero it means that the algorithm MUST use this hash. May be NULL.

**Returns** : the 0 if the hash algorithm is found. A negative error code is returned on error.

Since 2.12.0

**gnutls\_pubkey\_get\_pk\_rsa\_raw ()**

```
int gnutls_pubkey_get_pk_rsa_raw      (gnutls_pubkey_t key,
                                       gnutls_datum_t *m,
                                       gnutls_datum_t *e);
```

This function will export the RSA public key's parameters found in the given structure. The new parameters will be allocated using [gnutls\\_malloc\(\)](#) and will be stored in the appropriate datum.

**key** : Holds the certificate

**m** : will hold the modulus

**e** : will hold the public exponent

**Returns** : [GNUTLS\\_E\\_SUCCESS](#) on success, otherwise a negative error code.

Since 2.12.0

**gnutls\_pubkey\_get\_pk\_dsa\_raw ()**

```
int gnutls_pubkey_get_pk_dsa_raw      (gnutls_pubkey_t key,
                                       gnutls_datum_t *p,
                                       gnutls_datum_t *q,
                                       gnutls_datum_t *g,
                                       gnutls_datum_t *y);
```

This function will export the DSA public key's parameters found in the given certificate. The new parameters will be allocated using [gnutls\\_malloc\(\)](#) and will be stored in the appropriate datum.

**key** : Holds the public key

**p** : will hold the p

**q** : will hold the q

**g** : will hold the g

**y** : will hold the y

**Returns** : [GNUTLS\\_E\\_SUCCESS](#) on success, otherwise a negative error code.

Since 2.12.0

**gnutls\_pubkey\_get\_pk\_ecc\_raw ()**

```
int gnutls_pubkey_get_pk_ecc_raw (gnutls_pubkey_t key,
                                  gnutls_ecc_curve_t *curve,
                                  gnutls_datum_t *x,
                                  gnutls_datum_t *y);
```

This function will export the ECC public key's parameters found in the given certificate. The new parameters will be allocated using **gnutls\_malloc()** and will be stored in the appropriate datum.

**key** : Holds the public key

**curve** : will hold the curve

**x** : will hold x

**y** : will hold y

**Returns** : **GNUTLS\_E\_SUCCESS** on success, otherwise a negative error code.

Since 3.0.0

**gnutls\_pubkey\_get\_pk\_ecc\_x962 ()**

```
int gnutls_pubkey_get_pk_ecc_x962 (gnutls_pubkey_t key,
                                    gnutls_datum_t *parameters,
                                    gnutls_datum_t *ecpoint);
```

This function will export the ECC public key's parameters found in the given certificate. The new parameters will be allocated using **gnutls\_malloc()** and will be stored in the appropriate datum.

**key** : Holds the public key

**parameters** : DER encoding of an ANSI X9.62 parameters

**ecpoint** : DER encoding of ANSI X9.62 ECPoint

**Returns** : **GNUTLS\_E\_SUCCESS** on success, otherwise a negative error code.

Since 3.0.0

**gnutls\_pubkey\_export ()**

```
int gnutls_pubkey_export (gnutls_pubkey_t key,
                          gnutls_x509_crt_fmt_t format,
                          void *output_data,
                          size_t *output_data_size);
```

This function will export the certificate to DER or PEM format.

If the buffer provided is not long enough to hold the output, then *\*output\_data\_size* is updated and **GNUTLS\_E\_SHORT\_MEMORY\_BUFFER** will be returned.

If the structure is PEM encoded, it will have a header of "BEGIN CERTIFICATE".

**key** : Holds the certificate

**format** : the format of output params. One of PEM or DER.

**output\_data** : will contain a certificate PEM or DER encoded

**output\_data\_size** : holds the size of output\_data (and will be replaced by the actual size of parameters)

**Returns** : In case of failure a negative error code will be returned, and 0 on success.

Since 2.12.0

**gnutls\_pubkey\_get\_key\_id ()**

```
int gnutls_pubkey_get_key_id (gnutls_pubkey_t key,
                              unsigned int flags,
                              unsigned char *output_data,
                              size_t *output_data_size);
```

This function will return a unique ID the depends on the public key parameters. This ID can be used in checking whether a certificate corresponds to the given public key.

If the buffer provided is not long enough to hold the output, then \*output\_data\_size is updated and **GNUTLS\_E\_SHORT\_MEMORY\_BUFFER** will be returned. The output will normally be a SHA-1 hash output, which is 20 bytes.

**key** : Holds the public key

**flags** : should be 0 for now

**output\_data** : will contain the key ID

**output\_data\_size** : holds the size of output\_data (and will be replaced by the actual size of parameters)

**Returns** : In case of failure a negative error code will be returned, and 0 on success.

Since 2.12.0

**gnutls\_pubkey\_get\_openpgp\_key\_id ()**

```
int gnutls_pubkey_get_openpgp_key_id (gnutls_pubkey_t key,
                                       unsigned int flags,
                                       unsigned char *output_data,
                                       size_t *output_data_size,
                                       unsigned int *subkey);
```

This function will return a unique ID the depends on the public key parameters. This ID can be used in checking whether a certificate corresponds to the given public key.

If the buffer provided is not long enough to hold the output, then \*output\_data\_size is updated and **GNUTLS\_E\_SHORT\_MEMORY\_BUFFER** will be returned. The output will normally be a SHA-1 hash output, which is 20 bytes.

**key** : Holds the public key

**flags** : should be 0 for now

**output\_data** : will contain the key ID

**output\_data\_size** : holds the size of output\_data (and will be replaced by the actual size of parameters)

**subkey** : Will be non zero if the key ID corresponds to a subkey

**Returns** : In case of failure a negative error code will be returned, and 0 on success.

Since 3.0.0

**gnutls\_pubkey\_get\_key\_usage ()**

```
int gnutls_pubkey_get_key_usage (gnutls_pubkey_t key,
                                unsigned int *usage);
```

This function will return the key usage of the public key.

**key** : should contain a `gnutls_pubkey_t` structure

**usage** : If set will return the number of bits of the parameters (may be NULL)

**Returns** : On success, `GNUTLS_E_SUCCESS` (0) is returned, otherwise a negative error value.

Since 2.12.0

**gnutls\_pubkey\_set\_key\_usage ()**

```
int gnutls_pubkey_set_key_usage (gnutls_pubkey_t key,
                                unsigned int usage);
```

This function will set the key usage flags of the public key. This is only useful if the key is to be exported to a certificate or certificate request.

**key** : a certificate of type `gnutls_x509_cert_t`

**usage** : an ORed sequence of the `GNUTLS_KEY_*` elements.

**Returns** : On success, `GNUTLS_E_SUCCESS` (0) is returned, otherwise a negative error value.

Since 2.12.0

**gnutls\_pubkey\_import ()**

```
int gnutls_pubkey_import (gnutls_pubkey_t key,
                          const gnutls_datum_t *data,
                          gnutls_x509_cert_fmt_t format);
```

This function will convert the given DER or PEM encoded Public key to the native `gnutls_pubkey_t` format. The output will be stored in `key`. If the Certificate is PEM encoded it should have a header of "PUBLIC KEY".

**key** : The structure to store the parsed public key.

**data** : The DER or PEM encoded certificate.

**format** : One of DER or PEM

**Returns** : On success, `GNUTLS_E_SUCCESS` (0) is returned, otherwise a negative error value.

Since 2.12.0

**gnutls\_pubkey\_import\_pkcs11\_url ()**

```
int gnutls_pubkey_import_pkcs11_url (gnutls_pubkey_t key,
                                     const char *url,
                                     unsigned int flags);
```

This function will import a PKCS 11 certificate to a **gnutls\_pubkey\_t** structure.

**key** : A key of type **gnutls\_pubkey\_t**

**url** : A PKCS 11 url

**flags** : One of GNUTLS\_PKCS11\_OBJ\_\* flags

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

Since 2.12.0

**gnutls\_pubkey\_import\_dsa\_raw ()**

```
int gnutls_pubkey_import_dsa_raw (gnutls_pubkey_t key,
                                  const gnutls_datum_t *p,
                                  const gnutls_datum_t *q,
                                  const gnutls_datum_t *g,
                                  const gnutls_datum_t *y);
```

This function will convert the given DSA raw parameters to the native **gnutls\_pubkey\_t** format. The output will be stored in *key*.

**key** : The structure to store the parsed key

**p** : holds the p

**q** : holds the q

**g** : holds the g

**y** : holds the y

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

Since 2.12.0

**gnutls\_pubkey\_import\_rsa\_raw ()**

```
int gnutls_pubkey_import_rsa_raw (gnutls_pubkey_t key,
                                   const gnutls_datum_t *m,
                                   const gnutls_datum_t *e);
```

This function will replace the parameters in the given structure. The new parameters should be stored in the appropriate **gnutls\_datum**.

**key** : Is a structure will hold the parameters

**m** : holds the modulus

**e** : holds the public exponent

**Returns** : **GNUTLS\_E\_SUCCESS** on success, or an negative error code.

Since 2.12.0

**gnutls\_pubkey\_import\_ecc\_x962 ()**

```
int gnutls_pubkey_import_ecc_x962 (gnutls_pubkey_t key,
                                   const gnutls_datum_t *parameters,
                                   const gnutls_datum_t *ecpoint);
```

This function will convert the given elliptic curve parameters to a **gnutls\_pubkey\_t**. The output will be stored in *key*.

**key** : The structure to store the parsed key

**parameters** : DER encoding of an ANSI X9.62 parameters

**ecpoint** : DER encoding of ANSI X9.62 ECPoint

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

Since 3.0.0

**gnutls\_pubkey\_import\_ecc\_raw ()**

```
int gnutls_pubkey_import_ecc_raw (gnutls_pubkey_t key,
                                   gnutls_ecc_curve_t curve,
                                   const gnutls_datum_t *x,
                                   const gnutls_datum_t *y);
```

This function will convert the given elliptic curve parameters to a **gnutls\_pubkey\_t**. The output will be stored in *key*.

**key** : The structure to store the parsed key

**curve** : holds the curve

**x** : holds the x

**y** : holds the y

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

Since 3.0.0

**gnutls\_pubkey\_encrypt\_data ()**

```
int gnutls_pubkey_encrypt_data (gnutls_pubkey_t key,
                                 unsigned int flags,
                                 const gnutls_datum_t *plaintext,
                                 gnutls_datum_t *ciphertext);
```

This function will encrypt the given data, using the public key.

**key** : Holds the public key

**flags** : should be 0 for now

**plaintext** : The data to be encrypted

**ciphertext** : contains the encrypted data

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

Since 3.0.0



**gnutls\_x509 crt\_set\_pubkey ()**

```
int gnutls_x509 crt_set_pubkey (gnutls_x509 crt_t crt,
                                gnutls_pubkey_t key);
```

This function will set the public parameters from the given public key to the request.

**crt** : should contain a **gnutls\_x509 crt\_t** structure

**key** : holds a public key

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

Since 2.12.0

**gnutls\_x509 crq\_set\_pubkey ()**

```
int gnutls_x509 crq_set_pubkey (gnutls_x509 crq_t crq,
                                 gnutls_pubkey_t key);
```

This function will set the public parameters from the given public key to the request.

**crq** : should contain a **gnutls\_x509 crq\_t** structure

**key** : holds a public key

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

Since 2.12.0

**GNUTLS\_PUBKEY\_VERIFY\_FLAG\_TLS\_RSA**

```
#define GNUTLS_PUBKEY_VERIFY_FLAG_TLS_RSA 1
```

**gnutls\_pubkey\_verify\_hash ()**

```
int gnutls_pubkey_verify_hash (gnutls_pubkey_t key,
                                unsigned int flags,
                                const gnutls_datum_t *hash,
                                const gnutls_datum_t *signature);
```

This function will verify the given signed digest, using the parameters from the public key.

**key** : Holds the public key

**flags** : should be 0 for now

**hash** : holds the hash digest to be verified

**signature** : contains the signature

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value (**GNUTLS\_E\_PK\_SIG\_VERIFY\_FAIL** in verification failure).

Since 2.12.0

**gnutls\_pubkey\_get\_verify\_algorithm ()**

```
int gnutls_pubkey_get_verify_algorithm (gnutls_pubkey_t key,
                                       const gnutls_datum_t *signature,
                                       gnutls_digest_algorithm_t *hash);
```

This function will read the certificate and the signed data to determine the hash algorithm used to generate the signature.

**key** : Holds the certificate

**signature** : contains the signature

**hash** : The result of the call with the hash algorithm used for signature

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

Since 2.12.0

**gnutls\_pubkey\_verify\_data ()**

```
int gnutls_pubkey_verify_data (gnutls_pubkey_t pubkey,
                               unsigned int flags,
                               const gnutls_datum_t *data,
                               const gnutls_datum_t *signature);
```

This function will verify the given signed data, using the parameters from the certificate.

**pubkey** : Holds the public key

**flags** : should be 0 for now

**data** : holds the signed data

**signature** : contains the signature

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value (**GNUTLS\_E\_PK\_SIG\_VERIFY\_FAIL** in verification failure).

Since 2.12.0

**gnutls\_pubkey\_verify\_data2 ()**

```
int gnutls_pubkey_verify_data2 (gnutls_pubkey_t pubkey,
                                gnutls_sign_algorithm_t algo,
                                unsigned int flags,
                                const gnutls_datum_t *data,
                                const gnutls_datum_t *signature);
```

This function will verify the given signed data, using the parameters from the certificate.

**pubkey** : Holds the public key

**algo** : The signature algorithm used

**flags** : should be 0 for now

**data** : holds the signed data

**signature** : contains the signature

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value (**GNUTLS\_E\_PK\_SIG\_VERIFY\_FAIL** in verification failure).

Since 3.0.0

**gnutls\_privkey\_init ()**

```
int gnutls_privkey_init (gnutls_privkey_t *key);
```

This function will initialize an private key structure.

**key** : The structure to be initialized

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

Since 2.12.0

**gnutls\_privkey\_deinit ()**

```
void gnutls_privkey_deinit (gnutls_privkey_t key);
```

This function will deinitialize a private key structure.

**key** : The structure to be deinitialized

Since 2.12.0

**gnutls\_privkey\_get\_pk\_algorithm ()**

```
int gnutls_privkey_get_pk_algorithm (gnutls_privkey_t key,  
                                     unsigned int *bits);
```

This function will return the public key algorithm of a private key and if possible will return a number of bits that indicates the security parameter of the key.

**key** : should contain a **gnutls\_privkey\_t** structure

**bits** : If set will return the number of bits of the parameters (may be NULL)

**Returns** : a member of the **gnutls\_pk\_algorithm\_t** enumeration on success, or a negative error code on error.

Since 2.12.0

**gnutls\_privkey\_get\_type ()**

```
gnutls_privkey_type_t gnutls_privkey_get_type (gnutls_privkey_t key);
```

This function will return the type of the private key. This is actually the type of the subsystem used to set this private key.

**key** : should contain a **gnutls\_privkey\_t** structure

**Returns** : a member of the **gnutls\_privkey\_type\_t** enumeration on success, or a negative error code on error.

Since 2.12.0

**GNUTLS\_PRIVKEY\_IMPORT\_AUTO\_RELEASE**

```
#define GNUTLS_PRIVKEY_IMPORT_AUTO_RELEASE (1<<0)
```

## GNUTLS\_PRIVKEY\_IMPORT\_COPY

```
#define GNUTLS_PRIVKEY_IMPORT_COPY (1<<1)
```

### gnutls\_privkey\_import\_pkcs11 ()

```
int gnutls_privkey_import_pkcs11 (gnutls_privkey_t pkey,  
                                  gnutls_pkcs11_privkey_t key,  
                                  unsigned int flags);
```

This function will import the given private key to the abstract `gnutls_privkey_t` structure.

The `gnutls_pkcs11_privkey_t` object must not be deallocated during the lifetime of this structure.

*flags* might be zero or one of `GNUTLS_PRIVKEY_IMPORT_AUTO_RELEASE` and `GNUTLS_PRIVKEY_IMPORT_COPY`.

**pkey** : The private key

**key** : The private key to be imported

**flags** : Flags for the import

**Returns** : On success, `GNUTLS_E_SUCCESS` (0) is returned, otherwise a negative error value.

Since 2.12.0

### gnutls\_privkey\_import\_x509 ()

```
int gnutls_privkey_import_x509 (gnutls_privkey_t pkey,  
                                 gnutls_x509_privkey_t key,  
                                 unsigned int flags);
```

This function will import the given private key to the abstract `gnutls_privkey_t` structure.

The `gnutls_x509_privkey_t` object must not be deallocated during the lifetime of this structure.

*flags* might be zero or one of `GNUTLS_PRIVKEY_IMPORT_AUTO_RELEASE` and `GNUTLS_PRIVKEY_IMPORT_COPY`.

**pkey** : The private key

**key** : The private key to be imported

**flags** : Flags for the import

**Returns** : On success, `GNUTLS_E_SUCCESS` (0) is returned, otherwise a negative error value.

Since 2.12.0

### gnutls\_privkey\_import\_openpgp ()

```
int gnutls_privkey_import_openpgp (gnutls_privkey_t pkey,  
                                    gnutls_openpgp_privkey_t key,  
                                    unsigned int flags);
```

This function will import the given private key to the abstract `gnutls_privkey_t` structure.

The `gnutls_openpgp_privkey_t` object must not be deallocated during the lifetime of this structure. The subkey set as preferred will be used, or the master key otherwise.

*flags* might be zero or one of `GNUTLS_PRIVKEY_IMPORT_AUTO_RELEASE` and `GNUTLS_PRIVKEY_IMPORT_COPY`.

**pkey** : The private key

**key** : The private key to be imported

**flags** : Flags for the import

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

Since 2.12.0

### gnutls\_privkey\_import\_ext ()

```
int gnutls_privkey_import_ext (gnutls_privkey_t pkey,
                              gnutls_pk_algorithm_t pk,
                              void *userdata,
                              gnutls_privkey_sign_func sign_func ←
                              ,
                              gnutls_privkey_decrypt_func ←
                              decrypt_func,
                              unsigned int flags);
```

This function will associate the given callbacks with the **gnutls\_privkey\_t** structure. At least one of the two callbacks must be non-null.

**pkey** : The private key

**pk** : The public key algorithm

**userdata** : private data to be provided to the callbacks

**sign\_func** : callback for signature operations

**decrypt\_func** : callback for decryption operations

**flags** : Flags for the import

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

Since 3.0.0

### gnutls\_privkey\_sign\_data ()

```
int gnutls_privkey_sign_data (gnutls_privkey_t signer,
                              gnutls_digest_algorithm_t hash,
                              unsigned int flags,
                              const gnutls_datum_t *data,
                              gnutls_datum_t *signature);
```

This function will sign the given data using a signature algorithm supported by the private key. Signature algorithms are always used together with a hash functions. Different hash functions may be used for the RSA algorithm, but only the SHA family for the DSA keys.

Use **gnutls\_pubkey\_get\_preferred\_hash\_algorithm()** to determine the hash algorithm.

**signer** : Holds the key

**hash** : should be a digest algorithm

**flags** : should be 0 for now

**data** : holds the data to be signed

**signature** : will contain the signature allocate with `gnutls_malloc()`

**Returns** : On success, `GNUTLS_E_SUCCESS` (0) is returned, otherwise a negative error value.

Since 2.12.0

### **gnutls\_privkey\_sign\_hash ()**

```
int                gnutls_privkey_sign_hash      (gnutls_privkey_t signer,
                                                  gnutls_digest_algorithm_t hash_algo,
                                                  unsigned int flags,
                                                  const gnutls_datum_t *hash_data,
                                                  gnutls_datum_t *signature);
```

This function will sign the given hashed data using a signature algorithm supported by the private key. Signature algorithms are always used together with a hash functions. Different hash functions may be used for the RSA algorithm, but only SHA-XXX for the DSA keys.

Use `gnutls_pubkey_get_preferred_hash_algorithm()` to determine the hash algorithm.

**signer** : Holds the signer's key

**hash\_algo** : The hash algorithm used

**flags** : zero for now

**hash\_data** : holds the data to be signed

**signature** : will contain newly allocated signature

**Returns** : On success, `GNUTLS_E_SUCCESS` (0) is returned, otherwise a negative error value.

Since 2.12.0

### **gnutls\_privkey\_decrypt\_data ()**

```
int                gnutls_privkey_decrypt_data  (gnutls_privkey_t key,
                                                  unsigned int flags,
                                                  const gnutls_datum_t *ciphertext,
                                                  gnutls_datum_t *plaintext);
```

This function will decrypt the given data using the algorithm supported by the private key.

**key** : Holds the key

**flags** : zero for now

**ciphertext** : holds the data to be decrypted

**plaintext** : will contain the decrypted data, allocated with `gnutls_malloc()`

**Returns** : On success, `GNUTLS_E_SUCCESS` (0) is returned, otherwise a negative error value.

Since 2.12.0

**gnutls\_x509\_crt\_privkey\_sign ()**

```
int          gnutls_x509_crt_privkey_sign      (gnutls_x509_crt_t crt,  
                                                gnutls_x509_crt_t issuer,  
                                                gnutls_privkey_t issuer_key,  
                                                gnutls_digest_algorithm_t dig,  
                                                unsigned int flags);
```

This function will sign the certificate with the issuer's private key, and will copy the issuer's information into the certificate. This must be the last step in a certificate generation since all the previously set parameters are now signed.

**crt** : a certificate of type **gnutls\_x509\_crt\_t**

**issuer** : is the certificate of the certificate issuer

**issuer\_key** : holds the issuer's private key

**dig** : The message digest to use, **GNUTLS\_DIG\_SHA1** is a safe choice

**flags** : must be 0

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

**gnutls\_x509\_crl\_privkey\_sign ()**

```
int          gnutls_x509_crl_privkey_sign      (gnutls_x509_crl_t crl,  
                                                gnutls_x509_crt_t issuer,  
                                                gnutls_privkey_t issuer_key,  
                                                gnutls_digest_algorithm_t dig,  
                                                unsigned int flags);
```

This function will sign the CRL with the issuer's private key, and will copy the issuer's information into the CRL. This must be the last step in a certificate CRL since all the previously set parameters are now signed.

**crl** : should contain a **gnutls\_x509\_crl\_t** structure

**issuer** : is the certificate of the certificate issuer

**issuer\_key** : holds the issuer's private key

**dig** : The message digest to use. **GNUTLS\_DIG\_SHA1** is the safe choice unless you know what you're doing.

**flags** : must be 0

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value. Since 2.12.0

**gnutls\_x509\_crq\_privkey\_sign ()**

```
int          gnutls_x509_crq_privkey_sign      (gnutls_x509_crq_t crq,  
                                                gnutls_privkey_t key,  
                                                gnutls_digest_algorithm_t dig,  
                                                unsigned int flags);
```

This function will sign the certificate request with a private key. This must be the same key as the one used in **gnutls\_x509\_crt\_set\_key()** since a certificate request is self signed.

This must be the last step in a certificate request generation since all the previously set parameters are now signed.

**crq** : should contain a **gnutls\_x509\_crq\_t** structure

**key** : holds a private key

**dig** : The message digest to use, i.e., `GNUTLS_DIG_SHA1`

**flags** : must be 0

**Returns** : `GNUTLS_E_SUCCESS` on success, otherwise a negative error code. `GNUTLS_E_ASN1_VALUE_NOT_FOUND` is returned if you didn't set all information in the certificate request (e.g., the version using `gnutls_x509_crq_set_version()`).

Since 2.12.0

## GNUTLS\_PCERT\_NO\_CERT

```
#define GNUTLS_PCERT_NO_CERT 1
```

### gnutls\_pcert\_import\_x509 ()

```
int gnutls_pcert_import_x509 (gnutls_pcert_st *pcert,
                             gnutls_x509_crt_t crt,
                             unsigned int flags);
```

This convenience function will import the given certificate to a `gnutls_pcert_st` structure. The structure must be deinitialized afterwards using `gnutls_pcert_deinit()`;

**pcert** : The pcert structure

**crt** : The raw certificate to be imported

**flags** : zero for now

**Returns** : On success, `GNUTLS_E_SUCCESS` (0) is returned, otherwise a negative error value.

Since 3.0.0

### gnutls\_pcert\_list\_import\_x509\_raw ()

```
int gnutls_pcert_list_import_x509_raw (gnutls_pcert_st *pcerts,
                                       unsigned int *pcert_max,
                                       const gnutls_datum_t *data,
                                       gnutls_x509_crt_fmt_t format,
                                       unsigned int flags);
```

This function will convert the given PEM encoded certificate list to the native `gnutls_x509_crt_t` format. The output will be stored in `certs`. They will be automatically initialized.

If the Certificate is PEM encoded it should have a header of "X509 CERTIFICATE", or "CERTIFICATE".

**pcerts** : The structures to store the parsed certificate. Must not be initialized.

**pcert\_max** : Initially must hold the maximum number of certs. It will be updated with the number of certs available.

**data** : The certificates.

**format** : One of DER or PEM.

**flags** : must be (0) or an OR'd sequence of `gnutls_certificate_import_flags`.

**Returns** : the number of certificates read or a negative error value.

Since 3.0.0



**gnutls\_pcert\_import\_x509\_raw ()**

```
int          gnutls_pcert_import_x509_raw      (gnutls_pcert_st *pcert,
                                                const gnutls_datum_t *cert,
                                                gnutls_x509_crt_fmt_t format,
                                                unsigned int flags);
```

This convenience function will import the given certificate to a **gnutls\_pcert\_st** structure. The structure must be deinitialized afterwards using **gnutls\_pcert\_deinit()**;

**pcert** : The pcert structure

**cert** : The raw certificate to be imported

**format** : The format of the certificate

**flags** : zero for now

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

Since 3.0.0

**gnutls\_pcert\_import\_openpgp\_raw ()**

```
int          gnutls_pcert_import_openpgp_raw  (gnutls_pcert_st *pcert,
                                                const gnutls_datum_t *cert,
                                                gnutls_openpgp_crt_fmt_t format,
                                                gnutls_openpgp_keyid_t keyid,
                                                unsigned int flags);
```

This convenience function will import the given certificate to a **gnutls\_pcert\_st** structure. The structure must be deinitialized afterwards using **gnutls\_pcert\_deinit()**;

**pcert** : The pcert structure

**cert** : The raw certificate to be imported

**format** : The format of the certificate

**keyid** : The key ID to use (NULL for the master key)

**flags** : zero for now

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

Since 3.0.0

**gnutls\_pcert\_import\_openpgp ()**

```
int          gnutls_pcert_import_openpgp      (gnutls_pcert_st *pcert,
                                                gnutls_openpgp_crt_t crt,
                                                unsigned int flags);
```

This convenience function will import the given certificate to a **gnutls\_pcert\_st** structure. The structure must be deinitialized afterwards using **gnutls\_pcert\_deinit()**;

**pcert** : The pcert structure

**crt** : The raw certificate to be imported

**flags** : zero for now

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

Since 3.0.0

**gnutls\_pcert\_deinit ()**

```
void gnutls_pcert_deinit (gnutls_pcert_st *pcert);
```

This function will deinitialize a pcert structure.

**pcert** : The structure to be deinitialized

Since 3.0.0

**gnutls\_certificate\_set\_retrieve\_function2 ()**

```
void gnutls_certificate_set_retrieve_function2
                                     (gnutls_certificate_credentials_t cred,
                                     gnutls_certificate_retrieve_function2 func);
```

This function sets a callback to be called in order to retrieve the certificate to be used in the handshake.

The callback's function prototype is: `int (*callback)(gnutls_session_t, const gnutls_datum_t* req_ca_dn, int nreqs, const gnutls_pk_algos_t pk_algos, int pk_algos_length, gnutls_pcert_st* st);`

*req\_ca\_cert* is only used in X.509 certificates. Contains a list with the CA names that the server considers trusted. Normally we should send a certificate that is signed by one of these CAs. These names are DER encoded. To get a more meaningful value use the function [gnutls\\_x509\\_rdn\\_get\(\)](#).

*pk\_algos* contains a list with server's acceptable signature algorithms. The certificate returned should support the server's given algorithms.

*st* should contain the certificates and private keys.

If the callback function is provided then gnutls will call it, in the handshake, after the certificate request message has been received.

In server side *pk\_algos* and *req\_ca\_dn* are NULL.

The callback function should set the certificate list to be sent, and return 0 on success. If no certificate was selected then the number of certificates should be set to zero. The value (-1) indicates error and the handshake will be terminated.

**cred** : is a [gnutls\\_certificate\\_credentials\\_t](#) structure.

**func** : is the callback function

Since 3.0.0

**gnutls\_certificate\_set\_key ()**

```
int gnutls_certificate_set_key
  (gnutls_certificate_credentials_t cred,
   const char **names,
   int names_size,
   gnutls_pcert_st *pcert_list,
   int pcert_list_size,
   gnutls_privkey_t key);
```

This function sets a certificate/private key pair in the `gnutls_certificate_credentials_t` structure. This function may be called more than once, in case multiple keys/certificates exist for the server. For clients that wants to send more than its own end entity certificate (e.g., also an intermediate CA cert) then put the certificate chain in *pcert\_list*. The *pcert\_list* and *key* will become part of the credentials structure and must not be deallocated. They will be automatically deallocated when *res* is deinitialized.

**res** : is a `gnutls_certificate_credentials_t` structure.

**names** : is an array of DNS name of the certificate (NULL if none)

**names\_size** : holds the size of the names list

**pcert\_list** : contains a certificate list (path) for the specified private key

**pcert\_list\_size** : holds the size of the certificate list

**key** : is a `gnutls_x509_privkey_t` key

**Returns** : `GNUTLS_E_SUCCESS` (0) on success, or a negative error code.

Since 3.0.0

## 1.3 x509

x509 —

### Synopsis

```
#define GNUTLS_OID_X520_COUNTRY_NAME
#define GNUTLS_OID_X520_ORGANIZATION_NAME
#define GNUTLS_OID_X520_ORGANIZATIONAL_UNIT_NAME
#define GNUTLS_OID_X520_COMMON_NAME
#define GNUTLS_OID_X520_LOCALITY_NAME
#define GNUTLS_OID_X520_STATE_OR_PROVINCE_NAME
#define GNUTLS_OID_X520_INITIALS
#define GNUTLS_OID_X520_GENERATION_QUALIFIER
#define GNUTLS_OID_X520_SURNAME
#define GNUTLS_OID_X520_GIVEN_NAME
#define GNUTLS_OID_X520_TITLE
#define GNUTLS_OID_X520_DN_QUALIFIER
#define GNUTLS_OID_X520_PSEUDONYM
#define GNUTLS_OID_X520_POSTALCODE
#define GNUTLS_OID_X520_NAME
#define GNUTLS_OID_LDAP_DC
#define GNUTLS_OID_LDAP_UID
#define GNUTLS_OID_PKCS9_EMAIL
#define GNUTLS_OID_PKIX_DATE_OF_BIRTH
#define GNUTLS_OID_PKIX_PLACE_OF_BIRTH
#define GNUTLS_OID_PKIX_GENDER
#define GNUTLS_OID_PKIX_COUNTRY_OF_CITIZENSHIP
#define GNUTLS_OID_PKIX_COUNTRY_OF_RESIDENCE
#define GNUTLS_KP_TLS_WWW_SERVER
#define GNUTLS_KP_TLS_WWW_CLIENT
#define GNUTLS_KP_CODE_SIGNING
#define GNUTLS_KP_EMAIL_PROTECTION
#define GNUTLS_KP_TIME_STAMPING
#define GNUTLS_KP_OCSP_SIGNING
#define GNUTLS_KP_IPSEC_IKE
#define GNUTLS_KP_ANY
#define GNUTLS_OID_AIA
#define GNUTLS_OID_AD_OCSP
#define GNUTLS_OID_AD_CAISSEURS
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#define          GNUTLS_FSAN_SET
#define          GNUTLS_FSAN_APPEND
enum            gnutls_certificate_import_flags;
int             gnutls_x509_crt_init                (gnutls_x509_crt_t *cert);
void            gnutls_x509_crt_deinit             (gnutls_x509_crt_t cert);
int             gnutls_x509_crt_import              (gnutls_x509_crt_t cert,
                                                    const gnutls_datum_t *data,
                                                    gnutls_x509_crt_fmt_t format);

int             gnutls_x509_crt_list_import2         (gnutls_x509_crt_t **certs,
                                                    unsigned int *size,
                                                    const gnutls_datum_t *data,
                                                    gnutls_x509_crt_fmt_t format,
                                                    unsigned int flags);

int             gnutls_x509_crt_list_import          (gnutls_x509_crt_t *certs,
                                                    unsigned int *cert_max,
                                                    const gnutls_datum_t *data,
                                                    gnutls_x509_crt_fmt_t format,
                                                    unsigned int flags);

int             gnutls_x509_crt_export              (gnutls_x509_crt_t cert,
                                                    gnutls_x509_crt_fmt_t format,
                                                    void *output_data,
                                                    size_t *output_data_size);

int             gnutls_x509_crt_get_issuer_dn        (gnutls_x509_crt_t cert,
                                                    char *buf,
                                                    size_t *buf_size);

int             gnutls_x509_crt_get_issuer_dn_oid    (gnutls_x509_crt_t cert,
                                                    int indx,
                                                    void *oid,
                                                    size_t *oid_size);

int             gnutls_x509_crt_get_issuer_dn_by_oid (gnutls_x509_crt_t cert,
                                                    const char *oid,
                                                    int indx,
                                                    unsigned int raw_flag,
                                                    void *buf,
                                                    size_t *buf_size);

int             gnutls_x509_crt_get_dn              (gnutls_x509_crt_t cert,
                                                    char *buf,
                                                    size_t *buf_size);

int             gnutls_x509_crt_get_dn_oid          (gnutls_x509_crt_t cert,
                                                    int indx,
                                                    void *oid,
                                                    size_t *oid_size);

int             gnutls_x509_crt_get_dn_by_oid       (gnutls_x509_crt_t cert,
                                                    const char *oid,
                                                    int indx,
                                                    unsigned int raw_flag,
                                                    void *buf,
                                                    size_t *buf_size);

int             gnutls_x509_crt_check_hostname      (gnutls_x509_crt_t cert,
                                                    const char *hostname);

int             gnutls_x509_crt_get_signature_algorithm (gnutls_x509_crt_t cert);

int             gnutls_x509_crt_get_signature      (gnutls_x509_crt_t cert,
                                                    char *sig,
                                                    size_t *sizeof_sig);

int             gnutls_x509_crt_get_version         (gnutls_x509_crt_t cert);

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		unsigned int reason_flags);
int	gnutls_x509_crt_cpy_crl_dist_points	(gnutls_x509_crt_t dst,
		gnutls_x509_crt_t src);
int	gnutls_x509_crl_sign2	(gnutls_x509_crl_t crl,
		gnutls_x509_crt_t issuer,
		gnutls_x509_privkey_t issuer_key,
		gnutls_digest_algorithm_t dig,
		unsigned int flags);
time_t	gnutls_x509_crt_get_activation_time	(gnutls_x509_crt_t cert);
time_t	gnutls_x509_crt_get_expiration_time	(gnutls_x509_crt_t cert);
int	gnutls_x509_crt_get_serial	(gnutls_x509_crt_t cert,
		void *result,
		size_t *result_size);
int	gnutls_x509_crt_get_pk_algorithm	(gnutls_x509_crt_t cert,
		unsigned int *bits);
int	gnutls_x509_crt_get_pk_rsa_raw	(gnutls_x509_crt_t crt,
		gnutls_datum_t *m,
		gnutls_datum_t *e);
int	gnutls_x509_crt_get_pk_dsa_raw	(gnutls_x509_crt_t crt,
		gnutls_datum_t *p,
		gnutls_datum_t *q,
		gnutls_datum_t *g,
		gnutls_datum_t *y);
int	gnutls_x509_crt_get_subject_alt_name	(gnutls_x509_crt_t cert,
		unsigned int seq,
		void *ret,
		size_t *ret_size,
		unsigned int *critical);
int	gnutls_x509_crt_get_subject_alt_name2	(gnutls_x509_crt_t cert,
		unsigned int seq,
		void *ret,
		size_t *ret_size,
		unsigned int *ret_type,
		unsigned int *critical);
int	gnutls_x509_crt_get_subject_alt_othername_oid	(gnutls_x509_crt_t cert,
		unsigned int seq,
		void *oid,
		size_t *oid_size);
int	gnutls_x509_crt_get_issuer_alt_name	(gnutls_x509_crt_t cert,
		unsigned int seq,
		void *ret,
		size_t *ret_size,
		unsigned int *critical);
int	gnutls_x509_crt_get_issuer_alt_name2	(gnutls_x509_crt_t cert,
		unsigned int seq,
		void *ret,
		size_t *ret_size,
		unsigned int *ret_type,
		unsigned int *critical);
int	gnutls_x509_crt_get_issuer_alt_othername_oid	(gnutls_x509_crt_t cert,
		unsigned int seq,
		void *ret,

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		size_t *ret_size);
int	gnutls_x509_cert_get_ca_status	(gnutls_x509_cert_t cert, unsigned int *critical);
int	gnutls_x509_cert_get_basic_constraints	(gnutls_x509_cert_t cert, unsigned int *critical, unsigned int *ca, int *pathlen);
int	gnutls_x509_cert_get_key_usage	(gnutls_x509_cert_t cert, unsigned int *key_usage, unsigned int *critical);
int	gnutls_x509_cert_set_key_usage	(gnutls_x509_cert_t crt, unsigned int usage);
int	gnutls_x509_cert_get_proxy	(gnutls_x509_cert_t cert, unsigned int *critical, int *pathlen, char **policyLanguage, char **policy, size_t *sizeof_policy);
int	gnutls_x509_dn_oid_known	(const char *oid);
#define	GNUTLS_X509_DN_OID_RETURN_OID	
const char*	gnutls_x509_dn_oid_name	(const char *oid, unsigned int flags);
int	gnutls_x509_cert_get_extension_oid	(gnutls_x509_cert_t cert, int indx, void *oid, size_t *oid_size);
int	gnutls_x509_cert_get_extension_by_oid	(gnutls_x509_cert_t cert, const char *oid, int indx, void *buf, size_t *buf_size, unsigned int *critical);
int	gnutls_x509_cert_get_extension_info	(gnutls_x509_cert_t cert, int indx, void *oid, size_t *oid_size, unsigned int *critical);
int	gnutls_x509_cert_get_extension_data	(gnutls_x509_cert_t cert, int indx, void *data, size_t *sizeof_data);
int	gnutls_x509_cert_set_extension_by_oid	(gnutls_x509_cert_t crt, const char *oid, const void *buf, size_t sizeof_buf, unsigned int critical);
int	gnutls_x509_cert_set_dn_by_oid	(gnutls_x509_cert_t crt, const char *oid, unsigned int raw_flag, const void *name, unsigned int sizeof_name);
int	gnutls_x509_cert_set_issuer_dn_by_oid	(gnutls_x509_cert_t crt, const char *oid,

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		unsigned int raw_flag, const void *name, unsigned int sizeof_name);
int	gnutls_x509_crt_set_version	(gnutls_x509_crt_t crt, unsigned int version);
int	gnutls_x509_crt_set_key	(gnutls_x509_crt_t crt, gnutls_x509_privkey_t key);
int	gnutls_x509_crt_set_ca_status	(gnutls_x509_crt_t crt, unsigned int ca);
int	gnutls_x509_crt_set_basic_constraints	(gnutls_x509_crt_t crt, unsigned int ca, int pathLenConstraint);
int	gnutls_x509_crt_set_subject_alternative_name	(gnutls_x509_crt_t crt, gnutls_x509_subject_alt_name_t ty, const char *data_string);
int	gnutls_x509_crt_set_subject_alt_name	(gnutls_x509_crt_t crt, gnutls_x509_subject_alt_name_t ty, const void *data, unsigned int data_size, unsigned int flags);
int	gnutls_x509_crt_sign	(gnutls_x509_crt_t crt, gnutls_x509_crt_t issuer, gnutls_x509_privkey_t issuer_key)
int	gnutls_x509_crt_sign2	(gnutls_x509_crt_t crt, gnutls_x509_crt_t issuer, gnutls_x509_privkey_t issuer_key, gnutls_digest_algorithm_t dig, unsigned int flags);
int	gnutls_x509_crt_set_activation_time	(gnutls_x509_crt_t cert, time_t act_time);
int	gnutls_x509_crt_set_expiration_time	(gnutls_x509_crt_t cert, time_t exp_time);
int	gnutls_x509_crt_set_serial	(gnutls_x509_crt_t cert, const void *serial, size_t serial_size);
int	gnutls_x509_crt_set_subject_key_id	(gnutls_x509_crt_t cert, const void *id, size_t id_size);
int	gnutls_x509_crt_set_proxy_dn	(gnutls_x509_crt_t crt, gnutls_x509_crt_t eecrt, unsigned int raw_flag, const void *name, unsigned int sizeof_name);
int	gnutls_x509_crt_set_proxy	(gnutls_x509_crt_t crt, int pathLenConstraint, const char *policyLanguage, const char *policy, size_t sizeof_policy);
int	gnutls_x509_crt_print	(gnutls_x509_crt_t cert, gnutls_certificate_print_formats_t gnutls_datum_t *out);
int	gnutls_x509_crl_print	(gnutls_x509_crl_t crl, gnutls_certificate_print_formats_t gnutls_datum_t *out);

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int	gnutls_x509_crt_get_raw_issuer_dn	(gnutls_x509_crt_t cert, gnutls_datum_t *start);
int	gnutls_x509_crt_get_raw_dn	(gnutls_x509_crt_t cert, gnutls_datum_t *start);
int	gnutls_x509_rdn_get	(const gnutls_datum_t *idn, char *buf, size_t *sizeof_buf);
int	gnutls_x509_rdn_get_oid	(const gnutls_datum_t *idn, int indx, void *buf, size_t *sizeof_buf);
int	gnutls_x509_rdn_get_by_oid	(const gnutls_datum_t *idn, const char *oid, int indx, unsigned int raw_flag, void *buf, size_t *sizeof_buf);
typedef	gnutls_x509_dn_t;	
int	gnutls_x509_crt_get_subject	(gnutls_x509_crt_t cert, gnutls_x509_dn_t *dn);
int	gnutls_x509_crt_get_issuer	(gnutls_x509_crt_t cert, gnutls_x509_dn_t *dn);
int	gnutls_x509_dn_get_rdn_ava	(gnutls_x509_dn_t dn, int irdn, int iava, gnutls_x509_ava_st *ava);
int	gnutls_x509_dn_init	(gnutls_x509_dn_t *dn);
int	gnutls_x509_dn_import	(gnutls_x509_dn_t dn, const gnutls_datum_t *data);
int	gnutls_x509_dn_export	(gnutls_x509_dn_t dn, gnutls_x509_crt_fmt_t format, void *output_data, size_t *output_data_size);
void	gnutls_x509_dn_deinit	(gnutls_x509_dn_t dn);
int	gnutls_x509_crl_init	(gnutls_x509_crl_t *crl);
void	gnutls_x509_crl_deinit	(gnutls_x509_crl_t crl);
int	gnutls_x509_crl_import	(gnutls_x509_crl_t crl, const gnutls_datum_t *data, gnutls_x509_crt_fmt_t format);
int	gnutls_x509_crl_export	(gnutls_x509_crl_t crl, gnutls_x509_crt_fmt_t format, void *output_data, size_t *output_data_size);
int	gnutls_x509_crl_get_raw_issuer_dn	(gnutls_x509_crl_t crl, gnutls_datum_t *dn);
int	gnutls_x509_crl_get_issuer_dn	(const gnutls_x509_crl_t crl, char *buf, size_t *sizeof_buf);
int	gnutls_x509_crl_get_issuer_dn_by_oid	(gnutls_x509_crl_t crl, const char *oid, int indx, unsigned int raw_flag, void *buf, size_t *sizeof_buf);
int	gnutls_x509_crl_get_dn_oid	(gnutls_x509_crl_t crl, int indx,

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		void *oid, size_t *sizeof_oid);
int	gnutls_x509_crl_get_signature_algorithm	(gnutls_x509_crl_t crl);
int	gnutls_x509_crl_get_signature	(gnutls_x509_crl_t crl, char *sig, size_t *sizeof_sig);
int	gnutls_x509_crl_get_version	(gnutls_x509_crl_t crl);
time_t	gnutls_x509_crl_get_this_update	(gnutls_x509_crl_t crl);
time_t	gnutls_x509_crl_get_next_update	(gnutls_x509_crl_t crl);
int	gnutls_x509_crl_get_crt_count	(gnutls_x509_crl_t crl);
int	gnutls_x509_crl_get_crt_serial	(gnutls_x509_crl_t crl, int indx, unsigned char *serial, size_t *serial_size, time_t *t);
#define	gnutls_x509_crl_get_certificate_count	
#define	gnutls_x509_crl_get_certificate	
int	gnutls_x509_crl_check_issuer	(gnutls_x509_crl_t crl, gnutls_x509_crt_t issuer);
int	gnutls_x509_crl_list_import2	(gnutls_x509_crl_t **crls, unsigned int *size, const gnutls_datum_t *data, gnutls_x509_crt_fmt_t format, unsigned int flags);
int	gnutls_x509_crl_list_import	(gnutls_x509_crl_t *crls, unsigned int *crl_max, const gnutls_datum_t *data, gnutls_x509_crt_fmt_t format, unsigned int flags);
int	gnutls_x509_crl_set_version	(gnutls_x509_crl_t crl, unsigned int version);
int	gnutls_x509_crl_set_this_update	(gnutls_x509_crl_t crl, time_t act_time);
int	gnutls_x509_crl_set_next_update	(gnutls_x509_crl_t crl, time_t exp_time);
int	gnutls_x509_crl_set_crt_serial	(gnutls_x509_crl_t crl, const void *serial, size_t serial_size, time_t revocation_time);
int	gnutls_x509_crl_set_crt	(gnutls_x509_crl_t crl, gnutls_x509_crt_t crt, time_t revocation_time);
int	gnutls_x509_crl_get_authority_key_id	(gnutls_x509_crl_t crl, void *ret, size_t *ret_size, unsigned int *critical);
int	gnutls_x509_crl_get_number	(gnutls_x509_crl_t crl, void *ret, size_t *ret_size, unsigned int *critical);
int	gnutls_x509_crl_get_extension_oid	(gnutls_x509_crl_t crl, int indx, void *oid, size_t *sizeof_oid);
int	gnutls_x509_crl_get_extension_info	(gnutls_x509_crl_t crl,

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		int indx, void *oid, size_t *sizeof_oid, int *critical);
int	gnutls_x509_crl_get_extension_data	(gnutls_x509_crl_t crl, int indx, void *data, size_t *sizeof_data);
int	gnutls_x509_crl_set_authority_key_id	(gnutls_x509_crl_t crl, const void *id, size_t id_size);
int	gnutls_x509_crl_set_number	(gnutls_x509_crl_t crl, const void *nr, size_t nr_size);
struct	gnutls_pkcs7_int;	
typedef	gnutls_pkcs7_t;	
int	gnutls_pkcs7_init	(gnutls_pkcs7_t *pkcs7);
void	gnutls_pkcs7_deinit	(gnutls_pkcs7_t pkcs7);
int	gnutls_pkcs7_import	(gnutls_pkcs7_t pkcs7, const gnutls_datum_t *data, gnutls_x509_crt_fmt_t format);
int	gnutls_pkcs7_export	(gnutls_pkcs7_t pkcs7, gnutls_x509_crt_fmt_t format, void *output_data, size_t *output_data_size);
int	gnutls_pkcs7_get_crt_count	(gnutls_pkcs7_t pkcs7);
int	gnutls_pkcs7_get_crt_raw	(gnutls_pkcs7_t pkcs7, int indx, void *certificate, size_t *certificate_size);
int	gnutls_pkcs7_set_crt_raw	(gnutls_pkcs7_t pkcs7, const gnutls_datum_t *crt);
int	gnutls_pkcs7_set_crt	(gnutls_pkcs7_t pkcs7, gnutls_x509_crt_t crt);
int	gnutls_pkcs7_delete_crt	(gnutls_pkcs7_t pkcs7, int indx);
int	gnutls_pkcs7_get_crl_raw	(gnutls_pkcs7_t pkcs7, int indx, void *crl, size_t *crl_size);
int	gnutls_pkcs7_get_crl_count	(gnutls_pkcs7_t pkcs7);
int	gnutls_pkcs7_set_crl_raw	(gnutls_pkcs7_t pkcs7, const gnutls_datum_t *crl);
int	gnutls_pkcs7_set_crl	(gnutls_pkcs7_t pkcs7, gnutls_x509_crl_t crl);
int	gnutls_pkcs7_delete_crl	(gnutls_pkcs7_t pkcs7, int indx);
enum	gnutls_certificate_verify_flags;	
int	gnutls_x509_crt_check_issuer	(gnutls_x509_crt_t cert, gnutls_x509_crt_t issuer);
int	gnutls_x509_crt_list_verify	(const gnutls_x509_crt_t *cert_list, int cert_list_length, const gnutls_x509_crt_t *CA_list, int CA_list_length, const gnutls_x509_crl_t *CRL_list, int CRL_list_length,

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		unsigned int flags, unsigned int *verify);
int	gnutls_x509_cert_verify	(gnutls_x509_cert_t cert, const gnutls_x509_cert_t *CA_list, int CA_list_length, unsigned int flags, unsigned int *verify);
int	gnutls_x509_crl_verify	(gnutls_x509_crl_t crl, const gnutls_x509_cert_t *CA_list, int CA_list_length, unsigned int flags, unsigned int *verify);
int	gnutls_x509_cert_check_revocation	(gnutls_x509_cert_t cert, const gnutls_x509_crl_t *crl_list, int crl_list_length);
int	gnutls_x509_cert_get_fingerprint	(gnutls_x509_cert_t cert, gnutls_digest_algorithm_t algo, void *buf, size_t *buf_size);
int	gnutls_x509_cert_get_key_purpose_oid	(gnutls_x509_cert_t cert, int indx, void *oid, size_t *oid_size, unsigned int *critical);
int	gnutls_x509_cert_set_key_purpose_oid	(gnutls_x509_cert_t cert, const void *oid, unsigned int critical);
enum	gnutls_pkcs_encrypt_flags_t;	
int	gnutls_x509_privkey_init	(gnutls_x509_privkey_t *key);
void	gnutls_x509_privkey_deinit	(gnutls_x509_privkey_t key);
gnutls_sec_param_t	gnutls_x509_privkey_sec_param	(gnutls_x509_privkey_t key);
int	gnutls_x509_privkey_cpy	(gnutls_x509_privkey_t dst, gnutls_x509_privkey_t src);
int	gnutls_x509_privkey_import	(gnutls_x509_privkey_t key, const gnutls_datum_t *data, gnutls_x509_cert_fmt_t format);
int	gnutls_x509_privkey_import_pkcs8	(gnutls_x509_privkey_t key, const gnutls_datum_t *data, gnutls_x509_cert_fmt_t format, const char *password, unsigned int flags);
int	gnutls_x509_privkey_import_rsa_raw	(gnutls_x509_privkey_t key, const gnutls_datum_t *m, const gnutls_datum_t *e, const gnutls_datum_t *d, const gnutls_datum_t *p, const gnutls_datum_t *q, const gnutls_datum_t *u);
int	gnutls_x509_privkey_import_rsa_raw2	(gnutls_x509_privkey_t key, const gnutls_datum_t *m, const gnutls_datum_t *e, const gnutls_datum_t *d, const gnutls_datum_t *p, const gnutls_datum_t *q, const gnutls_datum_t *u, const gnutls_datum_t *e1, const gnutls_datum_t *e2);

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int	gnutls_x509_privkey_import_ecc_raw	(gnutls_x509_privkey_t key, gnutls_ecc_curve_t curve, const gnutls_datum_t *x, const gnutls_datum_t *y, const gnutls_datum_t *k);
int	gnutls_x509_privkey_fix	(gnutls_x509_privkey_t key);
int	gnutls_x509_privkey_export_dsa_raw	(gnutls_x509_privkey_t key, gnutls_datum_t *p, gnutls_datum_t *q, gnutls_datum_t *g, gnutls_datum_t *y, gnutls_datum_t *x);
int	gnutls_x509_privkey_import_dsa_raw	(gnutls_x509_privkey_t key, const gnutls_datum_t *p, const gnutls_datum_t *q, const gnutls_datum_t *g, const gnutls_datum_t *y, const gnutls_datum_t *x);
int	gnutls_x509_privkey_get_pk_algorithm	(gnutls_x509_privkey_t key);
int	gnutls_x509_privkey_get_key_id	(gnutls_x509_privkey_t key, unsigned int flags, unsigned char *output_data, size_t *output_data_size);
int	gnutls_x509_privkey_generate	(gnutls_x509_privkey_t key, gnutls_pk_algorithm_t algo, unsigned int bits, unsigned int flags);
int	gnutls_x509_privkey_verify_params	(gnutls_x509_privkey_t key);
int	gnutls_x509_privkey_export	(gnutls_x509_privkey_t key, gnutls_x509_crt_fmt_t format, void *output_data, size_t *output_data_size);
int	gnutls_x509_privkey_export_pkcs8	(gnutls_x509_privkey_t key, gnutls_x509_crt_fmt_t format, const char *password, unsigned int flags, void *output_data, size_t *output_data_size);
int	gnutls_x509_privkey_export_rsa_raw2	(gnutls_x509_privkey_t key, gnutls_datum_t *m, gnutls_datum_t *e, gnutls_datum_t *d, gnutls_datum_t *p, gnutls_datum_t *q, gnutls_datum_t *u, gnutls_datum_t *e1, gnutls_datum_t *e2);
int	gnutls_x509_privkey_export_rsa_raw	(gnutls_x509_privkey_t key, gnutls_datum_t *m, gnutls_datum_t *e, gnutls_datum_t *d, gnutls_datum_t *p, gnutls_datum_t *q, gnutls_datum_t *u);
int	gnutls_x509_privkey_export_ecc_raw	(gnutls_x509_privkey_t key, gnutls_ecc_curve_t *curve,

---

---

		gnutls_datum_t *x, gnutls_datum_t *y, gnutls_datum_t *k);
int	gnutls_x509_crq_sign2	(gnutls_x509_crq_t crq, gnutls_x509_privkey_t key, gnutls_digest_algorithm_t dig, unsigned int flags);
int	gnutls_x509_crq_print	(gnutls_x509_crq_t crq, gnutls_certificate_print_formats_t gnutls_datum_t *out);
int	gnutls_x509_crq_verify	(gnutls_x509_crq_t crq, unsigned int flags);
int	gnutls_x509_crq_init	(gnutls_x509_crq_t *crq);
void	gnutls_x509_crq_deinit	(gnutls_x509_crq_t crq);
int	gnutls_x509_crq_import	(gnutls_x509_crq_t crq, const gnutls_datum_t *data, gnutls_x509 crt_fmt_t format);
int	gnutls_x509_crq_get_dn	(gnutls_x509_crq_t crq, char *buf, size_t *sizeof_buf);
int	gnutls_x509_crq_get_dn_oid	(gnutls_x509_crq_t crq, int indx, void *oid, size_t *sizeof_oid);
int	gnutls_x509_crq_get_dn_by_oid	(gnutls_x509_crq_t crq, const char *oid, int indx, unsigned int raw_flag, void *buf, size_t *sizeof_buf);
int	gnutls_x509_crq_set_dn_by_oid	(gnutls_x509_crq_t crq, const char *oid, unsigned int raw_flag, const void *data, unsigned int sizeof_data);
int	gnutls_x509_crq_set_version	(gnutls_x509_crq_t crq, unsigned int version);
int	gnutls_x509_crq_get_version	(gnutls_x509_crq_t crq);
int	gnutls_x509_crq_set_key	(gnutls_x509_crq_t crq, gnutls_x509_privkey_t key);
int	gnutls_x509_crq_set_challenge_password	(gnutls_x509_crq_t crq, const char *pass);
int	gnutls_x509_crq_get_challenge_password	(gnutls_x509_crq_t crq, char *pass, size_t *sizeof_pass);
int	gnutls_x509_crq_set_attribute_by_oid	(gnutls_x509_crq_t crq, const char *oid, void *buf, size_t sizeof_buf);
int	gnutls_x509_crq_get_attribute_by_oid	(gnutls_x509_crq_t crq, const char *oid, int indx, void *buf,

---

---

		size_t *sizeof_buf);
int	gnutls_x509_crq_export	(gnutls_x509_crq_t crq, gnutls_x509 crt_fmt_t format, void *output_data, size_t *output_data_size);
int	gnutls_x509 crt_set_crq	(gnutls_x509 crt_t crt, gnutls_x509_crq_t crq);
int	gnutls_x509 crt_set_crq_extensions	(gnutls_x509 crt_t crt, gnutls_x509_crq_t crq);
int	gnutls_x509_crq_set_key_rsa_raw	(gnutls_x509_crq_t crq, const gnutls_datum_t *m, const gnutls_datum_t *e);
int	gnutls_x509_crq_set_subject_alt_name	(gnutls_x509_crq_t crq, gnutls_x509_subject_alt_name_t nt const void *data, unsigned int data_size, unsigned int flags);
int	gnutls_x509_crq_set_key_usage	(gnutls_x509_crq_t crq, unsigned int usage);
int	gnutls_x509_crq_set_basic_constraints	(gnutls_x509_crq_t crq, unsigned int ca, int pathLenConstraint);
int	gnutls_x509_crq_set_key_purpose_oid	(gnutls_x509_crq_t crq, const void *oid, unsigned int critical);
int	gnutls_x509_crq_get_key_purpose_oid	(gnutls_x509_crq_t crq, int indx, void *oid, size_t *sizeof_oid, unsigned int *critical);
int	gnutls_x509_crq_get_extension_data	(gnutls_x509_crq_t crq, int indx, void *data, size_t *sizeof_data);
int	gnutls_x509_crq_get_extension_info	(gnutls_x509_crq_t crq, int indx, void *oid, size_t *sizeof_oid, unsigned int *critical);
int	gnutls_x509_crq_get_attribute_data	(gnutls_x509_crq_t crq, int indx, void *data, size_t *sizeof_data);
int	gnutls_x509_crq_get_attribute_info	(gnutls_x509_crq_t crq, int indx, void *oid, size_t *sizeof_oid);
int	gnutls_x509_crq_get_pk_algorithm	(gnutls_x509_crq_t crq, unsigned int *bits);
int	gnutls_x509_crq_get_key_id	(gnutls_x509_crq_t crq, unsigned int flags, unsigned char *output_data, size_t *output_data_size);
int	gnutls_x509_crq_get_key_rsa_raw	(gnutls_x509_crq_t crq, gnutls_datum_t *m,

---

---

int	gnutls_x509_crq_get_key_usage	gnutls_datum_t *e); (gnutls_x509_crq_t crq, unsigned int *key_usage, unsigned int *critical);
int	gnutls_x509_crq_get_basic_constraints	(gnutls_x509_crq_t crq, unsigned int *critical, unsigned int *ca, int *pathlen);
int	gnutls_x509_crq_get_subject_alt_name	(gnutls_x509_crq_t crq, unsigned int seq, void *ret, size_t *ret_size, unsigned int *ret_type, unsigned int *critical);
int	gnutls_x509_crq_get_subject_alt_othername_oid	(gnutls_x509_crq_t crq, unsigned int seq, void *ret, size_t *ret_size);
int	gnutls_x509_crq_get_extension_by_oid	(gnutls_x509_crq_t crq, const char *oid, int indx, void *buf, size_t *sizeof_buf, unsigned int *critical);
typedef	gnutls_x509_trust_list_t;	
int	gnutls_x509_trust_list_init	(gnutls_x509_trust_list_t *list, unsigned int size);
void	gnutls_x509_trust_list_deinit	(gnutls_x509_trust_list_t list, unsigned int all);
int	gnutls_x509_trust_list_get_issuer	(gnutls_x509_trust_list_t list, gnutls_x509 crt_t cert, gnutls_x509 crt_t *issuer, unsigned int flags);
int	gnutls_x509_trust_list_add_cas	(gnutls_x509_trust_list_t list, const gnutls_x509 crt_t *clist, int clist_size, unsigned int flags);
int	gnutls_x509_trust_list_add_named_crt	(gnutls_x509_trust_list_t list, gnutls_x509 crt_t cert, const void *name, size_t name_size, unsigned int flags);
#define	GNUTLS_TL_VERIFY_CRL	
int	gnutls_x509_trust_list_add_crls	(gnutls_x509_trust_list_t list, const gnutls_x509_crl_t *crl_list int crl_size, unsigned int flags, unsigned int verification_flags);
int	gnutls_x509_trust_list_verify_named_crt	(gnutls_x509_trust_list_t list, gnutls_x509 crt_t cert, const void *name,

---



```
int gnutls_x509_trust_list_verify_cert(size_t name_size,
                                       unsigned int flags,
                                       unsigned int *verify,
                                       gnutls_verify_output_function fun
                                       (gnutls_x509_trust_list_t list,
                                       gnutls_x509_cert_t *cert_list,
                                       unsigned int cert_list_size,
                                       unsigned int flags,
                                       unsigned int *verify,
                                       gnutls_verify_output_function fun
```

## Description

## Details

### GNUTLS\_OID\_X520\_COUNTRY\_NAME

```
#define GNUTLS_OID_X520_COUNTRY_NAME    "2.5.4.6"
```

### GNUTLS\_OID\_X520\_ORGANIZATION\_NAME

```
#define GNUTLS_OID_X520_ORGANIZATION_NAME~"2.5.4.10"
```

### GNUTLS\_OID\_X520\_ORGANIZATIONAL\_UNIT\_NAME

```
#define GNUTLS_OID_X520_ORGANIZATIONAL_UNIT_NAME "2.5.4.11"
```

### GNUTLS\_OID\_X520\_COMMON\_NAME

```
#define GNUTLS_OID_X520_COMMON_NAME     "2.5.4.3"
```

### GNUTLS\_OID\_X520\_LOCALITY\_NAME

```
#define GNUTLS_OID_X520_LOCALITY_NAME    "2.5.4.7"
```

### GNUTLS\_OID\_X520\_STATE\_OR\_PROVINCE\_NAME

```
#define GNUTLS_OID_X520_STATE_OR_PROVINCE_NAME~"2.5.4.8"
```

### GNUTLS\_OID\_X520\_INITIALS

```
#define GNUTLS_OID_X520_INITIALS        "2.5.4.43"
```

### GNUTLS\_OID\_X520\_GENERATION\_QUALIFIER

```
#define GNUTLS_OID_X520_GENERATION_QUALIFIER~"2.5.4.44"
```

**GNUTLS\_OID\_X520\_SURNAME**

```
#define GNUTLS_OID_X520_SURNAME "2.5.4.4"
```

**GNUTLS\_OID\_X520\_GIVEN\_NAME**

```
#define GNUTLS_OID_X520_GIVEN_NAME "2.5.4.42"
```

**GNUTLS\_OID\_X520\_TITLE**

```
#define GNUTLS_OID_X520_TITLE "2.5.4.12"
```

**GNUTLS\_OID\_X520\_DN\_QUALIFIER**

```
#define GNUTLS_OID_X520_DN_QUALIFIER "2.5.4.46"
```

**GNUTLS\_OID\_X520\_PSEUDONYM**

```
#define GNUTLS_OID_X520_PSEUDONYM "2.5.4.65"
```

**GNUTLS\_OID\_X520\_POSTALCODE**

```
#define GNUTLS_OID_X520_POSTALCODE "2.5.4.17"
```

**GNUTLS\_OID\_X520\_NAME**

```
#define GNUTLS_OID_X520_NAME "2.5.4.41"
```

**GNUTLS\_OID\_LDAP\_DC**

```
#define GNUTLS_OID_LDAP_DC "0.9.2342.19200300.100.1.25"
```

**GNUTLS\_OID\_LDAP\_UID**

```
#define GNUTLS_OID_LDAP_UID "0.9.2342.19200300.100.1.1"
```

**GNUTLS\_OID\_PKCS9\_EMAIL**

```
#define GNUTLS_OID_PKCS9_EMAIL "1.2.840.113549.1.9.1"
```

**GNUTLS\_OID\_PKIX\_DATE\_OF\_BIRTH**

```
#define GNUTLS_OID_PKIX_DATE_OF_BIRTH "1.3.6.1.5.5.7.9.1"
```

**GNUTLS\_OID\_PKIX\_PLACE\_OF\_BIRTH**

```
#define GNUTLS_OID_PKIX_PLACE_OF_BIRTH "1.3.6.1.5.5.7.9.2"
```

**GNUTLS\_OID\_PKIX\_GENDER**

```
#define GNUTLS_OID_PKIX_GENDER "1.3.6.1.5.5.7.9.3"
```

**GNUTLS\_OID\_PKIX\_COUNTRY\_OF\_CITIZENSHIP**

```
#define GNUTLS_OID_PKIX_COUNTRY_OF_CITIZENSHIP~"1.3.6.1.5.5.7.9.4"
```

**GNUTLS\_OID\_PKIX\_COUNTRY\_OF\_RESIDENCE**

```
#define GNUTLS_OID_PKIX_COUNTRY_OF_RESIDENCE~"1.3.6.1.5.5.7.9.5"
```

**GNUTLS\_KP\_TLS\_WWW\_SERVER**

```
#define GNUTLS_KP_TLS_WWW_SERVER "1.3.6.1.5.5.7.3.1"
```

**GNUTLS\_KP\_TLS\_WWW\_CLIENT**

```
#define GNUTLS_KP_TLS_WWW_CLIENT "1.3.6.1.5.5.7.3.2"
```

**GNUTLS\_KP\_CODE\_SIGNING**

```
#define GNUTLS_KP_CODE_SIGNING "1.3.6.1.5.5.7.3.3"
```

**GNUTLS\_KP\_EMAIL\_PROTECTION**

```
#define GNUTLS_KP_EMAIL_PROTECTION "1.3.6.1.5.5.7.3.4"
```

**GNUTLS\_KP\_TIME\_STAMPING**

```
#define GNUTLS_KP_TIME_STAMPING "1.3.6.1.5.5.7.3.8"
```

**GNUTLS\_KP\_OCSP\_SIGNING**

```
#define GNUTLS_KP_OCSP_SIGNING "1.3.6.1.5.5.7.3.9"
```

**GNUTLS\_KP\_IPSEC\_IKE**

```
#define GNUTLS_KP_IPSEC_IKE "1.3.6.1.5.5.7.3.17"
```

**GNUTLS\_KP\_ANY**

```
#define GNUTLS_KP_ANY "2.5.29.37.0"
```

**GNUTLS\_OID\_AIA**

```
#define GNUTLS_OID_AIA "1.3.6.1.5.5.7.1.1"
```

**GNUTLS\_OID\_AD\_OCSP**

```
#define GNUTLS_OID_AD_OCSP "1.3.6.1.5.5.7.48.1"
```

**GNUTLS\_OID\_AD\_CAISUERS**

```
#define GNUTLS_OID_AD_CAISUERS "1.3.6.1.5.5.7.48.2"
```

**GNUTLS\_FSAN\_SET**

```
#define GNUTLS_FSAN_SET 0
```

**GNUTLS\_FSAN\_APPEND**

```
#define GNUTLS_FSAN_APPEND 1
```

**enum gnutls\_certificate\_import\_flags**

```
typedef enum gnutls_certificate_import_flags
{
    GNUTLS_X509_CERT_LIST_IMPORT_FAIL_IF_EXCEED = 1,
    GNUTLS_X509_CERT_LIST_FAIL_IF_UNSORTED = 2
} gnutls_certificate_import_flags;
```

Enumeration of different certificate import flags.

**GNUTLS\_X509\_CERT\_LIST\_IMPORT\_FAIL\_IF\_EXCEED** Fail if the certificates in the buffer are more than the space allocated for certificates. The error code will be **GNUTLS\_E\_SHORT\_MEMORY\_BUFFER**.

**GNUTLS\_X509\_CERT\_LIST\_FAIL\_IF\_UNSORTED** Fail if the certificates in the buffer are not ordered starting from subject to issuer. The error code will be **GNUTLS\_E\_CERTIFICATE\_LIST\_UNSORTED**.

**gnutls\_x509\_cert\_init ()**

```
int gnutls_x509_cert_init (gnutls_x509_cert_t *cert);
```

This function will initialize an X.509 certificate structure.

**cert** : The structure to be initialized

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

**gnutls\_x509\_cert\_deinit ()**

```
void gnutls_x509_cert_deinit (gnutls_x509_cert_t cert);
```

This function will deinitialize a certificate structure.

**cert** : The structure to be deinitialized

**gnutls\_x509\_cert\_import ()**

```
int gnutls_x509_cert_import (gnutls_x509_cert_t cert,  
                             const gnutls_datum_t *data,  
                             gnutls_x509_cert_fmt_t format);
```

This function will convert the given DER or PEM encoded Certificate to the native gnutls\_x509\_cert\_t format. The output will be stored in *cert*.

If the Certificate is PEM encoded it should have a header of "X509 CERTIFICATE", or "CERTIFICATE".

**cert** : The structure to store the parsed certificate.

**data** : The DER or PEM encoded certificate.

**format** : One of DER or PEM

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

**gnutls\_x509\_cert\_list\_import2 ()**

```
int gnutls_x509_cert_list_import2 (gnutls_x509_cert_t **certs,  
                                   unsigned int *size,  
                                   const gnutls_datum_t *data,  
                                   gnutls_x509_cert_fmt_t format,  
                                   unsigned int flags);
```

This function will convert the given PEM encoded certificate list to the native gnutls\_x509\_cert\_t format. The output will be stored in *certs*. They will be automatically initialized.

If the Certificate is PEM encoded it should have a header of "X509 CERTIFICATE", or "CERTIFICATE".

**certs** : The structures to store the parsed certificate. Must not be initialized.

**size** : It will contain the size of the list.

**data** : The PEM encoded certificate.

**format** : One of DER or PEM.

**flags** : must be (0) or an OR'd sequence of gnutls\_certificate\_import\_flags.

**Returns** : the number of certificates read or a negative error value.

Since 3.0.0



This function will copy the name of the Certificate issuer in the provided buffer. The name will be in the form "C=xxxx,O=yyyy,CN=zzzz" as described in RFC4514. The output string will be ASCII or UTF-8 encoded, depending on the certificate data.

If *buf* is null then only the size will be filled.

**cert** : should contain a [gnutls\\_x509\\_cert\\_t](#) structure

**buf** : a pointer to a structure to hold the name (may be null)

**buf\_size** : initially holds the size of *buf*

**Returns** : GNUTLS\_E\_SHORT\_MEMORY\_BUFFER if the provided buffer is not long enough, and in that case the *buf\_size* will be updated with the required size. On success 0 is returned.

#### gnutls\_x509\_cert\_get\_issuer\_dn\_oid ()

```
int gnutls_x509_cert_get_issuer_dn_oid (gnutls_x509_cert_t cert,
                                         int indx,
                                         void *oid,
                                         size_t *oid_size);
```

This function will extract the OIDs of the name of the Certificate issuer specified by the given index.

If *oid* is null then only the size will be filled. The *oid* returned will be null terminated, although *oid\_size* will not account for the trailing null.

**cert** : should contain a [gnutls\\_x509\\_cert\\_t](#) structure

**indx** : This specifies which OID to return. Use (0) to get the first one.

**oid** : a pointer to a buffer to hold the OID (may be null)

**oid\_size** : initially holds the size of *oid*

**Returns** : GNUTLS\_E\_SHORT\_MEMORY\_BUFFER if the provided buffer is not long enough, and in that case the *oid\_size* will be updated with the required size. On success 0 is returned.

#### gnutls\_x509\_cert\_get\_issuer\_dn\_by\_oid ()

```
int gnutls_x509_cert_get_issuer_dn_by_oid (gnutls_x509_cert_t cert,
                                             const char *oid,
                                             int indx,
                                             unsigned int raw_flag,
                                             void *buf,
                                             size_t *buf_size);
```

This function will extract the part of the name of the Certificate issuer specified by the given OID. The output, if the raw flag is not used, will be encoded as described in RFC4514. Thus a string that is ASCII or UTF-8 encoded, depending on the certificate data.

Some helper macros with popular OIDs can be found in [gnutls/x509.h](#) If raw flag is (0), this function will only return known OIDs as text. Other OIDs will be DER encoded, as described in RFC4514 -- in hex format with a '#' prefix. You can check about known OIDs using [gnutls\\_x509\\_dn\\_oid\\_known\(\)](#).

If *buf* is null then only the size will be filled. If the *raw\_flag* is not specified the output is always null terminated, although the *buf\_size* will not include the null character.

**cert** : should contain a [gnutls\\_x509\\_cert\\_t](#) structure

**oid** : holds an Object Identified in null terminated string

**indx** : In case multiple same OIDs exist in the RDN, this specifies which to send. Use (0) to get the first one.

**raw\_flag** : If non (0) returns the raw DER data of the DN part.

**buf** : a pointer to a structure to hold the name (may be null)

**buf\_size** : initially holds the size of *buf*

**Returns** : GNUTLS\_E\_SHORT\_MEMORY\_BUFFER if the provided buffer is not long enough, and in that case the *buf\_size* will be updated with the required size. On success 0 is returned.

### gnutls\_x509\_cert\_get\_dn ()

```
int gnutls_x509_cert_get_dn (gnutls_x509_cert_t cert,
                             char *buf,
                             size_t *buf_size);
```

This function will copy the name of the Certificate in the provided buffer. The name will be in the form "C=xxxx,O=yyyy,CN=zzzz" as described in RFC4514. The output string will be ASCII or UTF-8 encoded, depending on the certificate data.

If *buf* is null then only the size will be filled.

**cert** : should contain a [gnutls\\_x509\\_cert\\_t](#) structure

**buf** : a pointer to a structure to hold the name (may be null)

**buf\_size** : initially holds the size of *buf*

**Returns** : GNUTLS\_E\_SHORT\_MEMORY\_BUFFER if the provided buffer is not long enough, and in that case the *buf\_size* will be updated with the required size. On success 0 is returned.

### gnutls\_x509\_cert\_get\_dn\_oid ()

```
int gnutls_x509_cert_get_dn_oid (gnutls_x509_cert_t cert,
                                  int indx,
                                  void *oid,
                                  size_t *oid_size);
```

This function will extract the OIDs of the name of the Certificate subject specified by the given index.

If *oid* is null then only the size will be filled. The *oid* returned will be null terminated, although *oid\_size* will not account for the trailing null.

**cert** : should contain a [gnutls\\_x509\\_cert\\_t](#) structure

**indx** : This specifies which OID to return. Use (0) to get the first one.

**oid** : a pointer to a buffer to hold the OID (may be null)

**oid\_size** : initially holds the size of *oid*

**Returns** : GNUTLS\_E\_SHORT\_MEMORY\_BUFFER if the provided buffer is not long enough, and in that case the *oid\_size* will be updated with the required size. On success 0 is returned.



**gnutls\_x509\_cert\_get\_dn\_by\_oid()**

```
int gnutls_x509_cert_get_dn_by_oid (gnutls_x509_cert_t cert,
                                     const char *oid,
                                     int indx,
                                     unsigned int raw_flag,
                                     void *buf,
                                     size_t *buf_size);
```

This function will extract the part of the name of the Certificate subject specified by the given OID. The output, if the raw flag is not used, will be encoded as described in RFC4514. Thus a string that is ASCII or UTF-8 encoded, depending on the certificate data.

Some helper macros with popular OIDs can be found in `gnutls/x509.h`. If raw flag is (0), this function will only return known OIDs as text. Other OIDs will be DER encoded, as described in RFC4514 -- in hex format with a '#' prefix. You can check about known OIDs using `gnutls_x509_dn_oid_known()`.

If *buf* is null then only the size will be filled. If the *raw\_flag* is not specified the output is always null terminated, although the *buf\_size* will not include the null character.

**cert** : should contain a `gnutls_x509_cert_t` structure

**oid** : holds an Object Identified in null terminated string

**indx** : In case multiple same OIDs exist in the RDN, this specifies which to send. Use (0) to get the first one.

**raw\_flag** : If non (0) returns the raw DER data of the DN part.

**buf** : a pointer where the DN part will be copied (may be null).

**buf\_size** : initially holds the size of *buf*

**Returns** : `GNUTLS_E_SHORT_MEMORY_BUFFER` if the provided buffer is not long enough, and in that case the *\*buf\_size* will be updated with the required size. On success 0 is returned.

**gnutls\_x509\_cert\_check\_hostname()**

```
int gnutls_x509_cert_check_hostname (gnutls_x509_cert_t cert,
                                      const char *hostname);
```

This function will check if the given certificate's subject matches the given hostname. This is a basic implementation of the matching described in RFC2818 (HTTPS), which takes into account wildcards, and the DNSName/IPAddress subject alternative name PKIX extension.

**cert** : should contain an `gnutls_x509_cert_t` structure

**hostname** : A null terminated string that contains a DNS name

**Returns** : non (0) for a successful match, and (0) on failure.

**gnutls\_x509\_cert\_get\_signature\_algorithm()**

```
int gnutls_x509_cert_get_signature_algorithm (gnutls_x509_cert_t cert);
```

This function will return a value of the `gnutls_sign_algorithm_t` enumeration that is the signature algorithm that has been used to sign this certificate.

**cert** : should contain a `gnutls_x509_cert_t` structure

**Returns** : a `gnutls_sign_algorithm_t` value, or a negative error code on error.

**gnutls\_x509\_cert\_get\_signature ()**

```
int gnutls_x509_cert_get_signature (gnutls_x509_cert_t cert,
                                     char *sig,
                                     size_t *sizeof_sig);
```

This function will extract the signature field of a certificate.

**cert** : should contain a **gnutls\_x509\_cert\_t** structure

**sig** : a pointer where the signature part will be copied (may be null).

**sizeof\_sig** : initially holds the size of *sig*

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value. and a negative error code on error.

**gnutls\_x509\_cert\_get\_version ()**

```
int gnutls_x509_cert_get_version (gnutls_x509_cert_t cert);
```

This function will return the version of the specified Certificate.

**cert** : should contain a **gnutls\_x509\_cert\_t** structure

**Returns** : version of certificate, or a negative error code on error.

**gnutls\_x509\_cert\_get\_key\_id ()**

```
int gnutls_x509_cert_get_key_id (gnutls_x509_cert_t crt,
                                   unsigned int flags,
                                   unsigned char *output_data,
                                   size_t *output_data_size);
```

This function will return a unique ID the depends on the public key parameters. This ID can be used in checking whether a certificate corresponds to the given private key.

If the buffer provided is not long enough to hold the output, then *\*output\_data\_size* is updated and **GNUTLS\_E\_SHORT\_MEMORY\_BUFFER** will be returned. The output will normally be a SHA-1 hash output, which is 20 bytes.

**crt** : Holds the certificate

**flags** : should be 0 for now

**output\_data** : will contain the key ID

**output\_data\_size** : holds the size of *output\_data* (and will be replaced by the actual size of parameters)

**Returns** : In case of failure a negative error code will be returned, and 0 on success.

**gnutls\_x509\_cert\_set\_authority\_key\_id ()**

```
int gnutls_x509_cert_set_authority_key_id
                                     (gnutls_x509_cert_t cert,
                                      const void *id,
                                      size_t id_size);
```

This function will set the X.509 certificate's authority key ID extension. Only the keyIdentifier field can be set with this function.

**cert** : a certificate of type **gnutls\_x509\_cert\_t**

**id** : The key ID

**id\_size** : Holds the size of the serial field.

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

**gnutls\_x509\_cert\_get\_authority\_key\_id ()**

```
int gnutls_x509_cert_get_authority_key_id
                                     (gnutls_x509_cert_t cert,
                                      void *ret,
                                      size_t *ret_size,
                                      unsigned int *critical);
```

This function will return the X.509v3 certificate authority's key identifier. This is obtained by the X.509 Authority Key identifier extension field (2.5.29.35). Note that this function only returns the keyIdentifier field of the extension.

**cert** : should contain a **gnutls\_x509\_cert\_t** structure

**ret** : The place where the identifier will be copied

**ret\_size** : Holds the size of the result field.

**critical** : will be non (0) if the extension is marked as critical (may be null)

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

**gnutls\_x509\_cert\_get\_subject\_key\_id ()**

```
int gnutls_x509_cert_get_subject_key_id (gnutls_x509_cert_t cert,
                                          void *ret,
                                          size_t *ret_size,
                                          unsigned int *critical);
```

This function will return the X.509v3 certificate's subject key identifier. This is obtained by the X.509 Subject Key identifier extension field (2.5.29.14).

**cert** : should contain a **gnutls\_x509\_cert\_t** structure

**ret** : The place where the identifier will be copied

**ret\_size** : Holds the size of the result field.

**critical** : will be non (0) if the extension is marked as critical (may be null)

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

**gnutls\_x509\_cert\_get\_subject\_unique\_id ()**

```
int gnutls_x509_cert_get_subject_unique_id
                                     (gnutls_x509_cert_t crt,
                                      char *buf,
                                      size_t *buf_size);
```

This function will extract the subjectUniqueID value (if present) for the given certificate.

If the user allocated memory buffer is not large enough to hold the full subjectUniqueID, then a GNUTLS\_E\_SHORT\_MEMORY\_BUFFER error will be returned, and buf\_size will be set to the actual length.

**crt** : Holds the certificate

**buf** : user allocated memory buffer, will hold the unique id

**buf\_size** : size of user allocated memory buffer (on input), will hold actual size of the unique ID on return.

**Returns** : **GNUTLS\_E\_SUCCESS** on success, otherwise a negative error code.

**gnutls\_x509\_cert\_get\_issuer\_unique\_id ()**

```
int gnutls_x509_cert_get_issuer_unique_id
                                     (gnutls_x509_cert_t crt,
                                      char *buf,
                                      size_t *buf_size);
```

This function will extract the issuerUniqueID value (if present) for the given certificate.

If the user allocated memory buffer is not large enough to hold the full subjectUniqueID, then a GNUTLS\_E\_SHORT\_MEMORY\_BUFFER error will be returned, and buf\_size will be set to the actual length.

**crt** : Holds the certificate

**buf** : user allocated memory buffer, will hold the unique id

**buf\_size** : size of user allocated memory buffer (on input), will hold actual size of the unique ID on return.

**Returns** : **GNUTLS\_E\_SUCCESS** on success, otherwise a negative error code.

Since 2.12.0

**enum gnutls\_info\_access\_what\_t**

```
typedef enum gnutls_info_access_what_t
{
    GNUTLS_IA_ACCESSMETHOD_OID = 1,
    GNUTLS_IA_ACCESSLOCATION_GENERALNAME_TYPE = 2,
    /* use 100-108 for the generalName types, populate as needed */
    GNUTLS_IA_URI = 106,
    /* quick-access variants that match both OID and name type. */
    GNUTLS_IA_OCSP_URI = 10006,
    GNUTLS_IA_CAISSUERS_URI = 10106
} gnutls_info_access_what_t;
```

Enumeration of types for the *what* parameter of **gnutls\_x509\_cert\_get\_authority\_info\_access()**.

**GNUTLS\_IA\_ACCESSMETHOD\_OID** Get accessMethod OID.

**GNUTLS\_IA\_ACCESSLOCATION\_GENERALNAME\_TYPE** Get accessLocation name type.

**GNUTLS\_IA\_URI** Get accessLocation URI value.

**GNUTLS\_IA\_OCSP\_URI** get accessLocation URI value for OCSP.

**GNUTLS\_IA\_CAISSUERS\_URI** get accessLocation URI value for caIssuers.

**gnutls\_x509\_cert\_get\_authority\_info\_access ()**

```
int gnutls_x509_cert_get_authority_info_access
                                     (gnutls_x509_cert_t crt,
                                     unsigned int seq,
                                     int what,
                                     gnutls_datum_t *data,
                                     int *critical);
```

This function extracts the Authority Information Access (AIA) extension, see RFC 5280 section 4.2.2.1 for more information. The AIA extension holds a sequence of AccessDescription (AD) data:

```
<informalexample><programlisting> AuthorityInfoAccessSyntax ::= SEQUENCE SIZE (1..MAX) OF AccessDescription
AccessDescription ::= SEQUENCE { accessMethod OBJECT IDENTIFIER, accessLocation GeneralName } </programlisting>
</informalexample>
```

The *seq* input parameter is used to indicate which member of the sequence the caller is interested in. The first member is 0, the second member 1 and so on. When the *seq* value is out of bounds, **GNUTLS\_E\_REQUESTED\_DATA\_NOT\_AVAILABLE** is returned.

The type of data returned in *data* is specified via *what* which should be **gnutls\_info\_access\_what\_t** values.

If *what* is **GNUTLS\_IA\_ACCESSMETHOD\_OID** then *data* will hold the accessMethod OID (e.g., "1.3.6.1.5.5.7.48.1").

If *what* is **GNUTLS\_IA\_ACCESSLOCATION\_GENERALNAME\_TYPE**, *data* will hold the accessLocation GeneralName type (e.g., "uniformResourceIdentifier").

If *what* is **GNUTLS\_IA\_URI**, *data* will hold the accessLocation URI data. Requesting this *what* value leads to an error if the accessLocation is not of the "uniformResourceIdentifier" type.

If *what* is **GNUTLS\_IA\_OCSP\_URI**, *data* will hold the OCSP URI. Requesting this *what* value leads to an error if the accessMethod is not 1.3.6.1.5.5.7.48.1 aka OCSP, or if accessLocation is not of the "uniformResourceIdentifier" type.

If *what* is **GNUTLS\_IA\_CAISSUERS\_URI**, *data* will hold the caIssuers URI. Requesting this *what* value leads to an error if the accessMethod is not 1.3.6.1.5.5.7.48.2 aka caIssuers, or if accessLocation is not of the "uniformResourceIdentifier" type.

More *what* values may be allocated in the future as needed.

If *data* is NULL, the function does the same without storing the output data, that is, it will set *critical* and do error checking as usual.

The value of the critical flag is returned in *\*critical*. Supply a NULL *critical* if you want the function to make sure the extension is non-critical, as required by RFC 5280.

**crt** : Holds the certificate

**seq** : specifies the sequence number of the access descriptor (0 for the first one, 1 for the second etc.)

**what** : what data to get, a **gnutls\_info\_access\_what\_t** type.

**data** : output data to be freed with **gnutls\_free()**.

**critical** : pointer to output integer that is set to non-0 if the extension is marked as critical (may be NULL)

**Returns** : **GNUTLS\_E\_SUCCESS** on success, **GNUTLS\_E\_INVALID\_REQUEST** on invalid *crt*, **GNUTLS\_E\_CONSTRAINT\_ERROR** if the extension is incorrectly marked as critical (use a non-NULL *critical* to override), **GNUTLS\_E\_UNKNOWN\_ALGORITHM** if the requested OID does not match (e.g., when using **GNUTLS\_IA\_OCSP\_URI**), otherwise a negative error code.

Since 3.0.0

**GNUTLS\_CRL\_REASON\_UNUSED**

```
#define GNUTLS_CRL_REASON_UNUSED 128
```

**GNUTLS\_CRL\_REASON\_KEY\_COMPROMISE**

```
#define GNUTLS_CRL_REASON_KEY_COMPROMISE 64
```

**GNUTLS\_CRL\_REASON\_CA\_COMPROMISE**

```
#define GNUTLS_CRL_REASON_CA_COMPROMISE 32
```

**GNUTLS\_CRL\_REASON\_AFFILIATION\_CHANGED**

```
#define GNUTLS_CRL_REASON_AFFILIATION_CHANGED 16
```

**GNUTLS\_CRL\_REASON\_SUPERSEDED**

```
#define GNUTLS_CRL_REASON_SUPERSEDED 8
```

**GNUTLS\_CRL\_REASON\_SUPERSEDED**

```
#define GNUTLS_CRL_REASON_SUPERSEDED GNUTLS_CRL_REASON_SUPERSEDED
```

**GNUTLS\_CRL\_REASON\_CESSATION\_OF\_OPERATION**

```
#define GNUTLS_CRL_REASON_CESSATION_OF_OPERATION 4
```

**GNUTLS\_CRL\_REASON\_CERTIFICATE\_HOLD**

```
#define GNUTLS_CRL_REASON_CERTIFICATE_HOLD 2
```

**GNUTLS\_CRL\_REASON\_PRIVILEGE\_WITHDRAWN**

```
#define GNUTLS_CRL_REASON_PRIVILEGE_WITHDRAWN 1
```

**GNUTLS\_CRL\_REASON\_AA\_COMPROMISE**

```
#define GNUTLS_CRL_REASON_AA_COMPROMISE 32768
```

**gnutls\_x509\_crt\_get\_crl\_dist\_points()**

```
int gnutls_x509_crt_get_crl_dist_points (gnutls_x509_crt_t cert,
                                         unsigned int seq,
                                         void *ret,
                                         size_t *ret_size,
                                         unsigned int *reason_flags,
                                         unsigned int *critical);
```

This function retrieves the CRL distribution points (2.5.29.31), contained in the given certificate in the X509v3 Certificate Extensions.

*reason\_flags* should be an ORed sequence of `GNUTLS_CRL_REASON_UNUSED`, `GNUTLS_CRL_REASON_KEY_COMPROMISE`, `GNUTLS_CRL_REASON_CA_COMPROMISE`, `GNUTLS_CRL_REASON_AFFILIATION_CHANGED`, `GNUTLS_CRL_REASON_CESSATION_OF_OPERATION`, `GNUTLS_CRL_REASON_CERTIFICATE_HOLD`, `GNUTLS_CRL_REASON_AA_COMPROMISE`, or (0) for all possible reasons.

**cert** : should contain a `gnutls_x509_crt_t` structure

**seq** : specifies the sequence number of the distribution point (0 for the first one, 1 for the second etc.)

**ret** : is the place where the distribution point will be copied to

**ret\_size** : holds the size of ret.

**reason\_flags** : Revocation reasons flags.

**critical** : will be non (0) if the extension is marked as critical (may be null)

**Returns** : `GNUTLS_E_SHORT_MEMORY_BUFFER` and updates *ret\_size* if *ret\_size* is not enough to hold the distribution point, or the type of the distribution point if everything was ok. The type is one of the enumerated `gnutls_x509_subject_alt_name_t`. If the certificate does not have an Alternative name with the specified sequence number then `GNUTLS_E_REQUESTED_DATA_NOT_AVAILABLE` is returned.

**gnutls\_x509\_crt\_set\_crl\_dist\_points2()**

```
int gnutls_x509_crt_set_crl_dist_points2 (gnutls_x509_crt_t crt,
                                           gnutls_x509_subject_alt_name_t type,
                                           const void *data,
                                           unsigned int data_size,
                                           unsigned int reason_flags);
```

This function will set the CRL distribution points certificate extension.

**crt** : a certificate of type `gnutls_x509_crt_t`

**type** : is one of the `gnutls_x509_subject_alt_name_t` enumerations

**data** : The data to be set

**data\_size** : The data size

**reason\_flags** : revocation reasons

**Returns** : On success, `GNUTLS_E_SUCCESS` (0) is returned, otherwise a negative error value.

Since 2.6.0

**gnutls\_x509\_cert\_set\_crl\_dist\_points ()**

```
int gnutls_x509_cert_set_crl_dist_points (gnutls_x509_cert_t cert,
                                          gnutls_x509_subject_alt_name_t type,
                                          const void *data_string,
                                          unsigned int reason_flags);
```

This function will set the CRL distribution points certificate extension.

**cert** : a certificate of type **gnutls\_x509\_cert\_t**

**type** : is one of the **gnutls\_x509\_subject\_alt\_name\_t** enumerations

**data\_string** : The data to be set

**reason\_flags** : revocation reasons

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

**gnutls\_x509\_cert\_cpy\_crl\_dist\_points ()**

```
int gnutls_x509_cert_cpy_crl_dist_points (gnutls_x509_cert_t dst,
                                          gnutls_x509_cert_t src);
```

This function will copy the CRL distribution points certificate extension, from the source to the destination certificate. This may be useful to copy from a CA certificate to issued ones.

**dst** : a certificate of type **gnutls\_x509\_cert\_t**

**src** : the certificate where the dist points will be copied from

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

**gnutls\_x509\_crl\_sign2 ()**

```
int gnutls_x509_crl_sign2 (gnutls_x509_crl_t crl,
                           gnutls_x509_cert_t issuer,
                           gnutls_x509_privkey_t issuer_key,
                           gnutls_digest_algorithm_t dig,
                           unsigned int flags);
```

This function will sign the CRL with the issuer's private key, and will copy the issuer's information into the CRL.

This must be the last step in a certificate CRL since all the previously set parameters are now signed.

**crl** : should contain a **gnutls\_x509\_crl\_t** structure

**issuer** : is the certificate of the certificate issuer

**issuer\_key** : holds the issuer's private key

**dig** : The message digest to use. **GNUTLS\_DIG\_SHA1** is the safe choice unless you know what you're doing.

**flags** : must be 0

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.



**gnutls\_x509\_cert\_get\_activation\_time ()**

```
time_t          gnutls_x509_cert_get_activation_time (gnutls_x509_cert_t cert);
```

This function will return the time this Certificate was or will be activated.

**cert** : should contain a [gnutls\\_x509\\_cert\\_t](#) structure

**Returns** : activation time, or (time\_t)-1 on error.

**gnutls\_x509\_cert\_get\_expiration\_time ()**

```
time_t          gnutls_x509_cert_get_expiration_time (gnutls_x509_cert_t cert);
```

This function will return the time this Certificate was or will be expired.

**cert** : should contain a [gnutls\\_x509\\_cert\\_t](#) structure

**Returns** : expiration time, or (time\_t)-1 on error.

**gnutls\_x509\_cert\_get\_serial ()**

```
int             gnutls_x509_cert_get_serial          (gnutls_x509_cert_t cert,  
                                                     void *result,  
                                                     size_t *result_size);
```

This function will return the X.509 certificate's serial number. This is obtained by the X509 Certificate serialNumber field. Serial is not always a 32 or 64bit number. Some CAs use large serial numbers, thus it may be wise to handle it as something opaque.

**cert** : should contain a [gnutls\\_x509\\_cert\\_t](#) structure

**result** : The place where the serial number will be copied

**result\_size** : Holds the size of the result field.

**Returns** : On success, [GNUTLS\\_E\\_SUCCESS](#) (0) is returned, otherwise a negative error value.

**gnutls\_x509\_cert\_get\_pk\_algorithm ()**

```
int             gnutls_x509_cert_get_pk_algorithm    (gnutls_x509_cert_t cert,  
                                                     unsigned int *bits);
```

This function will return the public key algorithm of an X.509 certificate.

If bits is non null, it should have enough size to hold the parameters size in bits. For RSA the bits returned is the modulus. For DSA the bits returned are of the public exponent.

**cert** : should contain a [gnutls\\_x509\\_cert\\_t](#) structure

**bits** : if bits is non null it will hold the size of the parameters' in bits

**Returns** : a member of the [gnutls\\_pk\\_algorithm\\_t](#) enumeration on success, or a negative error code on error.

**gnutls\_x509\_cert\_get\_pk\_rsa\_raw ()**

```
int          gnutls_x509_cert_get_pk_rsa_raw      (gnutls_x509_cert_t crt,
                                                    gnutls_datum_t *m,
                                                    gnutls_datum_t *e);
```

This function will export the RSA public key's parameters found in the given structure. The new parameters will be allocated using **gnutls\_malloc()** and will be stored in the appropriate datum.

**crt** : Holds the certificate

**m** : will hold the modulus

**e** : will hold the public exponent

**Returns** : **GNUTLS\_E\_SUCCESS** on success, otherwise a negative error code.

**gnutls\_x509\_cert\_get\_pk\_dsa\_raw ()**

```
int          gnutls_x509_cert_get_pk_dsa_raw      (gnutls_x509_cert_t crt,
                                                    gnutls_datum_t *p,
                                                    gnutls_datum_t *q,
                                                    gnutls_datum_t *g,
                                                    gnutls_datum_t *y);
```

This function will export the DSA public key's parameters found in the given certificate. The new parameters will be allocated using **gnutls\_malloc()** and will be stored in the appropriate datum.

**crt** : Holds the certificate

**p** : will hold the p

**q** : will hold the q

**g** : will hold the g

**y** : will hold the y

**Returns** : **GNUTLS\_E\_SUCCESS** on success, otherwise a negative error code.

**gnutls\_x509\_cert\_get\_subject\_alt\_name ()**

```
int          gnutls_x509_cert_get_subject_alt_name (gnutls_x509_cert_t cert,
                                                    unsigned int seq,
                                                    void *ret,
                                                    size_t *ret_size,
                                                    unsigned int *critical);
```

This function retrieves the Alternative Name (2.5.29.17), contained in the given certificate in the X509v3 Certificate Extensions.

When the SAN type is otherName, it will extract the data in the otherName's value field, and **GNUTLS\_SAN\_OTHERNAME** is returned. You may use **gnutls\_x509\_cert\_get\_subject\_alt\_othername\_oid()** to get the corresponding OID and the "virtual" SAN types (e.g., **GNUTLS\_SAN\_OTHERNAME\_XMPP**).

If an otherName OID is known, the data will be decoded. Otherwise the returned data will be DER encoded, and you will have to decode it yourself. Currently, only the RFC 3920 id-on-xmppAddr SAN is recognized.

**cert** : should contain a **gnutls\_x509\_cert\_t** structure

**seq** : specifies the sequence number of the alt name (0 for the first one, 1 for the second etc.)

**ret** : is the place where the alternative name will be copied to

**ret\_size** : holds the size of ret.

**critical** : will be non (0) if the extension is marked as critical (may be null)

**Returns** : the alternative subject name type on success, one of the enumerated `gnutls_x509_subject_alt_name_t`. It will return `GNUTLS_E_SHORT_MEMORY_BUFFER` if `ret_size` is not large enough to hold the value. In that case `ret_size` will be updated with the required size. If the certificate does not have an Alternative name with the specified sequence number then `GNUTLS_E_REQUESTED_DATA_NOT_AVAILABLE` is returned.

#### `gnutls_x509_cert_get_subject_alt_name2()`

```
int gnutls_x509_cert_get_subject_alt_name2
                                     (gnutls_x509_cert_t cert,
                                      unsigned int seq,
                                      void *ret,
                                      size_t *ret_size,
                                      unsigned int *ret_type,
                                      unsigned int *critical);
```

This function will return the alternative names, contained in the given certificate. It is the same as `gnutls_x509_cert_get_subject_alt_name()` except for the fact that it will return the type of the alternative name in `ret_type` even if the function fails for some reason (i.e. the buffer provided is not enough).

**cert** : should contain a `gnutls_x509_cert_t` structure

**seq** : specifies the sequence number of the alt name (0 for the first one, 1 for the second etc.)

**ret** : is the place where the alternative name will be copied to

**ret\_size** : holds the size of ret.

**ret\_type** : holds the type of the alternative name (one of `gnutls_x509_subject_alt_name_t`).

**critical** : will be non (0) if the extension is marked as critical (may be null)

**Returns** : the alternative subject name type on success, one of the enumerated `gnutls_x509_subject_alt_name_t`. It will return `GNUTLS_E_SHORT_MEMORY_BUFFER` if `ret_size` is not large enough to hold the value. In that case `ret_size` will be updated with the required size. If the certificate does not have an Alternative name with the specified sequence number then `GNUTLS_E_REQUESTED_DATA_NOT_AVAILABLE` is returned.

#### `gnutls_x509_cert_get_subject_alt_othername_oid()`

```
int gnutls_x509_cert_get_subject_alt_othername_oid
                                     (gnutls_x509_cert_t cert,
                                      unsigned int seq,
                                      void *oid,
                                      size_t *oid_size);
```

This function will extract the type OID of an otherName Subject Alternative Name, contained in the given certificate, and return the type as an enumerated element.

This function is only useful if `gnutls_x509_cert_get_subject_alt_name()` returned `GNUTLS_SAN_OTHERNAME`.

If `oid` is null then only the size will be filled. The `oid` returned will be null terminated, although `oid_size` will not account for the trailing null.



This function will return the alternative names, contained in the given certificate. It is the same as `gnutls_x509_cert_get_issuer_alt_name()` except for the fact that it will return the type of the alternative name in `ret_type` even if the function fails for some reason (i.e. the buffer provided is not enough).

**cert** : should contain a `gnutls_x509_cert_t` structure

**seq** : specifies the sequence number of the alt name (0 for the first one, 1 for the second etc.)

**ret** : is the place where the alternative name will be copied to

**ret\_size** : holds the size of ret.

**ret\_type** : holds the type of the alternative name (one of `gnutls_x509_subject_alt_name_t`).

**critical** : will be non (0) if the extension is marked as critical (may be null)

**Returns** : the alternative issuer name type on success, one of the enumerated `gnutls_x509_subject_alt_name_t`. It will return `GNUTLS_E_SHORT_MEMORY_BUFFER` if `ret_size` is not large enough to hold the value. In that case `ret_size` will be updated with the required size. If the certificate does not have an Alternative name with the specified sequence number then `GNUTLS_E_REQUESTED_DATA_NOT_AVAILABLE` is returned.

Since 2.10.0

#### `gnutls_x509_cert_get_issuer_alt_othername_oid()`

```
int gnutls_x509_cert_get_issuer_alt_othername_oid
                                         (gnutls_x509_cert_t cert,
                                          unsigned int seq,
                                          void *ret,
                                          size_t *ret_size);
```

This function will extract the type OID of an otherName Subject Alternative Name, contained in the given certificate, and return the type as an enumerated element.

If `oid` is null then only the size will be filled. The `oid` returned will be null terminated, although `oid_size` will not account for the trailing null.

This function is only useful if `gnutls_x509_cert_get_issuer_alt_name()` returned `GNUTLS_SAN_OTHERNAME`.

**cert** : should contain a `gnutls_x509_cert_t` structure

**seq** : specifies the sequence number of the alt name (0 for the first one, 1 for the second etc.)

**ret** : is the place where the otherName OID will be copied to

**ret\_size** : holds the size of ret.

**Returns** : the alternative issuer name type on success, one of the enumerated `gnutls_x509_subject_alt_name_t`. For supported OIDs, it will return one of the virtual (`GNUTLS_SAN_OTHERNAME_*`) types, e.g. `GNUTLS_SAN_OTHERNAME_XMPP`, and `GNUTLS_SAN_OTHERNAME` for unknown OIDs. It will return `GNUTLS_E_SHORT_MEMORY_BUFFER` if `ret_size` is not large enough to hold the value. In that case `ret_size` will be updated with the required size. If the certificate does not have an Alternative name with the specified sequence number and with the otherName type then `GNUTLS_E_REQUESTED_DATA_NOT_AVAILABLE` is returned.

Since 2.10.0

**gnutls\_x509\_cert\_get\_ca\_status ()**

```
int gnutls_x509_cert_get_ca_status (gnutls_x509_cert_t cert,
                                     unsigned int *critical);
```

This function will return certificates CA status, by reading the basicConstraints X.509 extension (2.5.29.19). If the certificate is a CA a positive value will be returned, or (0) if the certificate does not have CA flag set.

Use [gnutls\\_x509\\_cert\\_get\\_basic\\_constraints\(\)](#) if you want to read the pathLenConstraint field too.

**cert** : should contain a [gnutls\\_x509\\_cert\\_t](#) structure

**critical** : will be non (0) if the extension is marked as critical

**Returns** : A negative error code may be returned in case of parsing error. If the certificate does not contain the basicConstraints extension [GNUTLS\\_E\\_REQUESTED\\_DATA\\_NOT\\_AVAILABLE](#) will be returned.

**gnutls\_x509\_cert\_get\_basic\_constraints ()**

```
int gnutls_x509_cert_get_basic_constraints (gnutls_x509_cert_t cert,
                                             unsigned int *critical,
                                             unsigned int *ca,
                                             int *pathlen);
```

This function will read the certificate's basic constraints, and return the certificates CA status. It reads the basicConstraints X.509 extension (2.5.29.19).

**cert** : should contain a [gnutls\\_x509\\_cert\\_t](#) structure

**critical** : will be non (0) if the extension is marked as critical

**ca** : pointer to output integer indicating CA status, may be NULL, value is 1 if the certificate CA flag is set, 0 otherwise.

**pathlen** : pointer to output integer indicating path length (may be NULL), non-negative error codes indicate a present pathLenConstraint field and the actual value, -1 indicate that the field is absent.

**Returns** : If the certificate is a CA a positive value will be returned, or (0) if the certificate does not have CA flag set. A negative error code may be returned in case of errors. If the certificate does not contain the basicConstraints extension [GNUTLS\\_E\\_REQUESTED\\_DATA\\_NOT\\_AVAILABLE](#) will be returned.

**gnutls\_x509\_cert\_get\_key\_usage ()**

```
int gnutls_x509_cert_get_key_usage (gnutls_x509_cert_t cert,
                                     unsigned int *key_usage,
                                     unsigned int *critical);
```

This function will return certificate's key usage, by reading the keyUsage X.509 extension (2.5.29.15). The key usage value will ORed values of the: [GNUTLS\\_KEY\\_DIGITAL\\_SIGNATURE](#), [GNUTLS\\_KEY\\_NON\\_REPUDIATION](#), [GNUTLS\\_KEY\\_KEY\\_ENCIPHERMENT](#), [GNUTLS\\_KEY\\_DATA\\_ENCIPHERMENT](#), [GNUTLS\\_KEY\\_KEY\\_AGREEMENT](#), [GNUTLS\\_KEY\\_KEY\\_CERT\\_SIGN](#), [GNUTLS\\_KEY\\_KEY\\_ENCIPHER\\_ONLY](#), [GNUTLS\\_KEY\\_DECIPHER\\_ONLY](#).

**cert** : should contain a [gnutls\\_x509\\_cert\\_t](#) structure

**key\_usage** : where the key usage bits will be stored

**critical** : will be non (0) if the extension is marked as critical

**Returns** : the certificate key usage, or a negative error code in case of parsing error. If the certificate does not contain the keyUsage extension [GNUTLS\\_E\\_REQUESTED\\_DATA\\_NOT\\_AVAILABLE](#) will be returned.

**gnutls\_x509\_cert\_set\_key\_usage ()**

```
int gnutls_x509_cert_set_key_usage (gnutls_x509_cert_t cert,
                                     unsigned int usage);
```

This function will set the keyUsage certificate extension.

**cert** : a certificate of type **gnutls\_x509\_cert\_t**

**usage** : an ORed sequence of the GNUTLS\_KEY\_\* elements.

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

**gnutls\_x509\_cert\_get\_proxy ()**

```
int gnutls_x509_cert_get_proxy (gnutls_x509_cert_t cert,
                                 unsigned int *critical,
                                 int *pathlen,
                                 char **policyLanguage,
                                 char **policy,
                                 size_t *sizeof_policy);
```

This function will get information from a proxy certificate. It reads the ProxyCertInfo X.509 extension (1.3.6.1.5.5.7.1.14).

**cert** : should contain a **gnutls\_x509\_cert\_t** structure

**critical** : will be non (0) if the extension is marked as critical

**pathlen** : pointer to output integer indicating path length (may be NULL), non-negative error codes indicate a present pCPath-LenConstraint field and the actual value, -1 indicate that the field is absent.

**policyLanguage** : output variable with OID of policy language

**policy** : output variable with policy data

**sizeof\_policy** : output variable size of policy data

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error code is returned.

**gnutls\_x509\_dn\_oid\_known ()**

```
int gnutls_x509_dn_oid_known (const char *oid);
```

This function will inform about known DN OIDs. This is useful since functions like **gnutls\_x509\_cert\_set\_dn\_by\_oid()** use the information on known OIDs to properly encode their input. Object Identifiers that are not known are not encoded by these functions, and their input is stored directly into the ASN.1 structure. In that case of unknown OIDs, you have the responsibility of DER encoding your data.

**oid** : holds an Object Identifier in a null terminated string

**Returns** : 1 on known OIDs and 0 otherwise.

**GNUTLS\_X509\_DN\_OID\_RETURN\_OID**

```
#define GNUTLS_X509_DN_OID_RETURN_OID 1
```

**gnutls\_x509\_dn\_oid\_name ()**

```
const char*          gnutls_x509_dn_oid_name          (const char *oid,
                                                         unsigned int flags);
```

This function will return the name of a known DN OID. If **GNUTLS\_X509\_DN\_OID\_RETURN\_OID** is specified this function will return the given OID if no descriptive name has been found.

**oid**: holds an Object Identifier in a null terminated string

**flags**: 0 or **GNUTLS\_X509\_DN\_OID\_\***

**Returns**: A null terminated string or NULL otherwise.

Since 3.0.0

**gnutls\_x509\_cert\_get\_extension\_oid ()**

```
int                  gnutls_x509_cert_get_extension_oid  (gnutls_x509_cert_t cert,
                                                         int indx,
                                                         void *oid,
                                                         size_t *oid_size);
```

This function will return the requested extension OID in the certificate. The extension OID will be stored as a string in the provided buffer.

The *oid* returned will be null terminated, although *oid\_size* will not account for the trailing null.

**cert**: should contain a **gnutls\_x509\_cert\_t** structure

**indx**: Specifies which extension OID to send. Use (0) to get the first one.

**oid**: a pointer to a structure to hold the OID (may be null)

**oid\_size**: initially holds the size of *oid*

**Returns**: On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error code is returned. If you have reached the last extension available **GNUTLS\_E\_REQUESTED\_DATA\_NOT\_AVAILABLE** will be returned.

**gnutls\_x509\_cert\_get\_extension\_by\_oid ()**

```
int                  gnutls_x509_cert_get_extension_by_oid  (gnutls_x509_cert_t cert,
                                                            const char *oid,
                                                            int indx,
                                                            void *buf,
                                                            size_t *buf_size,
                                                            unsigned int *critical);
```

This function will return the extension specified by the OID in the certificate. The extensions will be returned as binary data DER encoded, in the provided buffer.

**cert**: should contain a **gnutls\_x509\_cert\_t** structure

**oid**: holds an Object Identified in null terminated string

**indx**: In case multiple same OIDs exist in the extensions, this specifies which to send. Use (0) to get the first one.

**buf**: a pointer to a structure to hold the name (may be null)



**buf\_size**: initially holds the size of *buf*

**critical**: will be non (0) if the extension is marked as critical

**Returns**: On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error code is returned. If the certificate does not contain the specified extension **GNUTLS\_E\_REQUESTED\_DATA\_NOT\_AVAILABLE** will be returned.

#### gnutls\_x509\_cert\_get\_extension\_info ()

```
int gnutls_x509_cert_get_extension_info (gnutls_x509_cert_t cert,
                                         int indx,
                                         void *oid,
                                         size_t *oid_size,
                                         unsigned int *critical);
```

This function will return the requested extension OID in the certificate, and the critical flag for it. The extension OID will be stored as a string in the provided buffer. Use **gnutls\_x509\_cert\_get\_extension\_data()** to extract the data.

If the buffer provided is not long enough to hold the output, then *oid\_size* is updated and **GNUTLS\_E\_SHORT\_MEMORY\_BUFFER** will be returned. The *oid* returned will be null terminated, although *oid\_size* will not account for the trailing null.

**cert**: should contain a **gnutls\_x509\_cert\_t** structure

**indx**: Specifies which extension OID to send. Use (0) to get the first one.

**oid**: a pointer to a structure to hold the OID

**oid\_size**: initially holds the maximum size of *oid*, on return holds actual size of *oid*.

**critical**: output variable with critical flag, may be NULL.

**Returns**: On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error code is returned. If you have reached the last extension available **GNUTLS\_E\_REQUESTED\_DATA\_NOT\_AVAILABLE** will be returned.

#### gnutls\_x509\_cert\_get\_extension\_data ()

```
int gnutls_x509_cert_get_extension_data (gnutls_x509_cert_t cert,
                                         int indx,
                                         void *data,
                                         size_t *sizeof_data);
```

This function will return the requested extension data in the certificate. The extension data will be stored as a string in the provided buffer.

Use **gnutls\_x509\_cert\_get\_extension\_info()** to extract the OID and critical flag. Use **gnutls\_x509\_cert\_get\_extension\_by\_oid()** instead, if you want to get data indexed by the extension OID rather than sequence.

**cert**: should contain a **gnutls\_x509\_cert\_t** structure

**indx**: Specifies which extension OID to send. Use (0) to get the first one.

**data**: a pointer to a structure to hold the data (may be null)

**sizeof\_data**: initially holds the size of *oid*

**Returns**: On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error code is returned. If you have reached the last extension available **GNUTLS\_E\_REQUESTED\_DATA\_NOT\_AVAILABLE** will be returned.



This function will set the part of the name of the Certificate issuer, specified by the given OID. The input string should be ASCII or UTF-8 encoded.

Some helper macros with popular OIDs can be found in `gnutls/x509.h`. With this function you can only set the known OIDs. You can test for known OIDs using `gnutls_x509_dn_oid_known()`. For OIDs that are not known (by gnutls) you should properly DER encode your data, and call this function with `raw_flag` set.

Normally you do not need to call this function, since the signing operation will copy the signer's name as the issuer of the certificate.

**crt** : a certificate of type `gnutls_x509_cert_t`

**oid** : holds an Object Identifier in a null terminated string

**raw\_flag** : must be 0, or 1 if the data are DER encoded

**name** : a pointer to the name

**sizeof\_name** : holds the size of `name`

**Returns** : On success, `GNUTLS_E_SUCCESS` (0) is returned, otherwise a negative error value.

### `gnutls_x509_cert_set_version ()`

```
int gnutls_x509_cert_set_version (gnutls_x509_cert_t crt,
                                  unsigned int version);
```

This function will set the version of the certificate. This must be one for X.509 version 1, and so on. Plain certificates without extensions must have version set to one.

To create well-formed certificates, you must specify version 3 if you use any certificate extensions. Extensions are created by functions such as `gnutls_x509_cert_set_subject_alt_name()` or `gnutls_x509_cert_set_key_usage()`.

**crt** : a certificate of type `gnutls_x509_cert_t`

**version** : holds the version number. For X.509v1 certificates must be 1.

**Returns** : On success, `GNUTLS_E_SUCCESS` (0) is returned, otherwise a negative error value.

### `gnutls_x509_cert_set_key ()`

```
int gnutls_x509_cert_set_key (gnutls_x509_cert_t crt,
                               gnutls_x509_privkey_t key);
```

This function will set the public parameters from the given private key to the certificate. Only RSA keys are currently supported.

**crt** : a certificate of type `gnutls_x509_cert_t`

**key** : holds a private key

**Returns** : On success, `GNUTLS_E_SUCCESS` (0) is returned, otherwise a negative error value.

### `gnutls_x509_cert_set_ca_status ()`

```
int gnutls_x509_cert_set_ca_status (gnutls_x509_cert_t crt,
                                     unsigned int ca);
```

This function will set the basicConstraints certificate extension. Use `gnutls_x509_cert_set_basic_constraints()` if you want to control the pathLenConstraint field too.

**crt** : a certificate of type `gnutls_x509_cert_t`

**ca** : true(1) or false(0). Depending on the Certificate authority status.

**Returns** : On success, `GNUTLS_E_SUCCESS` (0) is returned, otherwise a negative error value.

**gnutls\_x509\_cert\_set\_basic\_constraints ()**

```
int gnutls_x509_cert_set_basic_constraints
                                     (gnutls_x509_cert_t crt,
                                      unsigned int ca,
                                      int pathLenConstraint);
```

This function will set the basicConstraints certificate extension.

**crt** : a certificate of type `gnutls_x509_cert_t`

**ca** : true(1) or false(0). Depending on the Certificate authority status.

**pathLenConstraint** : non-negative error codes indicate maximum length of path, and negative error codes indicate that the pathLenConstraints field should not be present.

**Returns** : On success, `GNUTLS_E_SUCCESS` (0) is returned, otherwise a negative error value.

**gnutls\_x509\_cert\_set\_subject\_alternative\_name ()**

```
int gnutls_x509_cert_set_subject_alternative_name
                                     (gnutls_x509_cert_t crt,
                                      gnutls_x509_subject_alt_name_t ↔
                                      type,
                                      const char *data_string);
```

This function will set the subject alternative name certificate extension. This function assumes that data can be expressed as a null terminated string.

The name of the function is unfortunate since it is inconsistent with `gnutls_x509_cert_get_subject_alt_name()`.

**crt** : a certificate of type `gnutls_x509_cert_t`

**type** : is one of the `gnutls_x509_subject_alt_name_t` enumerations

**data\_string** : The data to be set, a (0) terminated string

**Returns** : On success, `GNUTLS_E_SUCCESS` (0) is returned, otherwise a negative error value.

**gnutls\_x509\_cert\_set\_subject\_alt\_name ()**

```
int gnutls_x509_cert_set_subject_alt_name
                                     (gnutls_x509_cert_t crt,
                                      gnutls_x509_subject_alt_name_t ↔
                                      type,
                                      const void *data,
                                      unsigned int data_size,
                                      unsigned int flags);
```

This function will set the subject alternative name certificate extension. It can set the following types:

`GNUTLS_SAN_DNSNAME`: as a text string

`GNUTLS_SAN_RFC822NAME`: as a text string

`GNUTLS_SAN_URI`: as a text string

`GNUTLS_SAN_IPADDRESS`: as a binary IP address (4 or 16 bytes)

Other values can be set as binary values with the proper DER encoding.

**crt** : a certificate of type `gnutls_x509_cert_t`  
**type** : is one of the `gnutls_x509_subject_alt_name_t` enumerations  
**data** : The data to be set  
**data\_size** : The size of data to be set  
**flags** : `GNUTLS_FSAN_SET` to clear previous data or `GNUTLS_FSAN_APPEND` to append.  
**Returns** : On success, `GNUTLS_E_SUCCESS` (0) is returned, otherwise a negative error value.

Since 2.6.0

#### `gnutls_x509_cert_sign ()`

```
int gnutls_x509_cert_sign (gnutls_x509_cert_t crt,
                           gnutls_x509_cert_t issuer,
                           gnutls_x509_privkey_t issuer_key);
```

This function is the same as `gnutls_x509_cert_sign2()` with no flags, and SHA1 as the hash algorithm.

**crt** : a certificate of type `gnutls_x509_cert_t`  
**issuer** : is the certificate of the certificate issuer  
**issuer\_key** : holds the issuer's private key  
**Returns** : On success, `GNUTLS_E_SUCCESS` (0) is returned, otherwise a negative error value.

#### `gnutls_x509_cert_sign2 ()`

```
int gnutls_x509_cert_sign2 (gnutls_x509_cert_t crt,
                             gnutls_x509_cert_t issuer,
                             gnutls_x509_privkey_t issuer_key,
                             gnutls_digest_algorithm_t dig,
                             unsigned int flags);
```

This function will sign the certificate with the issuer's private key, and will copy the issuer's information into the certificate. This must be the last step in a certificate generation since all the previously set parameters are now signed.

**crt** : a certificate of type `gnutls_x509_cert_t`  
**issuer** : is the certificate of the certificate issuer  
**issuer\_key** : holds the issuer's private key  
**dig** : The message digest to use, `GNUTLS_DIG_SHA1` is a safe choice  
**flags** : must be 0  
**Returns** : On success, `GNUTLS_E_SUCCESS` (0) is returned, otherwise a negative error value.

**gnutls\_x509\_cert\_set\_activation\_time ()**

```
int gnutls_x509_cert_set_activation_time (gnutls_x509_cert_t cert,
                                          time_t act_time);
```

This function will set the time this Certificate was or will be activated.

**cert** : a certificate of type `gnutls_x509_cert_t`

**act\_time** : The actual time

**Returns** : On success, `GNUTLS_E_SUCCESS` (0) is returned, otherwise a negative error value.

**gnutls\_x509\_cert\_set\_expiration\_time ()**

```
int gnutls_x509_cert_set_expiration_time (gnutls_x509_cert_t cert,
                                           time_t exp_time);
```

This function will set the time this Certificate will expire.

**cert** : a certificate of type `gnutls_x509_cert_t`

**exp\_time** : The actual time

**Returns** : On success, `GNUTLS_E_SUCCESS` (0) is returned, otherwise a negative error value.

**gnutls\_x509\_cert\_set\_serial ()**

```
int gnutls_x509_cert_set_serial (gnutls_x509_cert_t cert,
                                  const void *serial,
                                  size_t serial_size);
```

This function will set the X.509 certificate's serial number. Serial is not always a 32 or 64bit number. Some CAs use large serial numbers, thus it may be wise to handle it as something opaque.

**cert** : a certificate of type `gnutls_x509_cert_t`

**serial** : The serial number

**serial\_size** : Holds the size of the serial field.

**Returns** : On success, `GNUTLS_E_SUCCESS` (0) is returned, otherwise a negative error value.

**gnutls\_x509\_cert\_set\_subject\_key\_id ()**

```
int gnutls_x509_cert_set_subject_key_id (gnutls_x509_cert_t cert,
                                           const void *id,
                                           size_t id_size);
```

This function will set the X.509 certificate's subject key ID extension.

**cert** : a certificate of type `gnutls_x509_cert_t`

**id** : The key ID

**id\_size** : Holds the size of the serial field.

**Returns** : On success, `GNUTLS_E_SUCCESS` (0) is returned, otherwise a negative error value.

**gnutls\_x509\_cert\_set\_proxy\_dn ()**

```
int gnutls_x509_cert_set_proxy_dn (gnutls_x509_cert_t crt,
                                   gnutls_x509_cert_t eecrt,
                                   unsigned int raw_flag,
                                   const void *name,
                                   unsigned int sizeof_name);
```

This function will set the subject in *crt* to the end entity's *eecrt* subject name, and add a single Common Name component *name* of size *sizeof\_name*. This corresponds to the required proxy certificate naming style. Note that if *name* is **NULL**, you MUST set it later by using **gnutls\_x509\_cert\_set\_dn\_by\_oid()** or similar.

**crt** : a gnutls\_x509\_cert\_t structure with the new proxy cert

**eecrt** : the end entity certificate that will be issuing the proxy

**raw\_flag** : must be 0, or 1 if the CN is DER encoded

**name** : a pointer to the CN name, may be NULL (but MUST then be added later)

**sizeof\_name** : holds the size of *name*

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

**gnutls\_x509\_cert\_set\_proxy ()**

```
int gnutls_x509_cert_set_proxy (gnutls_x509_cert_t crt,
                                int pathLenConstraint,
                                const char *policyLanguage,
                                const char *policy,
                                size_t sizeof_policy);
```

This function will set the proxyCertInfo extension.

**crt** : a certificate of type **gnutls\_x509\_cert\_t**

**pathLenConstraint** : non-negative error codes indicate maximum length of path, and negative error codes indicate that the pathLenConstraints field should not be present.

**policyLanguage** : OID describing the language of *policy*.

**policy** : opaque byte array with policy language, can be **NULL**

**sizeof\_policy** : size of *policy*.

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

**gnutls\_x509\_cert\_print ()**

```
int gnutls_x509_cert_print (gnutls_x509_cert_t cert,
                             gnutls_certificate_print_formats_t format,
                             gnutls_datum_t *out);
```

This function will pretty print a X.509 certificate, suitable for display to a human.

If the format is **GNUTLS\_CERT\_PRINT\_FULL** then all fields of the certificate will be output, on multiple lines. The **GNUTLS\_CERT\_PRINT\_SHORT** format will generate one line with some selected fields, which is useful for logging purposes.

The output *out* needs to be deallocate using **gnutls\_free()**.

**cert** : The structure to be printed

**format** : Indicate the format to use

**out** : Newly allocated datum with (0) terminated string.

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

#### **gnutls\_x509\_crl\_print ()**

```
int                gnutls_x509_crl_print      (gnutls_x509_crl_t crl,
                                              gnutls_certificate_print_formats_t ←
                                              format,
                                              gnutls_datum_t *out);
```

This function will pretty print a X.509 certificate revocation list, suitable for display to a human.

The output *out* needs to be deallocate using **gnutls\_free()**.

**crl** : The structure to be printed

**format** : Indicate the format to use

**out** : Newly allocated datum with (0) terminated string.

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

#### **gnutls\_x509\_cert\_get\_raw\_issuer\_dn ()**

```
int                gnutls_x509_cert_get_raw_issuer_dn  (gnutls_x509_cert_t cert,
                                                         gnutls_datum_t *start);
```

This function will return a pointer to the DER encoded DN structure and the length.

**cert** : should contain a **gnutls\_x509\_cert\_t** structure

**start** : will hold the starting point of the DN

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value. or a negative error code on error.

#### **gnutls\_x509\_cert\_get\_raw\_dn ()**

```
int                gnutls_x509_cert_get_raw_dn        (gnutls_x509_cert_t cert,
                                                         gnutls_datum_t *start);
```

This function will return a pointer to the DER encoded DN structure and the length.

**cert** : should contain a **gnutls\_x509\_cert\_t** structure

**start** : will hold the starting point of the DN

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value. or a negative error code on error.



**gnutls\_x509\_rdn\_get ()**

```
int                gnutls_x509_rdn_get                (const gnutls_datum_t *idn,  
                                                       char *buf,  
                                                       size_t *sizeof_buf);
```

This function will return the name of the given RDN sequence. The name will be in the form "C=xxxx,O=yyyy,CN=zzzz" as described in RFC4514.

**idn** : should contain a DER encoded RDN sequence

**buf** : a pointer to a structure to hold the peer's name

**sizeof\_buf** : holds the size of *buf*

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, or **GNUTLS\_E\_SHORT\_MEMORY\_BUFFER** is returned and *\*sizeof\_buf* is updated if the provided buffer is not long enough, otherwise a negative error value.

**gnutls\_x509\_rdn\_get\_oid ()**

```
int                gnutls_x509_rdn_get_oid            (const gnutls_datum_t *idn,  
                                                       int indx,  
                                                       void *buf,  
                                                       size_t *sizeof_buf);
```

This function will return the specified Object identifier, of the RDN sequence.

**idn** : should contain a DER encoded RDN sequence

**indx** : Indicates which OID to return. Use 0 for the first one.

**buf** : a pointer to a structure to hold the peer's name OID

**sizeof\_buf** : holds the size of *buf*

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, or **GNUTLS\_E\_SHORT\_MEMORY\_BUFFER** is returned and *\*sizeof\_buf* is updated if the provided buffer is not long enough, otherwise a negative error value.

Since 2.4.0

**gnutls\_x509\_rdn\_get\_by\_oid ()**

```
int                gnutls_x509_rdn_get_by_oid         (const gnutls_datum_t *idn,  
                                                       const char *oid,  
                                                       int indx,  
                                                       unsigned int raw_flag,  
                                                       void *buf,  
                                                       size_t *sizeof_buf);
```

This function will return the name of the given Object identifier, of the RDN sequence. The name will be encoded using the rules from RFC4514.

**idn** : should contain a DER encoded RDN sequence

**oid** : an Object Identifier

**indx** : In case multiple same OIDs exist in the RDN indicates which to send. Use 0 for the first one.

**raw\_flag** : If non (0) then the raw DER data are returned.

**buf** : a pointer to a structure to hold the peer's name

**sizeof\_buf** : holds the size of *buf*

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, or **GNUTLS\_E\_SHORT\_MEMORY\_BUFFER** is returned and *\*sizeof\_buf* is updated if the provided buffer is not long enough, otherwise a negative error value.

### gnutls\_x509\_dn\_t

```
typedef void *gnutls_x509_dn_t;
```

### gnutls\_x509\_cert\_get\_subject ()

```
int gnutls_x509_cert_get_subject (gnutls_x509_cert_t cert,
                                  gnutls_x509_dn_t *dn);
```

Return the Certificate's Subject DN as an opaque data type. You may use **gnutls\_x509\_dn\_get\_rdn\_ava()** to decode the DN.

Note that *dn* should be treated as constant. Because points into the *cert* object, you may not deallocate *cert* and continue to access *dn*.

**cert** : should contain a **gnutls\_x509\_cert\_t** structure

**dn** : output variable with pointer to opaque DN.

**Returns** : Returns 0 on success, or an error code.

### gnutls\_x509\_cert\_get\_issuer ()

```
int gnutls_x509_cert_get_issuer (gnutls_x509_cert_t cert,
                                  gnutls_x509_dn_t *dn);
```

Return the Certificate's Issuer DN as an opaque data type. You may use **gnutls\_x509\_dn\_get\_rdn\_ava()** to decode the DN.

Note that *dn* should be treated as constant. Because points into the *cert* object, you may not deallocate *cert* and continue to access *dn*.

**cert** : should contain a **gnutls\_x509\_cert\_t** structure

**dn** : output variable with pointer to opaque DN

**Returns** : Returns 0 on success, or an error code.

### gnutls\_x509\_dn\_get\_rdn\_ava ()

```
int gnutls_x509_dn_get_rdn_ava (gnutls_x509_dn_t dn,
                                 int irdn,
                                 int iava,
                                 gnutls_x509_ava_st *ava);
```

Get pointers to data within the DN.

Note that *ava* will contain pointers into the *dn* structure, so you should not modify any data or deallocate it. Note also that the DN in turn points into the original certificate structure, and thus you may not deallocate the certificate and continue to access *dn*.

**dn** : input variable with opaque DN pointer

***irdn*** : index of RDN

***iava*** : index of AVA.

***ava*** : Pointer to structure which will hold output information.

**Returns** : Returns 0 on success, or an error code.

### **gnutls\_x509\_dn\_init ()**

```
int gnutls_x509_dn_init (gnutls_x509_dn_t *dn);
```

This function initializes a **gnutls\_x509\_dn\_t** structure.

The object returned must be deallocated using **gnutls\_x509\_dn\_deinit()**.

***dn*** : the object to be initialized

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

Since 2.4.0

### **gnutls\_x509\_dn\_import ()**

```
int gnutls_x509_dn_import (gnutls_x509_dn_t dn,
                           const gnutls_datum_t *data);
```

This function parses an RDN sequence and stores the result to a **gnutls\_x509\_dn\_t** structure. The structure must have been initialized with **gnutls\_x509\_dn\_init()**. You may use **gnutls\_x509\_dn\_get\_rdn\_ava()** to decode the DN.

***dn*** : the structure that will hold the imported DN

***data*** : should contain a DER encoded RDN sequence

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

Since 2.4.0

### **gnutls\_x509\_dn\_export ()**

```
int gnutls_x509_dn_export (gnutls_x509_dn_t dn,
                           gnutls_x509_crt_fmt_t format,
                           void *output_data,
                           size_t *output_data_size);
```

This function will export the DN to DER or PEM format.

If the buffer provided is not long enough to hold the output, then *\*output\_data\_size* is updated and **GNUTLS\_E\_SHORT\_MEMORY** will be returned.

If the structure is PEM encoded, it will have a header of "BEGIN NAME".

***dn*** : Holds the opaque DN object

***format*** : the format of output params. One of PEM or DER.

***output\_data*** : will contain a DN PEM or DER encoded

***output\_data\_size*** : holds the size of output\_data (and will be replaced by the actual size of parameters)

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

**gnutls\_x509\_dn\_deinit ()**

```
void gnutls_x509_dn_deinit (gnutls_x509_dn_t dn);
```

This function deallocates the DN object as returned by [gnutls\\_x509\\_dn\\_import\(\)](#).

**dn** : a DN opaque object pointer.

Since 2.4.0

**gnutls\_x509\_crl\_init ()**

```
int gnutls_x509_crl_init (gnutls_x509_crl_t *crl);
```

This function will initialize a CRL structure. CRL stands for Certificate Revocation List. A revocation list usually contains lists of certificate serial numbers that have been revoked by an Authority. The revocation lists are always signed with the authority's private key.

**crl** : The structure to be initialized

**Returns** : On success, [GNUTLS\\_E\\_SUCCESS](#) (0) is returned, otherwise a negative error value.

**gnutls\_x509\_crl\_deinit ()**

```
void gnutls_x509_crl_deinit (gnutls_x509_crl_t crl);
```

This function will deinitialize a CRL structure.

**crl** : The structure to be initialized

**gnutls\_x509\_crl\_import ()**

```
int gnutls_x509_crl_import (gnutls_x509_crl_t crl,
                           const gnutls_datum_t *data,
                           gnutls_x509_crt_fmt_t format);
```

This function will convert the given DER or PEM encoded CRL to the native [gnutls\\_x509\\_crl\\_t](#) format. The output will be stored in 'crl'.

If the CRL is PEM encoded it should have a header of "X509 CRL".

**crl** : The structure to store the parsed CRL.

**data** : The DER or PEM encoded CRL.

**format** : One of DER or PEM

**Returns** : On success, [GNUTLS\\_E\\_SUCCESS](#) (0) is returned, otherwise a negative error value.

**gnutls\_x509\_crl\_export ()**

```
int gnutls_x509_crl_export (gnutls_x509_crl_t crl,
                           gnutls_x509_crt_fmt_t format,
                           void *output_data,
                           size_t *output_data_size);
```

This function will export the revocation list to DER or PEM format.

If the buffer provided is not long enough to hold the output, then **GNUTLS\_E\_SHORT\_MEMORY\_BUFFER** will be returned.

If the structure is PEM encoded, it will have a header of "BEGIN X509 CRL".

**crl** : Holds the revocation list

**format** : the format of output params. One of PEM or DER.

**output\_data** : will contain a private key PEM or DER encoded

**output\_data\_size** : holds the size of output\_data (and will be replaced by the actual size of parameters)

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value. and a negative error code on failure.

**gnutls\_x509\_crl\_get\_raw\_issuer\_dn ()**

```
int gnutls_x509_crl_get_raw_issuer_dn (gnutls_x509_crl_t crl,
                                       gnutls_datum_t *dn);
```

This function will return a pointer to the DER encoded DN structure and the length.

**crl** : should contain a gnutls\_x509\_crl\_t structure

**dn** : will hold the starting point of the DN

**Returns** : a negative error code on error, and (0) on success.

Since 2.12.0

**gnutls\_x509\_crl\_get\_issuer\_dn ()**

```
int gnutls_x509_crl_get_issuer_dn (const gnutls_x509_crl_t crl,
                                    char *buf,
                                    size_t *sizeof_buf);
```

This function will copy the name of the CRL issuer in the provided buffer. The name will be in the form "C=xxxx,O=yyyy,CN=zzzz" as described in RFC4514. The output string will be ASCII or UTF-8 encoded, depending on the certificate data.

If buf is **NULL** then only the size will be filled.

**crl** : should contain a gnutls\_x509\_crl\_t structure

**buf** : a pointer to a structure to hold the peer's name (may be null)

**sizeof\_buf** : initially holds the size of buf

**Returns** : **GNUTLS\_E\_SHORT\_MEMORY\_BUFFER** if the provided buffer is not long enough, and in that case the sizeof\_buf will be updated with the required size, and 0 on success.

**gnutls\_x509\_crl\_get\_issuer\_dn\_by\_oid()**

```
int gnutls_x509_crl_get_issuer_dn_by_oid
(
    gnutls_x509_crl_t crl,
    const char *oid,
    int indx,
    unsigned int raw_flag,
    void *buf,
    size_t *sizeof_buf);
```

This function will extract the part of the name of the CRL issuer specified by the given OID. The output will be encoded as described in RFC4514. The output string will be ASCII or UTF-8 encoded, depending on the certificate data.

Some helper macros with popular OIDs can be found in `gnutls/x509.h`. If `raw_flag` is (0), this function will only return known OIDs as text. Other OIDs will be DER encoded, as described in RFC4514 -- in hex format with a '#' prefix. You can check about known OIDs using [gnutls\\_x509\\_dn\\_oid\\_known\(\)](#).

If `buf` is null then only the size will be filled.

**crl** : should contain a `gnutls_x509_crl_t` structure

**oid** : holds an Object Identified in null terminated string

**indx** : In case multiple same OIDs exist in the RDN, this specifies which to send. Use (0) to get the first one.

**raw\_flag** : If non (0) returns the raw DER data of the DN part.

**buf** : a pointer to a structure to hold the peer's name (may be null)

**sizeof\_buf** : initially holds the size of `buf`

**Returns** : **GNUTLS\_E\_SHORT\_MEMORY\_BUFFER** if the provided buffer is not long enough, and in that case the `sizeof_buf` will be updated with the required size, and 0 on success.

**gnutls\_x509\_crl\_get\_dn\_oid()**

```
int gnutls_x509_crl_get_dn_oid
(
    gnutls_x509_crl_t crl,
    int indx,
    void *oid,
    size_t *sizeof_oid);
```

This function will extract the requested OID of the name of the CRL issuer, specified by the given index.

If `oid` is null then only the size will be filled.

**crl** : should contain a `gnutls_x509_crl_t` structure

**indx** : Specifies which DN OID to send. Use (0) to get the first one.

**oid** : a pointer to a structure to hold the name (may be null)

**sizeof\_oid** : initially holds the size of 'oid'

**Returns** : **GNUTLS\_E\_SHORT\_MEMORY\_BUFFER** if the provided buffer is not long enough, and in that case the `sizeof_oid` will be updated with the required size. On success 0 is returned.

**gnutls\_x509\_crl\_get\_signature\_algorithm ()**

```
int gnutls_x509_crl_get_signature_algorithm
                                   (gnutls_x509_crl_t crl);
```

This function will return a value of the `gnutls_sign_algorithm_t` enumeration that is the signature algorithm.

**crl** : should contain a `gnutls_x509_crl_t` structure

**Returns** : On success, `GNUTLS_E_SUCCESS` (0) is returned, otherwise a negative error value.

**gnutls\_x509\_crl\_get\_signature ()**

```
int gnutls_x509_crl_get_signature (gnutls_x509_crl_t crl,
                                   char *sig,
                                   size_t *sizeof_sig);
```

This function will extract the signature field of a CRL.

**crl** : should contain a `gnutls_x509_crl_t` structure

**sig** : a pointer where the signature part will be copied (may be null).

**sizeof\_sig** : initially holds the size of `sig`

**Returns** : On success, `GNUTLS_E_SUCCESS` (0) is returned, otherwise a negative error value. and a negative error code on error.

**gnutls\_x509\_crl\_get\_version ()**

```
int gnutls_x509_crl_get_version (gnutls_x509_crl_t crl);
```

This function will return the version of the specified CRL.

**crl** : should contain a `gnutls_x509_crl_t` structure

**Returns** : The version number, or a negative error code on error.

**gnutls\_x509\_crl\_get\_this\_update ()**

```
time_t gnutls_x509_crl_get_this_update (gnutls_x509_crl_t crl);
```

This function will return the time this CRL was issued.

**crl** : should contain a `gnutls_x509_crl_t` structure

**Returns** : when the CRL was issued, or (time\_t)-1 on error.

**gnutls\_x509\_crl\_get\_next\_update ()**

```
time_t gnutls_x509_crl_get_next_update (gnutls_x509_crl_t crl);
```

This function will return the time the next CRL will be issued. This field is optional in a CRL so it might be normal to get an error instead.

**crl** : should contain a `gnutls_x509_crl_t` structure

**Returns** : when the next CRL will be issued, or (time\_t)-1 on error.

**gnutls\_x509\_crl\_get\_crt\_count ()**

```
int gnutls_x509_crl_get_crt_count (gnutls_x509_crl_t crl);
```

This function will return the number of revoked certificates in the given CRL.

**crl** : should contain a **gnutls\_x509\_crl\_t** structure

**Returns** : number of certificates, a negative error code on failure.

**gnutls\_x509\_crl\_get\_crt\_serial ()**

```
int gnutls_x509_crl_get_crt_serial (gnutls_x509_crl_t crl,
                                     int indx,
                                     unsigned char *serial,
                                     size_t *serial_size,
                                     time_t *t);
```

This function will retrieve the serial number of the specified, by the index, revoked certificate.

**crl** : should contain a **gnutls\_x509\_crl\_t** structure

**indx** : the index of the certificate to extract (starting from 0)

**serial** : where the serial number will be copied

**serial\_size** : initially holds the size of serial

**t** : if non null, will hold the time this certificate was revoked

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value. and a negative error code on error.

**gnutls\_x509\_crl\_get\_certificate\_count**

```
#define gnutls_x509_crl_get_certificate_count gnutls_x509_crl_get_crt_count
```

**gnutls\_x509\_crl\_get\_certificate**

```
#define gnutls_x509_crl_get_certificate gnutls_x509_crl_get_crt_serial
```

**gnutls\_x509\_crl\_check\_issuer ()**

```
int gnutls_x509_crl_check_issuer (gnutls_x509_crl_t crl,
                                   gnutls_x509_crt_t issuer);
```

This function will check if the given CRL was issued by the given issuer certificate. It will return true (1) if the given CRL was issued by the given issuer, and false (0) if not.

**crl** : is the CRL to be checked

**issuer** : is the certificate of a possible issuer

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.



**gnutls\_x509\_crl\_list\_import2 ()**

```
int gnutls_x509_crl_list_import2 (gnutls_x509_crl_t **crls,
                                  unsigned int *size,
                                  const gnutls_datum_t *data,
                                  gnutls_x509_crt_fmt_t format,
                                  unsigned int flags);
```

This function will convert the given PEM encoded CRL list to the native `gnutls_x509_crl_t` format. The output will be stored in `crls`. They will be automatically initialized.

If the Certificate is PEM encoded it should have a header of "X509 CRL".

***crls*** : The structures to store the parsed crl list. Must not be initialized.

***size*** : It will contain the size of the list.

***data*** : The PEM encoded CRL.

***format*** : One of DER or PEM.

***flags*** : must be (0) or an OR'd sequence of `gnutls_certificate_import_flags`.

***Returns*** : the number of certificates read or a negative error value.

Since 3.0.0

**gnutls\_x509\_crl\_list\_import ()**

```
int gnutls_x509_crl_list_import (gnutls_x509_crl_t *crls,
                                  unsigned int *crl_max,
                                  const gnutls_datum_t *data,
                                  gnutls_x509_crt_fmt_t format,
                                  unsigned int flags);
```

This function will convert the given PEM encoded CRL list to the native `gnutls_x509_crl_t` format. The output will be stored in `crls`. They will be automatically initialized.

If the Certificate is PEM encoded it should have a header of "X509 CRL".

***crls*** : The structures to store the parsed CRLs. Must not be initialized.

***crl\_max*** : Initially must hold the maximum number of crls. It will be updated with the number of crls available.

***data*** : The PEM encoded CRLs

***format*** : One of DER or PEM.

***flags*** : must be (0) or an OR'd sequence of `gnutls_certificate_import_flags`.

***Returns*** : the number of certificates read or a negative error value.

Since 3.0.0

**gnutls\_x509\_crl\_set\_version ()**

```
int gnutls_x509_crl_set_version (gnutls_x509_crl_t crl,
                                unsigned int version);
```

This function will set the version of the CRL. This must be one for CRL version 1, and so on. The CRLs generated by gnutls should have a version number of 2.

**crl**: should contain a gnutls\_x509\_crl\_t structure

**version**: holds the version number. For CRLv1 crls must be 1.

**Returns**: On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

**gnutls\_x509\_crl\_set\_this\_update ()**

```
int gnutls_x509_crl_set_this_update (gnutls_x509_crl_t crl,
                                     time_t act_time);
```

This function will set the time this CRL was issued.

**crl**: should contain a gnutls\_x509\_crl\_t structure

**act\_time**: The actual time

**Returns**: On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

**gnutls\_x509\_crl\_set\_next\_update ()**

```
int gnutls_x509_crl_set_next_update (gnutls_x509_crl_t crl,
                                     time_t exp_time);
```

This function will set the time this CRL will be updated.

**crl**: should contain a gnutls\_x509\_crl\_t structure

**exp\_time**: The actual time

**Returns**: On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

**gnutls\_x509\_crl\_set\_crt\_serial ()**

```
int gnutls_x509_crl_set_crt_serial (gnutls_x509_crl_t crl,
                                    const void *serial,
                                    size_t serial_size,
                                    time_t revocation_time);
```

This function will set a revoked certificate's serial number to the CRL.

**crl**: should contain a gnutls\_x509\_crl\_t structure

**serial**: The revoked certificate's serial number

**serial\_size**: Holds the size of the serial field.

**revocation\_time**: The time this certificate was revoked

**Returns**: On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

**gnutls\_x509\_crl\_set\_crt()**

```
int gnutls_x509_crl_set_crt(gnutls_x509_crl_t crl,
                           gnutls_x509_crt_t crt,
                           time_t revocation_time);
```

This function will set a revoked certificate's serial number to the CRL.

**crl**: should contain a `gnutls_x509_crl_t` structure

**crt**: a certificate of type `gnutls_x509_crt_t` with the revoked certificate

**revocation\_time**: The time this certificate was revoked

**Returns**: On success, `GNUTLS_E_SUCCESS` (0) is returned, otherwise a negative error value.

**gnutls\_x509\_crl\_get\_authority\_key\_id()**

```
int gnutls_x509_crl_get_authority_key_id(gnutls_x509_crl_t crl,
                                          void *ret,
                                          size_t *ret_size,
                                          unsigned int *critical);
```

This function will return the CRL authority's key identifier. This is obtained by the X.509 Authority Key identifier extension field (2.5.29.35). Note that this function only returns the keyIdentifier field of the extension.

**crl**: should contain a `gnutls_x509_crl_t` structure

**ret**: The place where the identifier will be copied

**ret\_size**: Holds the size of the result field.

**critical**: will be non (0) if the extension is marked as critical (may be null)

**Returns**: On success, `GNUTLS_E_SUCCESS` (0) is returned, otherwise a negative error code in case of an error.

Since 2.8.0

**gnutls\_x509\_crl\_get\_number()**

```
int gnutls_x509_crl_get_number(gnutls_x509_crl_t crl,
                               void *ret,
                               size_t *ret_size,
                               unsigned int *critical);
```

This function will return the CRL number extension. This is obtained by the CRL Number extension field (2.5.29.20).

**crl**: should contain a `gnutls_x509_crl_t` structure

**ret**: The place where the number will be copied

**ret\_size**: Holds the size of the result field.

**critical**: will be non (0) if the extension is marked as critical (may be null)

**Returns**: On success, `GNUTLS_E_SUCCESS` (0) is returned, otherwise a negative error code in case of an error.

Since 2.8.0

**gnutls\_x509\_crl\_get\_extension\_oid ()**

```
int gnutls_x509_crl_get_extension_oid (gnutls_x509_crl_t crl,
                                       int indx,
                                       void *oid,
                                       size_t *sizeof_oid);
```

This function will return the requested extension OID in the CRL. The extension OID will be stored as a string in the provided buffer.

**crl** : should contain a **gnutls\_x509\_crl\_t** structure

**indx** : Specifies which extension OID to send, use (0) to get the first one.

**oid** : a pointer to a structure to hold the OID (may be null)

**sizeof\_oid** : initially holds the size of *oid*

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error code in case of an error. If your have reached the last extension available **GNUTLS\_E\_REQUESTED\_DATA\_NOT\_AVAILABLE** will be returned.

Since 2.8.0

**gnutls\_x509\_crl\_get\_extension\_info ()**

```
int gnutls_x509_crl_get_extension_info (gnutls_x509_crl_t crl,
                                       int indx,
                                       void *oid,
                                       size_t *sizeof_oid,
                                       int *critical);
```

This function will return the requested extension OID in the CRL, and the critical flag for it. The extension OID will be stored as a string in the provided buffer. Use **gnutls\_x509\_crl\_get\_extension\_data()** to extract the data.

If the buffer provided is not long enough to hold the output, then *\*sizeof\_oid* is updated and **GNUTLS\_E\_SHORT\_MEMORY\_BUFFER** will be returned.

**crl** : should contain a **gnutls\_x509\_crl\_t** structure

**indx** : Specifies which extension OID to send, use (0) to get the first one.

**oid** : a pointer to a structure to hold the OID

**sizeof\_oid** : initially holds the maximum size of *oid*, on return holds actual size of *oid*.

**critical** : output variable with critical flag, may be NULL.

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error code in case of an error. If your have reached the last extension available **GNUTLS\_E\_REQUESTED\_DATA\_NOT\_AVAILABLE** will be returned.

Since 2.8.0

**gnutls\_x509\_crl\_get\_extension\_data ()**

```
int gnutls_x509_crl_get_extension_data (gnutls_x509_crl_t crl,
                                         int indx,
                                         void *data,
                                         size_t *sizeof_data);
```

This function will return the requested extension data in the CRL. The extension data will be stored as a string in the provided buffer.

Use [gnutls\\_x509\\_crl\\_get\\_extension\\_info\(\)](#) to extract the OID and critical flag. Use [gnutls\\_x509\\_crl\\_get\\_extension\\_info\(\)](#) instead, if you want to get data indexed by the extension OID rather than sequence.

**crl** : should contain a [gnutls\\_x509\\_crl\\_t](#) structure

**indx** : Specifies which extension OID to send. Use (0) to get the first one.

**data** : a pointer to a structure to hold the data (may be null)

**sizeof\_data** : initially holds the size of *oid*

**Returns** : On success, [GNUTLS\\_E\\_SUCCESS](#) (0) is returned, otherwise a negative error code in case of an error. If you have reached the last extension available [GNUTLS\\_E\\_REQUESTED\\_DATA\\_NOT\\_AVAILABLE](#) will be returned.

Since 2.8.0

**gnutls\_x509\_crl\_set\_authority\_key\_id ()**

```
int gnutls_x509_crl_set_authority_key_id (gnutls_x509_crl_t crl,
                                           const void *id,
                                           size_t id_size);
```

This function will set the CRL's authority key ID extension. Only the keyIdentifier field can be set with this function. This may be used by an authority that holds multiple private keys, to distinguish the used key.

**crl** : a CRL of type [gnutls\\_x509\\_crl\\_t](#)

**id** : The key ID

**id\_size** : Holds the size of the serial field.

**Returns** : On success, [GNUTLS\\_E\\_SUCCESS](#) (0) is returned, otherwise a negative error value.

Since 2.8.0

**gnutls\_x509\_crl\_set\_number ()**

```
int gnutls_x509_crl_set_number (gnutls_x509_crl_t crl,
                                 const void *nr,
                                 size_t nr_size);
```

This function will set the CRL's number extension. This is to be used as a unique and monotonic number assigned to the CRL by the authority.

**crl** : a CRL of type [gnutls\\_x509\\_crl\\_t](#)

**nr** : The CRL number

**nr\_size** : Holds the size of the nr field.

**Returns** : On success, [GNUTLS\\_E\\_SUCCESS](#) (0) is returned, otherwise a negative error value.

Since 2.8.0

**struct gnutls\_pkcs7\_int**

```
struct gnutls_pkcs7_int;
```

**gnutls\_pkcs7\_t**

```
typedef struct gnutls_pkcs7_int *gnutls_pkcs7_t;
```

**gnutls\_pkcs7\_init ()**

```
int gnutls_pkcs7_init (gnutls_pkcs7_t *pkcs7);
```

This function will initialize a PKCS7 structure. PKCS7 structures usually contain lists of X.509 Certificates and X.509 Certificate revocation lists.

**pkcs7** : The structure to be initialized

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

**gnutls\_pkcs7\_deinit ()**

```
void gnutls_pkcs7_deinit (gnutls_pkcs7_t pkcs7);
```

This function will deinitialize a PKCS7 structure.

**pkcs7** : The structure to be initialized

**gnutls\_pkcs7\_import ()**

```
int gnutls_pkcs7_import (gnutls_pkcs7_t pkcs7,
                        const gnutls_datum_t *data,
                        gnutls_x509_crt_fmt_t format);
```

This function will convert the given DER or PEM encoded PKCS7 to the native **gnutls\_pkcs7\_t** format. The output will be stored in *pkcs7*.

If the PKCS7 is PEM encoded it should have a header of "PKCS7".

**pkcs7** : The structure to store the parsed PKCS7.

**data** : The DER or PEM encoded PKCS7.

**format** : One of DER or PEM

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

**gnutls\_pkcs7\_export ()**

```
int gnutls_pkcs7_export (gnutls_pkcs7_t pkcs7,
                        gnutls_x509_crt_fmt_t format,
                        void *output_data,
                        size_t *output_data_size);
```

This function will export the `pkcs7` structure to DER or PEM format.

If the buffer provided is not long enough to hold the output, then `*output_data_size` is updated and **GNUTLS\_E\_SHORT\_MEMORY** will be returned.

If the structure is PEM encoded, it will have a header of "BEGIN PKCS7".

**pkcs7**: Holds the `pkcs7` structure

**format**: the format of output params. One of PEM or DER.

**output\_data**: will contain a structure PEM or DER encoded

**output\_data\_size**: holds the size of `output_data` (and will be replaced by the actual size of parameters)

**Returns**: On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

**gnutls\_pkcs7\_get\_crt\_count ()**

```
int gnutls_pkcs7_get_crt_count (gnutls_pkcs7_t pkcs7);
```

This function will return the number of certificates in the PKCS7 or RFC2630 certificate set.

**pkcs7**: should contain a `gnutls_pkcs7_t` structure

**Returns**: On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

**gnutls\_pkcs7\_get\_crt\_raw ()**

```
int gnutls_pkcs7_get_crt_raw (gnutls_pkcs7_t pkcs7,
                              int indx,
                              void *certificate,
                              size_t *certificate_size);
```

This function will return a certificate of the PKCS7 or RFC2630 certificate set.

After the last certificate has been read **GNUTLS\_E\_REQUESTED\_DATA\_NOT\_AVAILABLE** will be returned.

**pkcs7**: should contain a `gnutls_pkcs7_t` structure

**indx**: contains the index of the certificate to extract

**certificate**: the contents of the certificate will be copied there (may be null)

**certificate\_size**: should hold the size of the certificate

**Returns**: On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value. If the provided buffer is not long enough, then `certificate_size` is updated and **GNUTLS\_E\_SHORT\_MEMORY\_BUFFER** is returned.

**gnutls\_pkcs7\_set\_cert\_raw ()**

```
int gnutls_pkcs7_set_cert_raw (gnutls_pkcs7_t pkcs7,
                               const gnutls_datum_t *cert);
```

This function will add a certificate to the PKCS7 or RFC2630 certificate set.

**pkcs7** : should contain a **gnutls\_pkcs7\_t** structure

**cert** : the DER encoded certificate to be added

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

**gnutls\_pkcs7\_set\_cert ()**

```
int gnutls_pkcs7_set_cert (gnutls_pkcs7_t pkcs7,
                           gnutls_x509_cert_t crt);
```

This function will add a parsed certificate to the PKCS7 or RFC2630 certificate set. This is a wrapper function over **gnutls\_pkcs7\_set\_cert\_raw**.

**pkcs7** : should contain a **gnutls\_pkcs7\_t** structure

**crt** : the certificate to be copied.

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

**gnutls\_pkcs7\_delete\_cert ()**

```
int gnutls_pkcs7_delete_cert (gnutls_pkcs7_t pkcs7,
                              int indx);
```

This function will delete a certificate from a PKCS7 or RFC2630 certificate set. Index starts from 0. Returns 0 on success.

**pkcs7** : should contain a **gnutls\_pkcs7\_t** structure

**indx** : the index of the certificate to delete

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

**gnutls\_pkcs7\_get\_crl\_raw ()**

```
int gnutls_pkcs7_get_crl_raw (gnutls_pkcs7_t pkcs7,
                              int indx,
                              void *crl,
                              size_t *crl_size);
```

This function will return a crl of the PKCS7 or RFC2630 crl set.

**pkcs7** : should contain a **gnutls\_pkcs7\_t** structure

**indx** : contains the index of the crl to extract

**crl** : the contents of the crl will be copied there (may be null)

**crl\_size** : should hold the size of the crl

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value. If the provided buffer is not long enough, then **crl\_size** is updated and **GNUTLS\_E\_SHORT\_MEMORY\_BUFFER** is returned. After the last crl has been read **GNUTLS\_E\_REQUESTED\_DATA\_NOT\_AVAILABLE** will be returned.



**gnutls\_pkcs7\_get\_crl\_count ()**

```
int gnutls_pkcs7_get_crl_count (gnutls_pkcs7_t pkcs7);
```

This function will return the number of certificates in the PKCS7 or RFC2630 crl set.

**pkcs7** : should contain a gnutls\_pkcs7\_t structure

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

**gnutls\_pkcs7\_set\_crl\_raw ()**

```
int gnutls_pkcs7_set_crl_raw (gnutls_pkcs7_t pkcs7,  
                             const gnutls_datum_t *crl);
```

This function will add a crl to the PKCS7 or RFC2630 crl set.

**pkcs7** : should contain a gnutls\_pkcs7\_t structure

**crl** : the DER encoded crl to be added

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

**gnutls\_pkcs7\_set\_crl ()**

```
int gnutls_pkcs7_set_crl (gnutls_pkcs7_t pkcs7,  
                          gnutls_x509_crl_t crl);
```

This function will add a parsed CRL to the PKCS7 or RFC2630 crl set.

**pkcs7** : should contain a gnutls\_pkcs7\_t structure

**crl** : the DER encoded crl to be added

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

**gnutls\_pkcs7\_delete\_crl ()**

```
int gnutls_pkcs7_delete_crl (gnutls_pkcs7_t pkcs7,  
                             int indx);
```

This function will delete a crl from a PKCS7 or RFC2630 crl set. Index starts from 0. Returns 0 on success.

**pkcs7** : should contain a gnutls\_pkcs7\_t structure

**indx** : the index of the crl to delete

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

**enum gnutls\_certificate\_verify\_flags**

```
typedef enum gnutls_certificate_verify_flags
{
    GNUTLS_VERIFY_DISABLE_CA_SIGN = 1,
    GNUTLS_VERIFY_ALLOW_X509_V1_CA_CRT = 2,
    GNUTLS_VERIFY_DO_NOT_ALLOW_SAME = 4,
    GNUTLS_VERIFY_ALLOW_ANY_X509_V1_CA_CRT = 8,
    GNUTLS_VERIFY_ALLOW_SIGN_RSA_MD2 = 16,
    GNUTLS_VERIFY_ALLOW_SIGN_RSA_MD5 = 32,
    GNUTLS_VERIFY_DISABLE_TIME_CHECKS = 64,
    GNUTLS_VERIFY_DISABLE_TRUSTED_TIME_CHECKS = 128,
    GNUTLS_VERIFY_DO_NOT_ALLOW_X509_V1_CA_CRT = 256,
    GNUTLS_VERIFY_DISABLE_CRL_CHECKS = 512,
} gnutls_certificate_verify_flags;
```

Enumeration of different certificate verify flags.

**GNUTLS\_VERIFY\_DISABLE\_CA\_SIGN** If set a signer does not have to be a certificate authority. This flag should normally be disabled, unless you know what this means.

**GNUTLS\_VERIFY\_ALLOW\_X509\_V1\_CA\_CRT** Allow trusted CA certificates with version 1. This is safer than **GNUTLS\_VERIFY\_DO\_NOT\_ALLOW\_X509\_V1\_CA\_CRT** and should be used instead. That way only signers in your trusted list will be allowed to have certificates of version 1. This is the default.

**GNUTLS\_VERIFY\_DO\_NOT\_ALLOW\_SAME** If a certificate is not signed by anyone trusted but exists in the trusted CA list do not treat it as trusted.

**GNUTLS\_VERIFY\_ALLOW\_ANY\_X509\_V1\_CA\_CRT** Allow CA certificates that have version 1 (both root and intermediate). This might be dangerous since those haven't the basicConstraints extension. Must be used in combination with **GNUTLS\_VERIFY\_ALLOW\_X509\_V1\_CA\_CRT**.

**GNUTLS\_VERIFY\_ALLOW\_SIGN\_RSA\_MD2** Allow certificates to be signed using the broken MD2 algorithm.

**GNUTLS\_VERIFY\_ALLOW\_SIGN\_RSA\_MD5** Allow certificates to be signed using the broken MD5 algorithm.

**GNUTLS\_VERIFY\_DISABLE\_TIME\_CHECKS** Disable checking of activation and expiration validity periods of certificate chains. Don't set this unless you understand the security implications.

**GNUTLS\_VERIFY\_DISABLE\_TRUSTED\_TIME\_CHECKS** If set a signer in the trusted list is never checked for expiration or activation.

**GNUTLS\_VERIFY\_DO\_NOT\_ALLOW\_X509\_V1\_CA\_CRT** Do not allow trusted CA certificates that have version 1. This option is to be used to deprecate all certificates of version 1.

**GNUTLS\_VERIFY\_DISABLE\_CRL\_CHECKS** Disable checking for validity using certificate revocation lists.

**gnutls\_x509\_crt\_check\_issuer()**

```
int gnutls_x509_crt_check_issuer(gnutls_x509_crt_t cert,
                                gnutls_x509_crt_t issuer);
```

This function will check if the given certificate was issued by the given issuer.

**cert** : is the certificate to be checked

**issuer** : is the certificate of a possible issuer

**Returns** : It will return true (1) if the given certificate is issued by the given issuer, and false (0) if not. A negative error code is returned in case of an error.

**gnutls\_x509\_cert\_list\_verify ()**

```
int gnutls_x509_cert_list_verify (const gnutls_x509_cert_t *cert_list ←
    ,
    int cert_list_length,
    const gnutls_x509_cert_t *CA_list,
    int CA_list_length,
    const gnutls_x509_crl_t *CRL_list,
    int CRL_list_length,
    unsigned int flags,
    unsigned int *verify);
```

This function will try to verify the given certificate list and return its status. If no flags are specified (0), this function will use the basicConstraints (2.5.29.19) PKIX extension. This means that only a certificate authority is allowed to sign a certificate.

You must also check the peer's name in order to check if the verified certificate belongs to the actual peer.

The certificate verification output will be put in *verify* and will be one or more of the `gnutls_certificate_status_t` enumerated elements bitwise or'd. For a more detailed verification status use `gnutls_x509_cert_verify()` per list element.

**cert\_list** : is the certificate list to be verified

**cert\_list\_length** : holds the number of certificate in cert\_list

**CA\_list** : is the CA list which will be used in verification

**CA\_list\_length** : holds the number of CA certificate in CA\_list

**CRL\_list** : holds a list of CRLs.

**CRL\_list\_length** : the length of CRL list.

**flags** : Flags that may be used to change the verification algorithm. Use OR of the `gnutls_certificate_verify_flags` enumerations.

**verify** : will hold the certificate verification output.

**Returns** : On success, `GNUTLS_E_SUCCESS` (0) is returned, otherwise a negative error value.

**gnutls\_x509\_cert\_verify ()**

```
int gnutls_x509_cert_verify (gnutls_x509_cert_t cert,
    const gnutls_x509_cert_t *CA_list,
    int CA_list_length,
    unsigned int flags,
    unsigned int *verify);
```

This function will try to verify the given certificate and return its status.

**cert** : is the certificate to be verified

**CA\_list** : is one certificate that is considered to be trusted one

**CA\_list\_length** : holds the number of CA certificate in CA\_list

**flags** : Flags that may be used to change the verification algorithm. Use OR of the `gnutls_certificate_verify_flags` enumerations.

**verify** : will hold the certificate verification output.

**Returns** : On success, `GNUTLS_E_SUCCESS` (0) is returned, otherwise a negative error value.

**gnutls\_x509\_crl\_verify ()**

```
int                                gnutls_x509_crl_verify      (gnutls_x509_crl_t crl,
                                                                const gnutls_x509_crt_t *CA_list,
                                                                int CA_list_length,
                                                                unsigned int flags,
                                                                unsigned int *verify);
```

This function will try to verify the given crl and return its status. See [gnutls\\_x509\\_crt\\_list\\_verify\(\)](#) for a detailed description of return values.

**crl** : is the crl to be verified

**CA\_list** : is a certificate list that is considered to be trusted one

**CA\_list\_length** : holds the number of CA certificates in CA\_list

**flags** : Flags that may be used to change the verification algorithm. Use OR of the gnutls\_certificate\_verify\_flags enumerations.

**verify** : will hold the crl verification output.

**Returns** : On success, [GNUTLS\\_E\\_SUCCESS](#) (0) is returned, otherwise a negative error value.

**gnutls\_x509\_crt\_check\_revocation ()**

```
int                                gnutls_x509_crt_check_revocation  (gnutls_x509_crt_t cert,
                                                                const gnutls_x509_crl_t *crl_list,
                                                                int crl_list_length);
```

This function will return check if the given certificate is revoked. It is assumed that the CRLs have been verified before.

**cert** : should contain a [gnutls\\_x509\\_crt\\_t](#) structure

**crl\_list** : should contain a list of gnutls\_x509\_crl\_t structures

**crl\_list\_length** : the length of the crl\_list

**Returns** : 0 if the certificate is NOT revoked, and 1 if it is. A negative error code is returned on error.

**gnutls\_x509\_crt\_get\_fingerprint ()**

```
int                                gnutls_x509_crt_get_fingerprint  (gnutls_x509_crt_t cert,
                                                                gnutls_digest_algorithm_t algo,
                                                                void *buf,
                                                                size_t *buf_size);
```

This function will calculate and copy the certificate's fingerprint in the provided buffer.

If the buffer is null then only the size will be filled.

**cert** : should contain a [gnutls\\_x509\\_crt\\_t](#) structure

**algo** : is a digest algorithm

**buf** : a pointer to a structure to hold the fingerprint (may be null)

**buf\_size** : initially holds the size of buf

**Returns** : [GNUTLS\\_E\\_SHORT\\_MEMORY\\_BUFFER](#) if the provided buffer is not long enough, and in that case the \*buf\_size will be updated with the required size. On success 0 is returned.

**gnutls\_x509\_cert\_get\_key\_purpose\_oid ()**

```
int gnutls_x509_cert_get_key_purpose_oid (gnutls_x509_cert_t cert,
                                         int indx,
                                         void *oid,
                                         size_t *oid_size,
                                         unsigned int *critical);
```

This function will extract the key purpose OIDs of the Certificate specified by the given index. These are stored in the Extended Key Usage extension (2.5.29.37) See the GNUTLS\_KP\_\* definitions for human readable names.

If *oid* is null then only the size will be filled. The *oid* returned will be null terminated, although *oid\_size* will not account for the trailing null.

**cert** : should contain a **gnutls\_x509\_cert\_t** structure

**indx** : This specifies which OID to return. Use (0) to get the first one.

**oid** : a pointer to a buffer to hold the OID (may be null)

**oid\_size** : initially holds the size of *oid*

**critical** : output flag to indicate criticality of extension

**Returns** : **GNUTLS\_E\_SHORT\_MEMORY\_BUFFER** if the provided buffer is not long enough, and in that case the *\*oid\_size* will be updated with the required size. On success 0 is returned.

**gnutls\_x509\_cert\_set\_key\_purpose\_oid ()**

```
int gnutls_x509_cert_set_key_purpose_oid (gnutls_x509_cert_t cert,
                                         const void *oid,
                                         unsigned int critical);
```

This function will set the key purpose OIDs of the Certificate. These are stored in the Extended Key Usage extension (2.5.29.37) See the GNUTLS\_KP\_\* definitions for human readable names.

Subsequent calls to this function will append OIDs to the OID list.

**cert** : a certificate of type **gnutls\_x509\_cert\_t**

**oid** : a pointer to a null terminated string that holds the OID

**critical** : Whether this extension will be critical or not

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error code is returned.

**enum gnutls\_pkcs\_encrypt\_flags\_t**

```
typedef enum gnutls_pkcs_encrypt_flags_t
{
    GNUTLS_PKCS_PLAIN = 1,
    GNUTLS_PKCS8_PLAIN = GNUTLS_PKCS_PLAIN,
    GNUTLS_PKCS_USE_PKCS12_3DES = 2,
    GNUTLS_PKCS8_USE_PKCS12_3DES = GNUTLS_PKCS_USE_PKCS12_3DES,
    GNUTLS_PKCS_USE_PKCS12_ARCFOUR = 4,
    GNUTLS_PKCS8_USE_PKCS12_ARCFOUR = GNUTLS_PKCS_USE_PKCS12_ARCFOUR,
    GNUTLS_PKCS_USE_PKCS12_RC2_40 = 8,
    GNUTLS_PKCS8_USE_PKCS12_RC2_40 = GNUTLS_PKCS_USE_PKCS12_RC2_40,
    GNUTLS_PKCS_USE_PBES2_3DES = 16,
    GNUTLS_PKCS_USE_PBES2_AES_128 = 32,
    GNUTLS_PKCS_USE_PBES2_AES_192 = 64,
    GNUTLS_PKCS_USE_PBES2_AES_256 = 128
} gnutls_pkcs_encrypt_flags_t;
```

Enumeration of different PKCS encryption flags.

**GNUTLS\_PKCS\_PLAIN** Unencrypted private key.

**GNUTLS\_PKCS8\_PLAIN** Same as **GNUTLS\_PKCS\_PLAIN**.

**GNUTLS\_PKCS\_USE\_PKCS12\_3DES** PKCS-12 3DES.

**GNUTLS\_PKCS8\_USE\_PKCS12\_3DES** Same as **GNUTLS\_PKCS\_USE\_PKCS12\_3DES**.

**GNUTLS\_PKCS\_USE\_PKCS12\_ARCFOUR** PKCS-12 ARCFOUR.

**GNUTLS\_PKCS8\_USE\_PKCS12\_ARCFOUR** Same as **GNUTLS\_PKCS\_USE\_PKCS12\_ARCFOUR**.

**GNUTLS\_PKCS\_USE\_PKCS12\_RC2\_40** PKCS-12 RC2-40.

**GNUTLS\_PKCS8\_USE\_PKCS12\_RC2\_40** Same as **GNUTLS\_PKCS\_USE\_PKCS12\_RC2\_40**.

**GNUTLS\_PKCS\_USE\_PBES2\_3DES** PBES2 3DES.

**GNUTLS\_PKCS\_USE\_PBES2\_AES\_128** PBES2 AES-128.

**GNUTLS\_PKCS\_USE\_PBES2\_AES\_192** PBES2 AES-192.

**GNUTLS\_PKCS\_USE\_PBES2\_AES\_256** PBES2 AES-256.

#### **gnutls\_x509\_privkey\_init ()**

```
int gnutls_x509_privkey_init (gnutls_x509_privkey_t *key);
```

This function will initialize an private key structure.

**key** : The structure to be initialized

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

#### **gnutls\_x509\_privkey\_deinit ()**

```
void gnutls_x509_privkey_deinit (gnutls_x509_privkey_t key);
```

This function will deinitialize a private key structure.

**key** : The structure to be deinitialized

#### **gnutls\_x509\_privkey\_sec\_param ()**

```
gnutls_sec_param_t gnutls_x509_privkey_sec_param (gnutls_x509_privkey_t key);
```

This function will return the security parameter appropriate with this private key.

**key** : a key structure

**Returns** : On success, a valid security parameter is returned otherwise **GNUTLS\_SEC\_PARAM\_UNKNOWN** is returned.

Since 2.12.0

**gnutls\_x509\_privkey\_cpy ()**

```
int gnutls_x509_privkey_cpy (gnutls_x509_privkey_t dst,
                             gnutls_x509_privkey_t src);
```

This function will copy a private key from source to destination key. Destination has to be initialized.

**dst** : The destination key, which should be initialized.

**src** : The source key

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

**gnutls\_x509\_privkey\_import ()**

```
int gnutls_x509_privkey_import (gnutls_x509_privkey_t key,
                                const gnutls_datum_t *data,
                                gnutls_x509_crt_fmt_t format);
```

This function will convert the given DER or PEM encoded key to the native **gnutls\_x509\_privkey\_t** format. The output will be stored in *key*.

If the key is PEM encoded it should have a header of "RSA PRIVATE KEY", or "DSA PRIVATE KEY".

**key** : The structure to store the parsed key

**data** : The DER or PEM encoded certificate.

**format** : One of DER or PEM

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

**gnutls\_x509\_privkey\_import\_pkcs8 ()**

```
int gnutls_x509_privkey_import_pkcs8 (gnutls_x509_privkey_t key,
                                       const gnutls_datum_t *data,
                                       gnutls_x509_crt_fmt_t format,
                                       const char *password,
                                       unsigned int flags);
```

This function will convert the given DER or PEM encoded PKCS8 2.0 encrypted key to the native **gnutls\_x509\_privkey\_t** format. The output will be stored in *key*. Both RSA and DSA keys can be imported, and flags can only be used to indicate an unencrypted key.

The *password* can be either ASCII or UTF-8 in the default PBES2 encryption schemas, or ASCII for the PKCS12 schemas.

If the Certificate is PEM encoded it should have a header of "ENCRYPTED PRIVATE KEY", or "PRIVATE KEY". You only need to specify the flags if the key is DER encoded, since in that case the encryption status cannot be auto-detected.

**key** : The structure to store the parsed key

**data** : The DER or PEM encoded key.

**format** : One of DER or PEM

**password** : the password to decrypt the key (if it is encrypted).

**flags** : 0 if encrypted or GNUTLS\_PKCS\_PLAIN if not encrypted.

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

**gnutls\_x509\_privkey\_import\_rsa\_raw ()**

```
int gnutls_x509_privkey_import_rsa_raw (gnutls_x509_privkey_t key,
                                         const gnutls_datum_t *m,
                                         const gnutls_datum_t *e,
                                         const gnutls_datum_t *d,
                                         const gnutls_datum_t *p,
                                         const gnutls_datum_t *q,
                                         const gnutls_datum_t *u);
```

This function will convert the given RSA raw parameters to the native **gnutls\_x509\_privkey\_t** format. The output will be stored in *key*.

**key** : The structure to store the parsed key

**m** : holds the modulus

**e** : holds the public exponent

**d** : holds the private exponent

**p** : holds the first prime (p)

**q** : holds the second prime (q)

**u** : holds the coefficient

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

**gnutls\_x509\_privkey\_import\_rsa\_raw2 ()**

```
int gnutls_x509_privkey_import_rsa_raw2 (gnutls_x509_privkey_t key,
                                           const gnutls_datum_t *m,
                                           const gnutls_datum_t *e,
                                           const gnutls_datum_t *d,
                                           const gnutls_datum_t *p,
                                           const gnutls_datum_t *q,
                                           const gnutls_datum_t *u,
                                           const gnutls_datum_t *e1,
                                           const gnutls_datum_t *e2);
```

This function will convert the given RSA raw parameters to the native **gnutls\_x509\_privkey\_t** format. The output will be stored in *key*.

**key** : The structure to store the parsed key

**m** : holds the modulus

**e** : holds the public exponent

**d** : holds the private exponent

**p** : holds the first prime (p)

**q** : holds the second prime (q)

**u** : holds the coefficient

**e1** : holds  $e1 = d \bmod (p-1)$

**e2** : holds  $e2 = d \bmod (q-1)$

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.



**gnutls\_x509\_privkey\_import\_ecc\_raw ()**

```
int gnutls_x509_privkey_import_ecc_raw (gnutls_x509_privkey_t key,
                                         gnutls_ecc_curve_t curve,
                                         const gnutls_datum_t *x,
                                         const gnutls_datum_t *y,
                                         const gnutls_datum_t *k);
```

This function will convert the given elliptic curve parameters to the native **gnutls\_x509\_privkey\_t** format. The output will be stored in *key*.

**key** : The structure to store the parsed key

**curve** : holds the curve

**x** : holds the x

**y** : holds the y

**k** : holds the k

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

Since 3.0.0

**gnutls\_x509\_privkey\_fix ()**

```
int gnutls_x509_privkey_fix (gnutls_x509_privkey_t key);
```

This function will recalculate the secondary parameters in a key. In RSA keys, this can be the coefficient and exponent1,2.

**key** : Holds the key

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

**gnutls\_x509\_privkey\_export\_dsa\_raw ()**

```
int gnutls_x509_privkey_export_dsa_raw (gnutls_x509_privkey_t key,
                                         gnutls_datum_t *p,
                                         gnutls_datum_t *q,
                                         gnutls_datum_t *g,
                                         gnutls_datum_t *y,
                                         gnutls_datum_t *x);
```

This function will export the DSA private key's parameters found in the given structure. The new parameters will be allocated using **gnutls\_malloc()** and will be stored in the appropriate datum.

**key** : a structure that holds the DSA parameters

**p** : will hold the p

**q** : will hold the q

**g** : will hold the g

**y** : will hold the y

**x** : will hold the x

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

**gnutls\_x509\_privkey\_import\_dsa\_raw ()**

```
int gnutls_x509_privkey_import_dsa_raw (gnutls_x509_privkey_t key,
                                         const gnutls_datum_t *p,
                                         const gnutls_datum_t *q,
                                         const gnutls_datum_t *g,
                                         const gnutls_datum_t *y,
                                         const gnutls_datum_t *x);
```

This function will convert the given DSA raw parameters to the native **gnutls\_x509\_privkey\_t** format. The output will be stored in *key*.

**key** : The structure to store the parsed key

**p** : holds the p

**q** : holds the q

**g** : holds the g

**y** : holds the y

**x** : holds the x

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

**gnutls\_x509\_privkey\_get\_pk\_algorithm ()**

```
int gnutls_x509_privkey_get_pk_algorithm (gnutls_x509_privkey_t key);
```

This function will return the public key algorithm of a private key.

**key** : should contain a **gnutls\_x509\_privkey\_t** structure

**Returns** : a member of the **gnutls\_pk\_algorithm\_t** enumeration on success, or a negative error code on error.

**gnutls\_x509\_privkey\_get\_key\_id ()**

```
int gnutls_x509_privkey_get_key_id (gnutls_x509_privkey_t key,
                                     unsigned int flags,
                                     unsigned char *output_data,
                                     size_t *output_data_size);
```

This function will return a unique ID the depends on the public key parameters. This ID can be used in checking whether a certificate corresponds to the given key.

If the buffer provided is not long enough to hold the output, then *\*output\_data\_size* is updated and **GNUTLS\_E\_SHORT\_MEMORY** will be returned. The output will normally be a SHA-1 hash output, which is 20 bytes.

**key** : Holds the key

**flags** : should be 0 for now

**output\_data** : will contain the key ID

**output\_data\_size** : holds the size of output\_data (and will be replaced by the actual size of parameters)

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

**gnutls\_x509\_privkey\_generate ()**

```
int gnutls_x509_privkey_generate (gnutls_x509_privkey_t key,
                                  gnutls_pk_algorithm_t algo,
                                  unsigned int bits,
                                  unsigned int flags);
```

This function will generate a random private key. Note that this function must be called on an empty private key.

Do not set the number of bits directly, use `gnutls_sec_param_to_pk_bits()`.

**key** : should contain a `gnutls_x509_privkey_t` structure

**algo** : is one of the algorithms in `gnutls_pk_algorithm_t`.

**bits** : the size of the modulus

**flags** : unused for now. Must be 0.

**Returns** : On success, `GNUTLS_E_SUCCESS` (0) is returned, otherwise a negative error value.

**gnutls\_x509\_privkey\_verify\_params ()**

```
int gnutls_x509_privkey_verify_params (gnutls_x509_privkey_t key);
```

This function will verify the private key parameters.

**key** : should contain a `gnutls_x509_privkey_t` structure

**Returns** : On success, `GNUTLS_E_SUCCESS` (0) is returned, otherwise a negative error value.

**gnutls\_x509\_privkey\_export ()**

```
int gnutls_x509_privkey_export (gnutls_x509_privkey_t key,
                                 gnutls_x509_crt_fmt_t format,
                                 void *output_data,
                                 size_t *output_data_size);
```

This function will export the private key to a PKCS1 structure for RSA keys, or an integer sequence for DSA keys. The DSA keys are in the same format with the parameters used by openssl.

If the buffer provided is not long enough to hold the output, then `*output_data_size` is updated and `GNUTLS_E_SHORT_MEMORY` will be returned.

If the structure is PEM encoded, it will have a header of "BEGIN RSA PRIVATE KEY".

**key** : Holds the key

**format** : the format of output params. One of PEM or DER.

**output\_data** : will contain a private key PEM or DER encoded

**output\_data\_size** : holds the size of output\_data (and will be replaced by the actual size of parameters)

**Returns** : On success, `GNUTLS_E_SUCCESS` (0) is returned, otherwise a negative error value.

**gnutls\_x509\_privkey\_export\_pkcs8 ()**

```
int gnutls_x509_privkey_export_pkcs8 (gnutls_x509_privkey_t key,
                                     gnutls_x509_crt_fmt_t format,
                                     const char *password,
                                     unsigned int flags,
                                     void *output_data,
                                     size_t *output_data_size);
```

This function will export the private key to a PKCS8 structure. Both RSA and DSA keys can be exported. For DSA keys we use PKCS [11](#) definitions. If the flags do not specify the encryption cipher, then the default 3DES (PBES2) will be used.

The *password* can be either ASCII or UTF-8 in the default PBES2 encryption schemas, or ASCII for the PKCS12 schemas.

If the buffer provided is not long enough to hold the output, then \*output\_data\_size is updated and GNUTLS\_E\_SHORT\_MEMORY\_BUFFER will be returned.

If the structure is PEM encoded, it will have a header of "BEGIN ENCRYPTED PRIVATE KEY" or "BEGIN PRIVATE KEY" if encryption is not used.

**key :** Holds the key

**format :** the format of output params. One of PEM or DER.

**password :** the password that will be used to encrypt the key.

**flags :** an ORed sequence of gnutls\_pkcs\_encrypt\_flags\_t

**output\_data :** will contain a private key PEM or DER encoded

**output\_data\_size :** holds the size of output\_data (and will be replaced by the actual size of parameters)

**Returns :** In case of failure a negative error code will be returned, and 0 on success.

**gnutls\_x509\_privkey\_export\_rsa\_raw2 ()**

```
int gnutls_x509_privkey_export_rsa_raw2 (gnutls_x509_privkey_t key,
                                         gnutls_datum_t *m,
                                         gnutls_datum_t *e,
                                         gnutls_datum_t *d,
                                         gnutls_datum_t *p,
                                         gnutls_datum_t *q,
                                         gnutls_datum_t *u,
                                         gnutls_datum_t *e1,
                                         gnutls_datum_t *e2);
```

This function will export the RSA private key's parameters found in the given structure. The new parameters will be allocated using [gnutls\\_malloc\(\)](#) and will be stored in the appropriate datum.

**key :** a structure that holds the rsa parameters

**m :** will hold the modulus

**e :** will hold the public exponent

**d :** will hold the private exponent

**p :** will hold the first prime (p)

**q :** will hold the second prime (q)

**u :** will hold the coefficient

**e1** : will hold  $e1 = d \bmod (p-1)$

**e2** : will hold  $e2 = d \bmod (q-1)$

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

Since 2.12.0

#### **gnutls\_x509\_privkey\_export\_rsa\_raw ()**

```
int gnutls_x509_privkey_export_rsa_raw (gnutls_x509_privkey_t key,
                                       gnutls_datum_t *m,
                                       gnutls_datum_t *e,
                                       gnutls_datum_t *d,
                                       gnutls_datum_t *p,
                                       gnutls_datum_t *q,
                                       gnutls_datum_t *u);
```

This function will export the RSA private key's parameters found in the given structure. The new parameters will be allocated using **gnutls\_malloc()** and will be stored in the appropriate datum.

**key** : a structure that holds the rsa parameters

**m** : will hold the modulus

**e** : will hold the public exponent

**d** : will hold the private exponent

**p** : will hold the first prime (p)

**q** : will hold the second prime (q)

**u** : will hold the coefficient

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

#### **gnutls\_x509\_privkey\_export\_ecc\_raw ()**

```
int gnutls_x509_privkey_export_ecc_raw (gnutls_x509_privkey_t key,
                                       gnutls_ecc_curve_t *curve,
                                       gnutls_datum_t *x,
                                       gnutls_datum_t *y,
                                       gnutls_datum_t *k);
```

This function will export the ECC private key's parameters found in the given structure. The new parameters will be allocated using **gnutls\_malloc()** and will be stored in the appropriate datum.

**key** : a structure that holds the rsa parameters

**curve** : will hold the curve

**x** : will hold the x coordinate

**y** : will hold the y coordinate

**k** : will hold the private key

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

Since 3.0.0

**gnutls\_x509\_crq\_sign2 ()**

```
int gnutls_x509_crq_sign2 (gnutls_x509_crq_t crq,
                           gnutls_x509_privkey_t key,
                           gnutls_digest_algorithm_t dig,
                           unsigned int flags);
```

This function will sign the certificate request with a private key. This must be the same key as the one used in **gnutls\_x509 crt\_set\_key()** since a certificate request is self signed.

This must be the last step in a certificate request generation since all the previously set parameters are now signed.

**crq** : should contain a **gnutls\_x509\_crq\_t** structure

**key** : holds a private key

**dig** : The message digest to use, i.e., **GNUTLS\_DIG\_SHA1**

**flags** : must be 0

**Returns** : **GNUTLS\_E\_SUCCESS** on success, otherwise a negative error code. **GNUTLS\_E\_ASN1\_VALUE\_NOT\_FOUND** is returned if you didn't set all information in the certificate request (e.g., the version using **gnutls\_x509\_crq\_set\_version()**).

**gnutls\_x509\_crq\_print ()**

```
int gnutls_x509_crq_print (gnutls_x509_crq_t crq,
                           gnutls_certificate_print_formats_t ←
                           format,
                           gnutls_datum_t *out);
```

This function will pretty print a certificate request, suitable for display to a human.

The output *out* needs to be deallocate using **gnutls\_free()**.

**crq** : The structure to be printed

**format** : Indicate the format to use

**out** : Newly allocated datum with (0) terminated string.

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

Since 2.8.0

**gnutls\_x509\_crq\_verify ()**

```
int gnutls_x509_crq_verify (gnutls_x509_crq_t crq,
                             unsigned int flags);
```

This function will verify self signature in the certificate request and return its status.

**crq** : is the crq to be verified

**flags** : Flags that may be used to change the verification algorithm. Use OR of the **gnutls\_certificate\_verify\_flags** enumerations.

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, **GNUTLS\_E\_PK\_SIG\_VERIFY\_FAILED** if verification failed, otherwise a negative error value. Since 2.12.0

**gnutls\_x509\_crq\_init ()**

```
int gnutls_x509_crq_init (gnutls_x509_crq_t *crq);
```

This function will initialize a PKCS10 certificate request structure.

**crq** : The structure to be initialized

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

**gnutls\_x509\_crq\_deinit ()**

```
void gnutls_x509_crq_deinit (gnutls_x509_crq_t crq);
```

This function will deinitialize a PKCS10 certificate request structure.

**crq** : The structure to be initialized

**gnutls\_x509\_crq\_import ()**

```
int gnutls_x509_crq_import (gnutls_x509_crq_t crq,
                             const gnutls_datum_t *data,
                             gnutls_x509_crt_fmt_t format);
```

This function will convert the given DER or PEM encoded certificate request to a **gnutls\_x509\_crq\_t** structure. The output will be stored in *crq*.

If the Certificate is PEM encoded it should have a header of "NEW CERTIFICATE REQUEST".

**crq** : The structure to store the parsed certificate request.

**data** : The DER or PEM encoded certificate.

**format** : One of DER or PEM

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

**gnutls\_x509\_crq\_get\_dn ()**

```
int gnutls_x509_crq_get_dn (gnutls_x509_crq_t crq,
                             char *buf,
                             size_t *sizeof_buf);
```

This function will copy the name of the Certificate request subject to the provided buffer. The name will be in the form "C=xxxx,O=yyyy,CN=zzzz" as described in RFC 2253. The output string *buf* will be ASCII or UTF-8 encoded, depending on the certificate data.

**crq** : should contain a **gnutls\_x509\_crq\_t** structure

**buf** : a pointer to a structure to hold the name (may be **NULL**)

**sizeof\_buf** : initially holds the size of *buf*

**Returns** : **GNUTLS\_E\_SHORT\_MEMORY\_BUFFER** if the provided buffer is not long enough, and in that case the *\*sizeof\_buf* will be updated with the required size. On success 0 is returned.

## gnutls\_x509\_crq\_get\_dn\_oid()

```
int gnutls_x509_crq_get_dn_oid (gnutls_x509_crq_t crq,
                                int indx,
                                void *oid,
                                size_t *sizeof_oid);
```

This function will extract the requested OID of the name of the certificate request subject, specified by the given index.

**crq**: should contain a gnutls\_x509\_crq\_t structure

**indx**: Specifies which DN OID to send. Use (0) to get the first one.

**oid**: a pointer to a structure to hold the name (may be **NULL**)

**sizeof\_oid:** initially holds the size of *oid*

**Returns :** `GNUTLS_E_SHORT_MEMORY_BUFFER` if the provided buffer is not long enough, and in that case the `*sizeoid` will be updated with the required size. On success 0 is returned.

## gnutls\_x509\_crq\_get\_dn\_by\_oid ()

```
int gnutls_x509_crq_get_dn_by_oid (gnutls_x509_crq_t crq,
                                   const char *oid,
                                   int indx,
                                   unsigned int raw_flag,
                                   void *buf,
                                   size_t *sizeof_buf);
```

This function will extract the part of the name of the Certificate request subject, specified by the given OID. The output will be encoded as described in RFC2253. The output string will be ASCII or UTF-8 encoded, depending on the certificate data.

Some helper macros with popular OIDs can be found in `gnutls/x509.h`. If `raw` flag is (0), this function will only return known OIDs as text. Other OIDs will be DER encoded, as described in RFC2253 -- in hex format with a '#' prefix. You can check about known OIDs using `gnutls_x509_dn_oid_known()`.

**crq**: should contain a gnutls\_x509\_crq\_t structure

**oid:** holds an Object Identified in null terminated string

**indx**: In case multiple same OIDs exist in the RDN, this specifies which to send. Use (0) to get the first one.

**raw\_flag:** If non (0) returns the raw DER data of the DN part.

**buf** : a pointer to a structure to hold the name (may be **NULL**)

**sizeof buf:** initially holds the size of *buf*

**Returns :** `GNUTLS_E_SHORT_MEMORY_BUFFER` if the provided buffer is not long enough, and in that case the `*size_of_f_buf` will be updated with the required size. On success 0 is returned.

```
gnutls x509 crq set dn by oid ()
```

[illegible]



This function will set the part of the name of the Certificate request subject, specified by the given OID. The input string should be ASCII or UTF-8 encoded.

Some helper macros with popular OIDs can be found in `gnutls/x509.h`. With this function you can only set the known OIDs. You can test for known OIDs using `gnutls_x509_dn_oid_known()`. For OIDs that are not known (by gnutls) you should properly DER encode your data, and call this function with `raw_flag` set.

**crq** : should contain a `gnutls_x509_crq_t` structure

**oid** : holds an Object Identifier in a (0)-terminated string

**raw\_flag** : must be 0, or 1 if the data are DER encoded

**data** : a pointer to the input data

**sizeof\_data** : holds the size of `data`

**Returns** : On success, `GNUTLS_E_SUCCESS` (0) is returned, otherwise a negative error value.

### `gnutls_x509_crq_set_version ()`

```
int gnutls_x509_crq_set_version (gnutls_x509_crq_t crq,
                                unsigned int version);
```

This function will set the version of the certificate request. For version 1 requests this must be one.

**crq** : should contain a `gnutls_x509_crq_t` structure

**version** : holds the version number, for v1 Requests must be 1

**Returns** : On success, `GNUTLS_E_SUCCESS` (0) is returned, otherwise a negative error value.

### `gnutls_x509_crq_get_version ()`

```
int gnutls_x509_crq_get_version (gnutls_x509_crq_t crq);
```

This function will return the version of the specified Certificate request.

**crq** : should contain a `gnutls_x509_crq_t` structure

**Returns** : version of certificate request, or a negative error code on error.

### `gnutls_x509_crq_set_key ()`

```
int gnutls_x509_crq_set_key (gnutls_x509_crq_t crq,
                              gnutls_x509_privkey_t key);
```

This function will set the public parameters from the given private key to the request.

**crq** : should contain a `gnutls_x509_crq_t` structure

**key** : holds a private key

**Returns** : On success, `GNUTLS_E_SUCCESS` (0) is returned, otherwise a negative error value.

**gnutls\_x509\_crq\_set\_challenge\_password ()**

```
int gnutls_x509_crq_set_challenge_password
                                   (gnutls_x509_crq_t crq,
                                   const char *pass);
```

This function will set a challenge password to be used when revoking the request.

**crq** : should contain a **gnutls\_x509\_crq\_t** structure

**pass** : holds a (0)-terminated password

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

**gnutls\_x509\_crq\_get\_challenge\_password ()**

```
int gnutls_x509_crq_get_challenge_password
                                   (gnutls_x509_crq_t crq,
                                   char *pass,
                                   size_t *sizeof_pass);
```

This function will return the challenge password in the request. The challenge password is intended to be used for requesting a revocation of the certificate.

**crq** : should contain a **gnutls\_x509\_crq\_t** structure

**pass** : will hold a (0)-terminated password string

**sizeof\_pass** : Initially holds the size of *pass*.

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

**gnutls\_x509\_crq\_set\_attribute\_by\_oid ()**

```
int gnutls_x509_crq_set_attribute_by_oid
                                   (gnutls_x509_crq_t crq,
                                   const char *oid,
                                   void *buf,
                                   size_t sizeof_buf);
```

This function will set the attribute in the certificate request specified by the given Object ID. The attribute must be DER encoded.

**crq** : should contain a **gnutls\_x509\_crq\_t** structure

**oid** : holds an Object Identified in (0)-terminated string

**buf** : a pointer to a structure that holds the attribute data

**sizeof\_buf** : holds the size of *buf*

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

**gnutls\_x509\_crq\_get\_attribute\_by\_oid ()**

```
int gnutls_x509_crq_get_attribute_by_oid (gnutls_x509_crq_t crq,
                                          const char *oid,
                                          int indx,
                                          void *buf,
                                          size_t *sizeof_buf);
```

This function will return the attribute in the certificate request specified by the given Object ID. The attribute will be DER encoded.

**crq** : should contain a **gnutls\_x509\_crq\_t** structure

**oid** : holds an Object Identified in (0)-terminated string

**indx** : In case multiple same OIDs exist in the attribute list, this specifies which to send, use (0) to get the first one

**buf** : a pointer to a structure to hold the attribute data (may be **NULL**)

**sizeof\_buf** : initially holds the size of *buf*

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

**gnutls\_x509\_crq\_export ()**

```
int gnutls_x509_crq_export (gnutls_x509_crq_t crq,
                             gnutls_x509_crq_fmt_t format,
                             void *output_data,
                             size_t *output_data_size);
```

This function will export the certificate request to a PEM or DER encoded PKCS10 structure.

If the buffer provided is not long enough to hold the output, then **GNUTLS\_E\_SHORT\_MEMORY\_BUFFER** will be returned and *\*output\_data\_size* will be updated.

If the structure is PEM encoded, it will have a header of "BEGIN NEW CERTIFICATE REQUEST".

**crq** : should contain a **gnutls\_x509\_crq\_t** structure

**format** : the format of output params. One of PEM or DER.

**output\_data** : will contain a certificate request PEM or DER encoded

**output\_data\_size** : holds the size of output\_data (and will be replaced by the actual size of parameters)

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

**gnutls\_x509 crt\_set\_crq ()**

```
int gnutls_x509_crt_set_crq (gnutls_x509_crt_t crt,
                              gnutls_x509_crq_t crq);
```

This function will set the name and public parameters as well as the extensions from the given certificate request to the certificate. Only RSA keys are currently supported.

**crt** : a certificate of type **gnutls\_x509\_crt\_t**

**crq** : holds a certificate request

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

**gnutls\_x509 crt\_set\_crq\_extensions ()**

```
int gnutls_x509_crt_set_crq_extensions (gnutls_x509_crt_t crt,
                                       gnutls_x509_crq_t crq);
```

This function will set extensions from the given request to the certificate.

**crt** : a certificate of type **gnutls\_x509\_crt\_t**

**crq** : holds a certificate request

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

Since 2.8.0

**gnutls\_x509\_crq\_set\_key\_rsa\_raw ()**

```
int gnutls_x509_crq_set_key_rsa_raw (gnutls_x509_crq_t crq,
                                     const gnutls_datum_t *m,
                                     const gnutls_datum_t *e);
```

This function will set the public parameters from the given private key to the request. Only RSA keys are currently supported.

**crq** : should contain a **gnutls\_x509\_crq\_t** structure

**m** : holds the modulus

**e** : holds the public exponent

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

Since 2.6.0

**gnutls\_x509\_crq\_set\_subject\_alt\_name ()**

```
int gnutls_x509_crq_set_subject_alt_name (gnutls_x509_crq_t crq,
                                           gnutls_x509_subject_alt_name_t nt,
                                           const void *data,
                                           unsigned int data_size,
                                           unsigned int flags);
```

This function will set the subject alternative name certificate extension. It can set the following types:

**GNUTLS\_SAN\_DNSNAME**: as a text string

**GNUTLS\_SAN\_RFC822NAME**: as a text string

**GNUTLS\_SAN\_URI**: as a text string

**GNUTLS\_SAN\_IPADDRESS**: as a binary IP address (4 or 16 bytes)

Other values can be set as binary values with the proper DER encoding.

**crq** : a certificate request of type **gnutls\_x509\_crq\_t**

**nt** : is one of the **gnutls\_x509\_subject\_alt\_name\_t** enumerations

**data** : The data to be set

**data\_size** : The size of data to be set

**flags** : **GNUTLS\_FSAN\_SET** to clear previous data or **GNUTLS\_FSAN\_APPEND** to append.

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

Since 2.8.0

**gnutls\_x509\_crq\_set\_key\_usage ()**

```
int gnutls_x509_crq_set_key_usage (gnutls_x509_crq_t crq,
                                   unsigned int usage);
```

This function will set the keyUsage certificate extension.

**crq** : a certificate request of type **gnutls\_x509\_crq\_t**

**usage** : an ORed sequence of the GNUTLS\_KEY\_\* elements.

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

Since 2.8.0

**gnutls\_x509\_crq\_set\_basic\_constraints ()**

```
int gnutls_x509_crq_set_basic_constraints (gnutls_x509_crq_t crq,
                                           unsigned int ca,
                                           int pathLenConstraint);
```

This function will set the basicConstraints certificate extension.

**crq** : a certificate request of type **gnutls\_x509\_crq\_t**

**ca** : true(1) or false(0) depending on the Certificate authority status.

**pathLenConstraint** : non-negative error codes indicate maximum length of path, and negative error codes indicate that the pathLenConstraints field should not be present.

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

Since 2.8.0

**gnutls\_x509\_crq\_set\_key\_purpose\_oid ()**

```
int gnutls_x509_crq_set_key_purpose_oid (gnutls_x509_crq_t crq,
                                        const void *oid,
                                        unsigned int critical);
```

This function will set the key purpose OIDs of the Certificate. These are stored in the Extended Key Usage extension (2.5.29.37) See the GNUTLS\_KP\_\* definitions for human readable names.

Subsequent calls to this function will append OIDs to the OID list.

**crq** : a certificate of type **gnutls\_x509\_crq\_t**

**oid** : a pointer to a (0)-terminated string that holds the OID

**critical** : Whether this extension will be critical or not

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

Since 2.8.0

**gnutls\_x509\_crq\_get\_key\_purpose\_oid ()**

```
int gnutls_x509_crq_get_key_purpose_oid (gnutls_x509_crq_t crq,
                                       int indx,
                                       void *oid,
                                       size_t *sizeof_oid,
                                       unsigned int *critical);
```

This function will extract the key purpose OIDs of the Certificate specified by the given index. These are stored in the Extended Key Usage extension (2.5.29.37). See the GNUTLS\_KP\_\* definitions for human readable names.

**crq** : should contain a [gnutls\\_x509\\_crq\\_t](#) structure

**indx** : This specifies which OID to return, use (0) to get the first one

**oid** : a pointer to a buffer to hold the OID (may be [NULL](#))

**sizeof\_oid** : initially holds the size of *oid*

**critical** : output variable with critical flag, may be [NULL](#).

**Returns** : [GNUTLS\\_E\\_SHORT\\_MEMORY\\_BUFFER](#) if the provided buffer is not long enough, and in that case the *\*sizeof\_oid* will be updated with the required size. On success 0 is returned.

Since 2.8.0

**gnutls\_x509\_crq\_get\_extension\_data ()**

```
int gnutls_x509_crq_get_extension_data (gnutls_x509_crq_t crq,
                                       int indx,
                                       void *data,
                                       size_t *sizeof_data);
```

This function will return the requested extension data in the certificate. The extension data will be stored as a string in the provided buffer.

Use [gnutls\\_x509\\_crq\\_get\\_extension\\_info\(\)](#) to extract the OID and critical flag. Use [gnutls\\_x509\\_crq\\_get\\_extension\\_by\\_oid\(\)](#) instead, if you want to get data indexed by the extension OID rather than sequence.

**crq** : should contain a [gnutls\\_x509\\_crq\\_t](#) structure

**indx** : Specifies which extension OID to send. Use (0) to get the first one.

**data** : a pointer to a structure to hold the data (may be null)

**sizeof\_data** : initially holds the size of *oid*

**Returns** : On success, [GNUTLS\\_E\\_SUCCESS](#) (0) is returned, otherwise a negative error code in case of an error. If your have reached the last extension available [GNUTLS\\_E\\_REQUESTED\\_DATA\\_NOT\\_AVAILABLE](#) will be returned.

Since 2.8.0

**gnutls\_x509\_crq\_get\_extension\_info ()**

```
int gnutls_x509_crq_get_extension_info (gnutls_x509_crq_t crq,
                                         int indx,
                                         void *oid,
                                         size_t *sizeof_oid,
                                         unsigned int *critical);
```

This function will return the requested extension OID in the certificate, and the critical flag for it. The extension OID will be stored as a string in the provided buffer. Use [gnutls\\_x509\\_crq\\_get\\_extension\\_data\(\)](#) to extract the data.

If the buffer provided is not long enough to hold the output, then *\*sizeof\_oid* is updated and [GNUTLS\\_E\\_SHORT\\_MEMORY\\_BUFFER](#) will be returned.

**crq** : should contain a [gnutls\\_x509\\_crq\\_t](#) structure

**indx** : Specifies which extension OID to send. Use (0) to get the first one.

**oid** : a pointer to a structure to hold the OID

**sizeof\_oid** : initially holds the maximum size of *oid*, on return holds actual size of *oid*.

**critical** : output variable with critical flag, may be NULL.

**Returns** : On success, [GNUTLS\\_E\\_SUCCESS](#) (0) is returned, otherwise a negative error code in case of an error. If you have reached the last extension available [GNUTLS\\_E\\_REQUESTED\\_DATA\\_NOT\\_AVAILABLE](#) will be returned.

Since 2.8.0

**gnutls\_x509\_crq\_get\_attribute\_data ()**

```
int gnutls_x509_crq_get_attribute_data (gnutls_x509_crq_t crq,
                                         int indx,
                                         void *data,
                                         size_t *sizeof_data);
```

This function will return the requested attribute data in the certificate request. The attribute data will be stored as a string in the provided buffer.

Use [gnutls\\_x509\\_crq\\_get\\_attribute\\_info\(\)](#) to extract the OID. Use [gnutls\\_x509\\_crq\\_get\\_attribute\\_by\\_oid\(\)](#) instead, if you want to get data indexed by the attribute OID rather than sequence.

**crq** : should contain a [gnutls\\_x509\\_crq\\_t](#) structure

**indx** : Specifies which attribute OID to send. Use (0) to get the first one.

**data** : a pointer to a structure to hold the data (may be null)

**sizeof\_data** : initially holds the size of *oid*

**Returns** : On success, [GNUTLS\\_E\\_SUCCESS](#) (0) is returned, otherwise a negative error code in case of an error. If you have reached the last extension available [GNUTLS\\_E\\_REQUESTED\\_DATA\\_NOT\\_AVAILABLE](#) will be returned.

Since 2.8.0

**gnutls\_x509\_crq\_get\_attribute\_info ()**

```
int gnutls_x509_crq_get_attribute_info (gnutls_x509_crq_t crq,
                                       int indx,
                                       void *oid,
                                       size_t *sizeof_oid);
```

This function will return the requested attribute OID in the certificate, and the critical flag for it. The attribute OID will be stored as a string in the provided buffer. Use [gnutls\\_x509\\_crq\\_get\\_attribute\\_data\(\)](#) to extract the data.

If the buffer provided is not long enough to hold the output, then *\*sizeof\_oid* is updated and [GNUTLS\\_E\\_SHORT\\_MEMORY\\_BUFFER](#) will be returned.

**crq** : should contain a [gnutls\\_x509\\_crq\\_t](#) structure

**indx** : Specifies which attribute OID to send. Use (0) to get the first one.

**oid** : a pointer to a structure to hold the OID

**sizeof\_oid** : initially holds the maximum size of *oid*, on return holds actual size of *oid*.

**Returns** : On success, [GNUTLS\\_E\\_SUCCESS](#) (0) is returned, otherwise a negative error code in case of an error. If you have reached the last extension available [GNUTLS\\_E\\_REQUESTED\\_DATA\\_NOT\\_AVAILABLE](#) will be returned.

Since 2.8.0

**gnutls\_x509\_crq\_get\_pk\_algorithm ()**

```
int gnutls_x509_crq_get_pk_algorithm (gnutls_x509_crq_t crq,
                                       unsigned int *bits);
```

This function will return the public key algorithm of a PKCS#10 certificate request.

If *bits* is non-[NULL](#), it should have enough size to hold the parameters size in bits. For RSA the bits returned is the modulus. For DSA the bits returned are of the public exponent.

**crq** : should contain a [gnutls\\_x509\\_crq\\_t](#) structure

**bits** : if *bits* is non-[NULL](#) it will hold the size of the parameters' in bits

**Returns** : a member of the [gnutls\\_pk\\_algorithm\\_t](#) enumeration on success, or a negative error code on error.

**gnutls\_x509\_crq\_get\_key\_id ()**

```
int gnutls_x509_crq_get_key_id (gnutls_x509_crq_t crq,
                                unsigned int flags,
                                unsigned char *output_data,
                                size_t *output_data_size);
```

This function will return a unique ID that depends on the public key parameters. This ID can be used in checking whether a certificate corresponds to the given private key.

If the buffer provided is not long enough to hold the output, then *\*output\_data\_size* is updated and [GNUTLS\\_E\\_SHORT\\_MEMORY\\_BUFFER](#) will be returned. The output will normally be a SHA-1 hash output, which is 20 bytes.

**crq** : a certificate of type [gnutls\\_x509\\_crq\\_t](#)

**flags** : should be 0 for now

**output\_data** : will contain the key ID

**output\_data\_size** : holds the size of *output\_data* (and will be replaced by the actual size of parameters)

**Returns** : In case of failure a negative error code will be returned, and 0 on success.

Since 2.8.0



**gnutls\_x509\_crq\_get\_key\_rsa\_raw ()**

```
int gnutls_x509_crq_get_key_rsa_raw (gnutls_x509_crq_t crq,
                                     gnutls_datum_t *m,
                                     gnutls_datum_t *e);
```

This function will export the RSA public key's parameters found in the given structure. The new parameters will be allocated using **gnutls\_malloc()** and will be stored in the appropriate datum.

**crq** : Holds the certificate

**m** : will hold the modulus

**e** : will hold the public exponent

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

Since 2.8.0

**gnutls\_x509\_crq\_get\_key\_usage ()**

```
int gnutls_x509_crq_get_key_usage (gnutls_x509_crq_t crq,
                                   unsigned int *key_usage,
                                   unsigned int *critical);
```

This function will return certificate's key usage, by reading the keyUsage X.509 extension (2.5.29.15). The key usage value will ORed values of the: **GNUTLS\_KEY\_DIGITAL\_SIGNATURE**, **GNUTLS\_KEY\_NON\_REPUDIATION**, **GNUTLS\_KEY\_KEY\_ENCI**, **GNUTLS\_KEY\_DATA\_ENCIPHERMENT**, **GNUTLS\_KEY\_KEY\_AGREEMENT**, **GNUTLS\_KEY\_KEY\_CERT\_SIGN**, **GNUTLS\_KEY\_ENCIPHER\_ONLY**, **GNUTLS\_KEY\_DECIPHER\_ONLY**.

**crq** : should contain a **gnutls\_x509\_crq\_t** structure

**key\_usage** : where the key usage bits will be stored

**critical** : will be non (0) if the extension is marked as critical

**Returns** : the certificate key usage, or a negative error code in case of parsing error. If the certificate does not contain the keyUsage extension **GNUTLS\_E\_REQUESTED\_DATA\_NOT\_AVAILABLE** will be returned.

Since 2.8.0

**gnutls\_x509\_crq\_get\_basic\_constraints ()**

```
int gnutls_x509_crq_get_basic_constraints (gnutls_x509_crq_t crq,
                                           unsigned int *critical,
                                           unsigned int *ca,
                                           int *pathlen);
```

This function will read the certificate's basic constraints, and return the certificates CA status. It reads the basicConstraints X.509 extension (2.5.29.19).

**crq** : should contain a **gnutls\_x509\_crq\_t** structure

**critical** : will be non (0) if the extension is marked as critical

**ca** : pointer to output integer indicating CA status, may be NULL, value is 1 if the certificate CA flag is set, 0 otherwise.

**pathlen**: pointer to output integer indicating path length (may be NULL), non-negative error codes indicate a present pathLenConstraint field and the actual value, -1 indicate that the field is absent.

**Returns**: If the certificate is a CA a positive value will be returned, or (0) if the certificate does not have CA flag set. A negative error code may be returned in case of errors. If the certificate does not contain the basicConstraints extension **GNUTLS\_E\_REQUESTED\_DATA\_NOT\_AVAILABLE** will be returned.

Since 2.8.0

### gnutls\_x509\_crq\_get\_subject\_alt\_name ()

```
int gnutls_x509_crq_get_subject_alt_name
                                     (gnutls_x509_crq_t crq,
                                      unsigned int seq,
                                      void *ret,
                                      size_t *ret_size,
                                      unsigned int *ret_type,
                                      unsigned int *critical);
```

This function will return the alternative names, contained in the given certificate. It is the same as **gnutls\_x509\_crq\_get\_subject\_alt\_name** except for the fact that it will return the type of the alternative name in *ret\_type* even if the function fails for some reason (i.e. the buffer provided is not enough).

**crq**: should contain a **gnutls\_x509\_crq\_t** structure

**seq**: specifies the sequence number of the alt name, 0 for the first one, 1 for the second etc.

**ret**: is the place where the alternative name will be copied to

**ret\_size**: holds the size of ret.

**ret\_type**: holds the **gnutls\_x509\_subject\_alt\_name\_t** name type

**critical**: will be non (0) if the extension is marked as critical (may be null)

**Returns**: the alternative subject name type on success, one of the enumerated **gnutls\_x509\_subject\_alt\_name\_t**. It will return **GNUTLS\_E\_SHORT\_MEMORY\_BUFFER** if *ret\_size* is not large enough to hold the value. In that case *ret\_size* will be updated with the required size. If the certificate request does not have an Alternative name with the specified sequence number then **GNUTLS\_E\_REQUESTED\_DATA\_NOT\_AVAILABLE** is returned.

Since 2.8.0

### gnutls\_x509\_crq\_get\_subject\_alt\_othername\_oid ()

```
int gnutls_x509_crq_get_subject_alt_othername_oid
                                     (gnutls_x509_crq_t crq,
                                      unsigned int seq,
                                      void *ret,
                                      size_t *ret_size);
```

This function will extract the type OID of an otherName Subject Alternative Name, contained in the given certificate, and return the type as an enumerated element.

This function is only useful if **gnutls\_x509\_crq\_get\_subject\_alt\_name()** returned **GNUTLS\_SAN\_OTHERNAME**.

**crq**: should contain a **gnutls\_x509\_crq\_t** structure

**seq**: specifies the sequence number of the alt name (0 for the first one, 1 for the second etc.)

**ret** : is the place where the otherName OID will be copied to

**ret\_size** : holds the size of ret.

**Returns** : the alternative subject name type on success, one of the enumerated `gnutls_x509_subject_alt_name_t`. For supported OIDs, it will return one of the virtual (`GNUTLS_SAN_OTHERNAME_*`) types, e.g. `GNUTLS_SAN_OTHERNAME_XMPP`, and `GNUTLS_SAN_OTHERNAME` for unknown OIDs. It will return `GNUTLS_E_SHORT_MEMORY_BUFFER` if `ret_size` is not large enough to hold the value. In that case `ret_size` will be updated with the required size. If the certificate does not have an Alternative name with the specified sequence number and with the otherName type then `GNUTLS_E_REQUESTED_DATA_NOT_AVAILABLE` is returned.

Since 2.8.0

### `gnutls_x509_crq_get_extension_by_oid()`

```
int gnutls_x509_crq_get_extension_by_oid
                                     (gnutls_x509_crq_t crq,
                                      const char *oid,
                                      int indx,
                                      void *buf,
                                      size_t *sizeof_buf,
                                      unsigned int *critical);
```

This function will return the extension specified by the OID in the certificate. The extensions will be returned as binary data DER encoded, in the provided buffer.

**crq** : should contain a `gnutls_x509_crq_t` structure

**oid** : holds an Object Identified in null terminated string

**indx** : In case multiple same OIDs exist in the extensions, this specifies which to send. Use (0) to get the first one.

**buf** : a pointer to a structure to hold the name (may be null)

**sizeof\_buf** : initially holds the size of `buf`

**critical** : will be non (0) if the extension is marked as critical

**Returns** : On success, `GNUTLS_E_SUCCESS` (0) is returned, otherwise a negative error code in case of an error. If the certificate does not contain the specified extension `GNUTLS_E_REQUESTED_DATA_NOT_AVAILABLE` will be returned.

Since 2.8.0

### `gnutls_x509_trust_list_t`

```
typedef struct gnutls_x509_trust_list_st *gnutls_x509_trust_list_t;
```

### `gnutls_x509_trust_list_init()`

```
int gnutls_x509_trust_list_init      (gnutls_x509_trust_list_t *list,
                                     unsigned int size);
```

This function will initialize an X.509 trust list structure.

**list** : The structure to be initialized

**size** : The size of the internal hash table. Use (0) for default size.

**Returns** : On success, `GNUTLS_E_SUCCESS` (0) is returned, otherwise a negative error value.

Since 3.0.0

**gnutls\_x509\_trust\_list\_deinit ()**

```
void                gnutls_x509_trust_list_deinit      (gnutls_x509_trust_list_t list,  
                                                       unsigned int all);
```

This function will deinitialize a trust list.

**list** : The structure to be deinitialized

**all** : if non-(0) it will deinitialize all the certificates and CRLs contained in the structure.

Since 3.0.0

**gnutls\_x509\_trust\_list\_get\_issuer ()**

```
int                gnutls_x509_trust_list_get_issuer  (gnutls_x509_trust_list_t list,  
                                                       gnutls_x509_crt_t cert,  
                                                       gnutls_x509_crt_t *issuer,  
                                                       unsigned int flags);
```

This function will attempt to find the issuer of the given certificate.

**list** : The structure of the list

**cert** : is the certificate to find issuer for

**issuer** : Will hold the issuer if any. Should be treated as constant.

**flags** : Use (0).

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

Since 3.0.0

**gnutls\_x509\_trust\_list\_add\_cas ()**

```
int                gnutls_x509_trust_list_add_cas    (gnutls_x509_trust_list_t list,  
                                                       const gnutls_x509_crt_t *clist,  
                                                       int clist_size,  
                                                       unsigned int flags);
```

This function will add the given certificate authorities to the trusted list. The list of CAs must not be deinitialized during this structure's lifetime.

**list** : The structure of the list

**clist** : A list of CAs

**clist\_size** : The length of the CA list

**flags** : should be 0.

**Returns** : The number of added elements is returned.

Since 3.0.0

**gnutls\_x509\_trust\_list\_add\_named\_cert()**

```
int gnutls_x509_trust_list_add_named_cert
                                     (gnutls_x509_trust_list_t list,
                                     gnutls_x509_cert_t cert,
                                     const void *name,
                                     size_t name_size,
                                     unsigned int flags);
```

This function will add the given certificate to the trusted list and associate it with a name. The certificate will not be used for verification with `gnutls_x509_trust_list_verify_cert()` but only with `gnutls_x509_trust_list_verify_named_cert()`.

In principle this function can be used to set individual "server" certificates that are trusted by the user for that specific server but for no other purposes.

The certificate must not be deinitialized during the lifetime of the trusted list.

**list** : The structure of the list

**cert** : A certificate

**name** : An identifier for the certificate

**name\_size** : The size of the identifier

**flags** : should be 0.

**Returns** : On success, `GNUTLS_E_SUCCESS` (0) is returned, otherwise a negative error value.

Since 3.0.0

**GNUTLS\_TL\_VERIFY\_CRL**

```
#define GNUTLS_TL_VERIFY_CRL 1
```

**gnutls\_x509\_trust\_list\_add\_crls()**

```
int gnutls_x509_trust_list_add_crls (gnutls_x509_trust_list_t list,
                                     const gnutls_x509_crl_t *crl_list,
                                     int crl_size,
                                     unsigned int flags,
                                     unsigned int verification_flags);
```

This function will add the given certificate revocation lists to the trusted list. The list of CRLs must not be deinitialized during this structure's lifetime.

This function must be called after `gnutls_x509_trust_list_add_cas()` to allow verifying the CRLs for validity.

**list** : The structure of the list

**crl\_list** : A list of CRLs

**crl\_size** : The length of the CRL list

**flags** : if `GNUTLS_TL_VERIFY_CRL` is given the CRLs will be verified before being added.

**verification\_flags** : `gnutls_certificate_verify_flags` if flags specifies `GNUTLS_TL_VERIFY_CRL`

**Returns** : The number of added elements is returned.

Since 3.0.0

**gnutls\_x509\_trust\_list\_verify\_named\_cert ()**

```
int gnutls_x509_trust_list_verify_named_cert
(
    gnutls_x509_trust_list_t list,
    gnutls_x509_cert_t cert,
    const void *name,
    size_t name_size,
    unsigned int flags,
    unsigned int *verify,
    gnutls_verify_output_function func ←
);
```

This function will try to find a matching named certificate. If a match is found the certificate is considered valid. In addition to that this function will also check CRLs.

**list** : The structure of the list

**cert** : is the certificate to be verified

**name** : is the certificate's name

**name\_size** : is the certificate's name size

**flags** : Flags that may be used to change the verification algorithm. Use OR of the gnutls\_certificate\_verify\_flags enumerations.

**verify** : will hold the certificate verification output.

**func** : If non-null will be called on each chain element verification with the output.

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

Since 3.0.0

**gnutls\_x509\_trust\_list\_verify\_cert ()**

```
int gnutls_x509_trust_list_verify_cert
(
    gnutls_x509_trust_list_t list,
    gnutls_x509_cert_t *cert_list,
    unsigned int cert_list_size,
    unsigned int flags,
    unsigned int *verify,
    gnutls_verify_output_function func ←
);
```

This function will try to verify the given certificate and return its status.

**list** : The structure of the list

**cert\_list** : is the certificate list to be verified

**cert\_list\_size** : is the certificate list size

**flags** : Flags that may be used to change the verification algorithm. Use OR of the gnutls\_certificate\_verify\_flags enumerations.

**verify** : will hold the certificate verification output.

**func** : If non-null will be called on each chain element verification with the output.

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

Since 3.0.0

## 1.4 openpgp

openpgp —

### Synopsis

```
enum          gnutls_openpgp_cert_fmt_t;
#define        GNUTLS_OPENPGP_KEYID_SIZE
typedef        gnutls_openpgp_keyid_t;
int           gnutls_openpgp_cert_init          (gnutls_openpgp_cert_t *key);
void          gnutls_openpgp_cert_deinit        (gnutls_openpgp_cert_t key);
int           gnutls_openpgp_cert_import        (gnutls_openpgp_cert_t key,
const gnutls_datum_t *data,
gnutls_openpgp_cert_fmt_t format);
int           gnutls_openpgp_cert_export        (gnutls_openpgp_cert_t key,
gnutls_openpgp_cert_fmt_t format,
void *output_data,
size_t *output_data_size);
int           gnutls_openpgp_cert_print         (gnutls_openpgp_cert_t cert,
gnutls_certificate_print_formats_t
gnutls_datum_t *out);
int           gnutls_openpgp_cert_get_key_usage (gnutls_openpgp_cert_t key,
unsigned int *key_usage);
int           gnutls_openpgp_cert_get_fingerprint (gnutls_openpgp_cert_t key,
void *fpr,
size_t *fprlen);
int           gnutls_openpgp_cert_get_subkey_fingerprint (gnutls_openpgp_cert_t key,
unsigned int idx,
void *fpr,
size_t *fprlen);
int           gnutls_openpgp_cert_get_name      (gnutls_openpgp_cert_t key,
int idx,
char *buf,
size_t *sizeof_buf);
gnutls_pk_algorithm_t gnutls_openpgp_cert_get_pk_algorithm (gnutls_openpgp_cert_t key,
unsigned int *bits);
int           gnutls_openpgp_cert_get_version   (gnutls_openpgp_cert_t key);
time_t        gnutls_openpgp_cert_get_creation_time (gnutls_openpgp_cert_t key);
time_t        gnutls_openpgp_cert_get_expiration_time (gnutls_openpgp_cert_t key);
int           gnutls_openpgp_cert_get_key_id    (gnutls_openpgp_cert_t key,
gnutls_openpgp_keyid_t keyid);
int           gnutls_openpgp_cert_check_hostname (gnutls_openpgp_cert_t key,
const char *hostname);
int           gnutls_openpgp_cert_get_revoked_status (gnutls_openpgp_cert_t key);
int           gnutls_openpgp_cert_get_subkey_count (gnutls_openpgp_cert_t key);
int           gnutls_openpgp_cert_get_subkey_idx (gnutls_openpgp_cert_t key,
const gnutls_openpgp_keyid_t keyid);
int           gnutls_openpgp_cert_get_subkey_revoked_status (gnutls_openpgp_cert_t key,
unsigned int idx);
gnutls_pk_algorithm_t gnutls_openpgp_cert_get_subkey_pk_algorithm
```

---

		(gnutls_openpgp_cert_t key, unsigned int idx, unsigned int *bits);
time_t	gnutls_openpgp_cert_get_subkey_creation_time	(gnutls_openpgp_cert_t key, unsigned int idx);
time_t	gnutls_openpgp_cert_get_subkey_expiration_time	(gnutls_openpgp_cert_t key, unsigned int idx);
int	gnutls_openpgp_cert_get_subkey_id	(gnutls_openpgp_cert_t key, unsigned int idx, gnutls_openpgp_keyid_t keyid);
int	gnutls_openpgp_cert_get_subkey_usage	(gnutls_openpgp_cert_t key, unsigned int idx, unsigned int *key_usage);
int	gnutls_openpgp_cert_get_subkey_pk_dsa_raw	(gnutls_openpgp_cert_t crt, unsigned int idx, gnutls_datum_t *p, gnutls_datum_t *q, gnutls_datum_t *g, gnutls_datum_t *y);
int	gnutls_openpgp_cert_get_subkey_pk_rsa_raw	(gnutls_openpgp_cert_t crt, unsigned int idx, gnutls_datum_t *m, gnutls_datum_t *e);
int	gnutls_openpgp_cert_get_pk_dsa_raw	(gnutls_openpgp_cert_t crt, gnutls_datum_t *p, gnutls_datum_t *q, gnutls_datum_t *g, gnutls_datum_t *y);
int	gnutls_openpgp_cert_get_pk_rsa_raw	(gnutls_openpgp_cert_t crt, gnutls_datum_t *m, gnutls_datum_t *e);
int	gnutls_openpgp_cert_get_preferred_key_id	(gnutls_openpgp_cert_t key, gnutls_openpgp_keyid_t keyid);
int	gnutls_openpgp_cert_set_preferred_key_id	(gnutls_openpgp_cert_t key, const gnutls_openpgp_keyid_t keyid);
int	gnutls_openpgp_privkey_init	(gnutls_openpgp_privkey_t *key);
void	gnutls_openpgp_privkey_deinit	(gnutls_openpgp_privkey_t key);
gnutls_pk_algorithm_t	gnutls_openpgp_privkey_get_pk_algorithm	(gnutls_openpgp_privkey_t key, unsigned int *bits);
gnutls_sec_param_t	gnutls_openpgp_privkey_sec_param	(gnutls_openpgp_privkey_t key);
int	gnutls_openpgp_privkey_import	(gnutls_openpgp_privkey_t key, const gnutls_datum_t *data, gnutls_openpgp_cert_fmt_t format, const char *password, unsigned int flags);
int	gnutls_openpgp_privkey_get_fingerprint	(gnutls_openpgp_privkey_t key, void *fpr, size_t *fprlen);
int	gnutls_openpgp_privkey_get_subkey_fingerprint	

---



---

		(gnutls_openpgp_privkey_t key, unsigned int idx, void *fpr, size_t *fprlen);
int	gnutls_openpgp_privkey_get_key_id	(gnutls_openpgp_privkey_t key, gnutls_openpgp_keyid_t keyid);
int	gnutls_openpgp_privkey_get_subkey_count	(gnutls_openpgp_privkey_t key);
int	gnutls_openpgp_privkey_get_subkey_idx	(gnutls_openpgp_privkey_t key, const gnutls_openpgp_keyid_t keyid);
int	gnutls_openpgp_privkey_get_subkey_revoked_status	(gnutls_openpgp_privkey_t key, unsigned int idx);
int	gnutls_openpgp_privkey_get_revoked_status	(gnutls_openpgp_privkey_t key);
gnutls_pk_algorithm_t	gnutls_openpgp_privkey_get_subkey_pk_algorithm	(gnutls_openpgp_privkey_t key, unsigned int idx, unsigned int *bits);
time_t	gnutls_openpgp_privkey_get_subkey_expiration_time	(gnutls_openpgp_privkey_t key, unsigned int idx);
int	gnutls_openpgp_privkey_get_subkey_id	(gnutls_openpgp_privkey_t key, unsigned int idx, gnutls_openpgp_keyid_t keyid);
time_t	gnutls_openpgp_privkey_get_subkey_creation_time	(gnutls_openpgp_privkey_t key, unsigned int idx);
int	gnutls_openpgp_privkey_export_subkey_dsa_raw	(gnutls_openpgp_privkey_t pkey, unsigned int idx, gnutls_datum_t *p, gnutls_datum_t *q, gnutls_datum_t *g, gnutls_datum_t *y, gnutls_datum_t *x);
int	gnutls_openpgp_privkey_export_subkey_rsa_raw	(gnutls_openpgp_privkey_t pkey, unsigned int idx, gnutls_datum_t *m, gnutls_datum_t *e, gnutls_datum_t *d, gnutls_datum_t *p, gnutls_datum_t *q, gnutls_datum_t *u);
int	gnutls_openpgp_privkey_export_dsa_raw	(gnutls_openpgp_privkey_t pkey, gnutls_datum_t *p, gnutls_datum_t *q, gnutls_datum_t *g, gnutls_datum_t *y, gnutls_datum_t *x);
int	gnutls_openpgp_privkey_export_rsa_raw	(gnutls_openpgp_privkey_t pkey, gnutls_datum_t *m,

---

---

		gnutls_datum_t *e, gnutls_datum_t *d, gnutls_datum_t *p, gnutls_datum_t *q, gnutls_datum_t *u);
int	gnutls_openpgp_privkey_export	(gnutls_openpgp_privkey_t key, gnutls_openpgp_crt_fmt_t format, const char *password, unsigned int flags, void *output_data, size_t *output_data_size);
int	gnutls_openpgp_privkey_set_preferred_key_id	(gnutls_openpgp_privkey_t key, const gnutls_openpgp_keyid_t keyid);
int	gnutls_openpgp_privkey_get_preferred_key_id	(gnutls_openpgp_privkey_t key, gnutls_openpgp_keyid_t keyid);
int	gnutls_openpgp_crt_get_auth_subkey	(gnutls_openpgp_crt_t crt, gnutls_openpgp_keyid_t keyid, unsigned int flag);
int	gnutls_openpgp_keyring_init	(gnutls_openpgp_keyring_t *keyring,
void	gnutls_openpgp_keyring_deinit	(gnutls_openpgp_keyring_t keyring);
int	gnutls_openpgp_keyring_import	(gnutls_openpgp_keyring_t keyring, const gnutls_datum_t *data, gnutls_openpgp_crt_fmt_t format);
int	gnutls_openpgp_keyring_check_id	(gnutls_openpgp_keyring_t ring, const gnutls_openpgp_keyid_t keyid, unsigned int flags);
int	gnutls_openpgp_crt_verify_ring	(gnutls_openpgp_crt_t key, gnutls_openpgp_keyring_t keyring, unsigned int flags, unsigned int *verify);
int	gnutls_openpgp_crt_verify_self	(gnutls_openpgp_crt_t key, unsigned int flags, unsigned int *verify);
int	gnutls_openpgp_keyring_get_crt	(gnutls_openpgp_keyring_t ring, unsigned int idx, gnutls_openpgp_crt_t *cert);
int	gnutls_openpgp_keyring_get_crt_count	(gnutls_openpgp_keyring_t ring);
int	(*gnutls_openpgp_recv_key_func)	(gnutls_session_t session, unsigned char *keyfpr, unsigned int keyfpr_length, gnutls_datum_t *key);
void	gnutls_openpgp_set_recv_key_function	(gnutls_session_t session, gnutls_openpgp_recv_key_func func);
int	gnutls_certificate_set_openpgp_key	(gnutls_certificate_credentials_t cred, gnutls_openpgp_crt_t crt, gnutls_openpgp_privkey_t pkey);
int	gnutls_certificate_set_openpgp_key_file	(gnutls_certificate_credentials_t cred, const char *certfile, const char *keyfile, gnutls_openpgp_crt_fmt_t format);
int	gnutls_certificate_set_openpgp_key_mem	(gnutls_certificate_credentials_t cred, const gnutls_datum_t *cert, const gnutls_datum_t *key, gnutls_openpgp_crt_fmt_t format);

---

```

                                const gnutls_datum_t *cert,
                                const gnutls_datum_t *key,
                                gnutls_openpgp_cert_fmt_t format);
int      gnutls_certificate_set_openpgp_key_file2
                                (gnutls_certificate_credentials_t
                                const char *certfile,
                                const char *keyfile,
                                const char *subkey_id,
                                gnutls_openpgp_cert_fmt_t format);
int      gnutls_certificate_set_openpgp_key_mem2
                                (gnutls_certificate_credentials_t
                                const gnutls_datum_t *cert,
                                const gnutls_datum_t *key,
                                const char *subkey_id,
                                gnutls_openpgp_cert_fmt_t format);
int      gnutls_certificate_set_openpgp_keyring_mem
                                (gnutls_certificate_credentials_t
                                unsigned char *data,
                                size_t dlen,
                                gnutls_openpgp_cert_fmt_t format);
int      gnutls_certificate_set_openpgp_keyring_file
                                (gnutls_certificate_credentials_t
                                const char *file,
                                gnutls_openpgp_cert_fmt_t format);

```

## Description

## Details

### enum gnutls\_openpgp\_cert\_fmt\_t

```

typedef enum gnutls_openpgp_cert_fmt
{
    GNUTLS_OPENPGP_FMT_RAW,
    GNUTLS_OPENPGP_FMT_BASE64
} gnutls_openpgp_cert_fmt_t;

```

Enumeration of different OpenPGP key formats.

**GNUTLS\_OPENPGP\_FMT\_RAW** OpenPGP certificate in raw format.

**GNUTLS\_OPENPGP\_FMT\_BASE64** OpenPGP certificate in base64 format.

### GNUTLS\_OPENPGP\_KEYID\_SIZE

```
#define GNUTLS_OPENPGP_KEYID_SIZE 8
```

### gnutls\_openpgp\_keyid\_t

```
typedef unsigned char gnutls_openpgp_keyid_t[GNUTLS_OPENPGP_KEYID_SIZE];
```

**gnutls\_openpgp\_cert\_init ()**

```
int gnutls_openpgp_cert_init (gnutls_openpgp_cert_t *key);
```

This function will initialize an OpenPGP key structure.

**key** : The structure to be initialized

**Returns** : **GNUTLS\_E\_SUCCESS** on success, or an error code.

**gnutls\_openpgp\_cert\_deinit ()**

```
void gnutls_openpgp_cert_deinit (gnutls_openpgp_cert_t key);
```

This function will deinitialize a key structure.

**key** : The structure to be initialized

**gnutls\_openpgp\_cert\_import ()**

```
int gnutls_openpgp_cert_import (gnutls_openpgp_cert_t key,
                                const gnutls_datum_t *data,
                                gnutls_openpgp_cert_fmt_t format);
```

This function will convert the given RAW or Base64 encoded key to the native **gnutls\_openpgp\_cert\_t** format. The output will be stored in 'key'.

**key** : The structure to store the parsed key.

**data** : The RAW or BASE64 encoded key.

**format** : One of gnutls\_openpgp\_cert\_fmt\_t elements.

**Returns** : **GNUTLS\_E\_SUCCESS** on success, or an error code.

**gnutls\_openpgp\_cert\_export ()**

```
int gnutls_openpgp_cert_export (gnutls_openpgp_cert_t key,
                                gnutls_openpgp_cert_fmt_t format,
                                void *output_data,
                                size_t *output_data_size);
```

This function will convert the given key to RAW or Base64 format. If the buffer provided is not long enough to hold the output, then **GNUTLS\_E\_SHORT\_MEMORY\_BUFFER** will be returned.

**key** : Holds the key.

**format** : One of gnutls\_openpgp\_cert\_fmt\_t elements.

**output\_data** : will contain the key base64 encoded or raw

**output\_data\_size** : holds the size of output\_data (and will be replaced by the actual size of parameters)

**Returns** : **GNUTLS\_E\_SUCCESS** on success, or an error code.

**gnutls\_openpgp\_cert\_print ()**

```
int                gnutls_openpgp_cert_print      (gnutls_openpgp_cert_t cert,  
                                                  gnutls_certificate_print_formats_t ←  
                                                  format,  
                                                  gnutls_datum_t *out);
```

This function will pretty print an OpenPGP certificate, suitable for display to a human.

The format should be (0) for future compatibility.

The output *out* needs to be deallocate using **gnutls\_free()**.

**cert** : The structure to be printed

**format** : Indicate the format to use

**out** : Newly allocated datum with (0) terminated string.

**Returns** : **GNUTLS\_E\_SUCCESS** on success, or an error code.

**gnutls\_openpgp\_cert\_get\_key\_usage ()**

```
int                gnutls_openpgp_cert_get_key_usage  (gnutls_openpgp_cert_t key,  
                                                       unsigned int *key_usage);
```

This function will return certificate's key usage, by checking the key algorithm. The key usage value will ORed values of the: **GNUTLS\_KEY\_DIGITAL\_SIGNATURE**, **GNUTLS\_KEY\_KEY\_ENCIPHERMENT**.

**key** : should contain a gnutls\_openpgp\_cert\_t structure

**key\_usage** : where the key usage bits will be stored

**Returns** : **GNUTLS\_E\_SUCCESS** on success, or an error code.

**gnutls\_openpgp\_cert\_get\_fingerprint ()**

```
int                gnutls_openpgp_cert_get_fingerprint  (gnutls_openpgp_cert_t key,  
                                                         void *fpr,  
                                                         size_t *fprlen);
```

Get key fingerprint. Depending on the algorithm, the fingerprint can be 16 or 20 bytes.

**key** : the raw data that contains the OpenPGP public key.

**fpr** : the buffer to save the fingerprint, must hold at least 20 bytes.

**fprlen** : the integer to save the length of the fingerprint.

**Returns** : On success, 0 is returned. Otherwise, an error code.

**gnutls\_openpgp\_cert\_get\_subkey\_fingerprint ()**

```
int gnutls_openpgp_cert_get_subkey_fingerprint
                                     (gnutls_openpgp_cert_t key,
                                     unsigned int idx,
                                     void *fpr,
                                     size_t *fprlen);
```

Get key fingerprint of a subkey. Depending on the algorithm, the fingerprint can be 16 or 20 bytes.

**key** : the raw data that contains the OpenPGP public key.

**idx** : the subkey index

**fpr** : the buffer to save the fingerprint, must hold at least 20 bytes.

**fprlen** : the integer to save the length of the fingerprint.

**Returns** : On success, 0 is returned. Otherwise, an error code.

Since 2.4.0

**gnutls\_openpgp\_cert\_get\_name ()**

```
int gnutls_openpgp_cert_get_name      (gnutls_openpgp_cert_t key,
                                       int idx,
                                       char *buf,
                                       size_t *sizeof_buf);
```

Extracts the userID from the parsed OpenPGP key.

**key** : the structure that contains the OpenPGP public key.

**idx** : the index of the ID to extract

**buf** : a pointer to a structure to hold the name, may be **NULL** to only get the *sizeof\_buf*.

**sizeof\_buf** : holds the maximum size of *buf*, on return hold the actual/required size of *buf*.

**Returns** : **GNUTLS\_E\_SUCCESS** on success, and if the index of the ID does not exist **GNUTLS\_E\_REQUESTED\_DATA\_NOT\_AVAILABLE** or an error code.

**gnutls\_openpgp\_cert\_get\_pk\_algorithm ()**

```
gnutls_pk_algorithm_t gnutls_openpgp_cert_get_pk_algorithm
                                     (gnutls_openpgp_cert_t key,
                                     unsigned int *bits);
```

This function will return the public key algorithm of an OpenPGP certificate.

If bits is non null, it should have enough size to hold the parameters size in bits. For RSA the bits returned is the modulus. For DSA the bits returned are of the public exponent.

**key** : is an OpenPGP key

**bits** : if bits is non null it will hold the size of the parameters' in bits

**Returns** : a member of the **gnutls\_pk\_algorithm\_t** enumeration on success, or **GNUTLS\_PK\_UNKNOWN** on error.

**gnutls\_openpgp\_cert\_get\_version ()**

```
int gnutls_openpgp_cert_get_version (gnutls_openpgp_cert_t key);
```

Extract the version of the OpenPGP key.

**key** : the structure that contains the OpenPGP public key.

**Returns** : the version number is returned, or a negative error code on errors.

**gnutls\_openpgp\_cert\_get\_creation\_time ()**

```
time_t gnutls_openpgp_cert_get_creation_time (gnutls_openpgp_cert_t key);
```

Get key creation time.

**key** : the structure that contains the OpenPGP public key.

**Returns** : the timestamp when the OpenPGP key was created.

**gnutls\_openpgp\_cert\_get\_expiration\_time ()**

```
time_t gnutls_openpgp_cert_get_expiration_time (gnutls_openpgp_cert_t key);
```

Get key expiration time. A value of '0' means that the key doesn't expire at all.

**key** : the structure that contains the OpenPGP public key.

**Returns** : the time when the OpenPGP key expires.

**gnutls\_openpgp\_cert\_get\_key\_id ()**

```
int gnutls_openpgp_cert_get_key_id (gnutls_openpgp_cert_t key,  
gnutls_openpgp_keyid_t keyid);
```

Get key id string.

**key** : the structure that contains the OpenPGP public key.

**keyid** : the buffer to save the keyid.

**Returns** : the 64-bit keyID of the OpenPGP key.

Since 2.4.0

**gnutls\_openpgp\_cert\_check\_hostname ()**

```
int gnutls_openpgp_cert_check_hostname (gnutls_openpgp_cert_t key,  
const char *hostname);
```

This function will check if the given key's owner matches the given hostname. This is a basic implementation of the matching described in RFC2818 (HTTPS), which takes into account wildcards.

**key** : should contain a [gnutls\\_openpgp\\_cert\\_t](#) structure

**hostname** : A null terminated string that contains a DNS name

**Returns** : [GNUTLS\\_E\\_SUCCESS](#) on success, or an error code.

**gnutls\_openpgp\_cert\_get\_revoked\_status ()**

```
int gnutls_openpgp_cert_get_revoked_status (gnutls_openpgp_cert_t key);
```

Get revocation status of key.

**key** : the structure that contains the OpenPGP public key.

**Returns** : true (1) if the key has been revoked, or false (0) if it has not.

Since 2.4.0

**gnutls\_openpgp\_cert\_get\_subkey\_count ()**

```
int gnutls_openpgp_cert_get_subkey_count (gnutls_openpgp_cert_t key);
```

This function will return the number of subkeys present in the given OpenPGP certificate.

**key** : is an OpenPGP key

**Returns** : the number of subkeys, or a negative error code on error.

Since 2.4.0

**gnutls\_openpgp\_cert\_get\_subkey\_idx ()**

```
int gnutls_openpgp_cert_get_subkey_idx (gnutls_openpgp_cert_t key,
                                         const gnutls_openpgp_keyid_t keyid ↵
                                         );
```

Get subkey's index.

**key** : the structure that contains the OpenPGP public key.

**keyid** : the keyid.

**Returns** : the index of the subkey or a negative error value.

Since 2.4.0

**gnutls\_openpgp\_cert\_get\_subkey\_revoked\_status ()**

```
int gnutls_openpgp_cert_get_subkey_revoked_status (gnutls_openpgp_cert_t key,
                                                    unsigned int idx);
```

Get subkey revocation status. A negative error code indicates an error.

**key** : the structure that contains the OpenPGP public key.

**idx** : is the subkey index

**Returns** : true (1) if the key has been revoked, or false (0) if it has not.

Since 2.4.0



**gnutls\_openpgp\_cert\_get\_subkey\_pk\_algorithm ()**

```
gnutls_pk_algorithm_t gnutls_openpgp_cert_get_subkey_pk_algorithm
                                                                (gnutls_openpgp_cert_t key,
                                                                unsigned int idx,
                                                                unsigned int *bits);
```

This function will return the public key algorithm of a subkey of an OpenPGP certificate.

If bits is non null, it should have enough size to hold the parameters size in bits. For RSA the bits returned is the modulus. For DSA the bits returned are of the public exponent.

**key** : is an OpenPGP key

**idx** : is the subkey index

**bits** : if bits is non null it will hold the size of the parameters' in bits

**Returns** : a member of the [gnutls\\_pk\\_algorithm\\_t](#) enumeration on success, or GNUTLS\_PK\_UNKNOWN on error.

Since 2.4.0

**gnutls\_openpgp\_cert\_get\_subkey\_creation\_time ()**

```
time_t gnutls_openpgp_cert_get_subkey_creation_time
                                                                (gnutls_openpgp_cert_t key,
                                                                unsigned int idx);
```

Get subkey creation time.

**key** : the structure that contains the OpenPGP public key.

**idx** : the subkey index

**Returns** : the timestamp when the OpenPGP sub-key was created.

Since 2.4.0

**gnutls\_openpgp\_cert\_get\_subkey\_expiration\_time ()**

```
time_t gnutls_openpgp_cert_get_subkey_expiration_time
                                                                (gnutls_openpgp_cert_t key,
                                                                unsigned int idx);
```

Get subkey expiration time. A value of '0' means that the key doesn't expire at all.

**key** : the structure that contains the OpenPGP public key.

**idx** : the subkey index

**Returns** : the time when the OpenPGP key expires.

Since 2.4.0

**gnutls\_openpgp\_cert\_get\_subkey\_id ()**

```
int gnutls_openpgp_cert_get_subkey_id (gnutls_openpgp_cert_t key,
                                       unsigned int idx,
                                       gnutls_openpgp_keyid_t keyid);
```

Get the subkey's key-id.

**key** : the structure that contains the OpenPGP public key.

**idx** : the subkey index

**keyid** : the buffer to save the keyid.

**Returns** : the 64-bit keyID of the OpenPGP key.

**gnutls\_openpgp\_cert\_get\_subkey\_usage ()**

```
int gnutls_openpgp_cert_get_subkey_usage (gnutls_openpgp_cert_t key,
                                          unsigned int idx,
                                          unsigned int *key_usage);
```

This function will return certificate's key usage, by checking the key algorithm. The key usage value will ORed values of **GNUTLS\_KEY\_DIGITAL\_SIGNATURE** or **GNUTLS\_KEY\_KEY\_ENCIIPHERMENT**.

A negative error code may be returned in case of parsing error.

**key** : should contain a gnutls\_openpgp\_cert\_t structure

**idx** : the subkey index

**key\_usage** : where the key usage bits will be stored

**Returns** : key usage value.

Since 2.4.0

**gnutls\_openpgp\_cert\_get\_subkey\_pk\_dsa\_raw ()**

```
int gnutls_openpgp_cert_get_subkey_pk_dsa_raw
(gnutls_openpgp_cert_t crt,
 unsigned int idx,
 gnutls_datum_t *p,
 gnutls_datum_t *q,
 gnutls_datum_t *g,
 gnutls_datum_t *y);
```

This function will export the DSA public key's parameters found in the given certificate. The new parameters will be allocated using **gnutls\_malloc()** and will be stored in the appropriate datum.

**crt** : Holds the certificate

**idx** : Is the subkey index

**p** : will hold the p

**q** : will hold the q

**g** : will hold the g

**y** : will hold the y

**Returns** : **GNUTLS\_E\_SUCCESS** on success, otherwise a negative error code.

Since 2.4.0

**gnutls\_openpgp\_cert\_get\_subkey\_pk\_rsa\_raw ()**

```
int gnutls_openpgp_cert_get_subkey_pk_rsa_raw
                                         (gnutls_openpgp_cert_t crt,
                                          unsigned int idx,
                                          gnutls_datum_t *m,
                                          gnutls_datum_t *e);
```

This function will export the RSA public key's parameters found in the given structure. The new parameters will be allocated using **gnutls\_malloc()** and will be stored in the appropriate datum.

**crt** : Holds the certificate

**idx** : Is the subkey index

**m** : will hold the modulus

**e** : will hold the public exponent

**Returns** : **GNUTLS\_E\_SUCCESS** on success, otherwise a negative error code.

Since 2.4.0

**gnutls\_openpgp\_cert\_get\_pk\_dsa\_raw ()**

```
int gnutls_openpgp_cert_get_pk_dsa_raw  (gnutls_openpgp_cert_t crt,
                                           gnutls_datum_t *p,
                                           gnutls_datum_t *q,
                                           gnutls_datum_t *g,
                                           gnutls_datum_t *y);
```

This function will export the DSA public key's parameters found in the given certificate. The new parameters will be allocated using **gnutls\_malloc()** and will be stored in the appropriate datum.

**crt** : Holds the certificate

**p** : will hold the p

**q** : will hold the q

**g** : will hold the g

**y** : will hold the y

**Returns** : **GNUTLS\_E\_SUCCESS** on success, otherwise a negative error code.

Since 2.4.0

**gnutls\_openpgp\_cert\_get\_pk\_rsa\_raw ()**

```
int gnutls_openpgp_cert_get_pk_rsa_raw  (gnutls_openpgp_cert_t crt,
                                           gnutls_datum_t *m,
                                           gnutls_datum_t *e);
```

This function will export the RSA public key's parameters found in the given structure. The new parameters will be allocated using **gnutls\_malloc()** and will be stored in the appropriate datum.

**crt** : Holds the certificate

**m** : will hold the modulus

**e** : will hold the public exponent

**Returns** : **GNUTLS\_E\_SUCCESS** on success, otherwise a negative error code.

Since 2.4.0

#### **gnutls\_openpgp\_cert\_get\_preferred\_key\_id ()**

```
int gnutls_openpgp_cert_get_preferred_key_id
                                     (gnutls_openpgp_cert_t key,
                                     gnutls_openpgp_keyid_t keyid);
```

Get preferred key id. If it hasn't been set it returns **GNUTLS\_E\_INVALID\_REQUEST**.

**key** : the structure that contains the OpenPGP public key.

**keyid** : the struct to save the keyid.

**Returns** : the 64-bit preferred keyID of the OpenPGP key.

#### **gnutls\_openpgp\_cert\_set\_preferred\_key\_id ()**

```
int gnutls_openpgp_cert_set_preferred_key_id
                                     (gnutls_openpgp_cert_t key,
                                     const gnutls_openpgp_keyid_t keyid ←
                                     );
```

This allows setting a preferred key id for the given certificate. This key will be used by functions that involve key handling.

**key** : the structure that contains the OpenPGP public key.

**keyid** : the selected keyid

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error code is returned.

#### **gnutls\_openpgp\_privkey\_init ()**

```
int gnutls_openpgp_privkey_init (gnutls_openpgp_privkey_t *key);
```

This function will initialize an OpenPGP key structure.

**key** : The structure to be initialized

**Returns** : **GNUTLS\_E\_SUCCESS** on success, or an error code.

#### **gnutls\_openpgp\_privkey\_deinit ()**

```
void gnutls_openpgp_privkey_deinit (gnutls_openpgp_privkey_t key);
```

This function will deinitialize a key structure.

**key** : The structure to be initialized

**gnutls\_openpgp\_privkey\_get\_pk\_algorithm ()**

```
gnutls_pk_algorithm_t gnutls_openpgp_privkey_get_pk_algorithm
                                                                (gnutls_openpgp_privkey_t key,
                                                                unsigned int *bits);
```

This function will return the public key algorithm of an OpenPGP certificate.

If bits is non null, it should have enough size to hold the parameters size in bits. For RSA the bits returned is the modulus. For DSA the bits returned are of the public exponent.

**key** : is an OpenPGP key

**bits** : if bits is non null it will hold the size of the parameters' in bits

**Returns** : a member of the [gnutls\\_pk\\_algorithm\\_t](#) enumeration on success, or a negative error code on error.

Since 2.4.0

**gnutls\_openpgp\_privkey\_sec\_param ()**

```
gnutls_sec_param_t gnutls_openpgp_privkey_sec_param (gnutls_openpgp_privkey_t key);
```

This function will return the security parameter appropriate with this private key.

**key** : a key structure

**Returns** : On success, a valid security parameter is returned otherwise [GNUTLS\\_SEC\\_PARAM\\_UNKNOWN](#) is returned.

Since 2.12.0

**gnutls\_openpgp\_privkey\_import ()**

```
int gnutls_openpgp_privkey_import (gnutls_openpgp_privkey_t key,
                                   const gnutls_datum_t *data,
                                   gnutls_openpgp_crt_fmt_t format,
                                   const char *password,
                                   unsigned int flags);
```

This function will convert the given RAW or Base64 encoded key to the native gnutls\_openpgp\_privkey\_t format. The output will be stored in 'key'.

**key** : The structure to store the parsed key.

**data** : The RAW or BASE64 encoded key.

**format** : One of [gnutls\\_openpgp\\_crt\\_fmt\\_t](#) elements.

**password** : not used for now

**flags** : should be (0)

**Returns** : [GNUTLS\\_E\\_SUCCESS](#) on success, or an error code.

**gnutls\_openpgp\_privkey\_get\_fingerprint ()**

```
int gnutls_openpgp_privkey_get_fingerprint
                                     (gnutls_openpgp_privkey_t key,
                                     void *fpr,
                                     size_t *fprlen);
```

Get the fingerprint of the OpenPGP key. Depends on the algorithm, the fingerprint can be 16 or 20 bytes.

**key** : the raw data that contains the OpenPGP secret key.

**fpr** : the buffer to save the fingerprint, must hold at least 20 bytes.

**fprlen** : the integer to save the length of the fingerprint.

**Returns** : On success, 0 is returned, or an error code.

Since 2.4.0

**gnutls\_openpgp\_privkey\_get\_subkey\_fingerprint ()**

```
int gnutls_openpgp_privkey_get_subkey_fingerprint
                                     (gnutls_openpgp_privkey_t key,
                                     unsigned int idx,
                                     void *fpr,
                                     size_t *fprlen);
```

Get the fingerprint of an OpenPGP subkey. Depends on the algorithm, the fingerprint can be 16 or 20 bytes.

**key** : the raw data that contains the OpenPGP secret key.

**idx** : the subkey index

**fpr** : the buffer to save the fingerprint, must hold at least 20 bytes.

**fprlen** : the integer to save the length of the fingerprint.

**Returns** : On success, 0 is returned, or an error code.

Since 2.4.0

**gnutls\_openpgp\_privkey\_get\_key\_id ()**

```
int gnutls_openpgp_privkey_get_key_id (gnutls_openpgp_privkey_t key,
                                         gnutls_openpgp_keyid_t keyid);
```

Get key-id.

**key** : the structure that contains the OpenPGP secret key.

**keyid** : the buffer to save the keyid.

**Returns** : the 64-bit keyID of the OpenPGP key.

Since 2.4.0

**gnutls\_openpgp\_privkey\_get\_subkey\_count ()**

```
int gnutls_openpgp_privkey_get_subkey_count
                                     (gnutls_openpgp_privkey_t key);
```

This function will return the number of subkeys present in the given OpenPGP certificate.

**key** : is an OpenPGP key

**Returns** : the number of subkeys, or a negative error code on error.

Since 2.4.0

**gnutls\_openpgp\_privkey\_get\_subkey\_idx ()**

```
int gnutls_openpgp_privkey_get_subkey_idx
                                     (gnutls_openpgp_privkey_t key,
                                     const gnutls_openpgp_keyid_t keyid ←
                                     );
```

Get index of subkey.

**key** : the structure that contains the OpenPGP private key.

**keyid** : the keyid.

**Returns** : the index of the subkey or a negative error value.

Since 2.4.0

**gnutls\_openpgp\_privkey\_get\_subkey\_revoked\_status ()**

```
int gnutls_openpgp_privkey_get_subkey_revoked_status
                                     (gnutls_openpgp_privkey_t key,
                                     unsigned int idx);
```

Get revocation status of key.

**key** : the structure that contains the OpenPGP private key.

**idx** : is the subkey index

**Returns** : true (1) if the key has been revoked, or false (0) if it has not, or a negative error code indicates an error.

Since 2.4.0

**gnutls\_openpgp\_privkey\_get\_revoked\_status ()**

```
int gnutls_openpgp_privkey_get_revoked_status
                                     (gnutls_openpgp_privkey_t key);
```

Get revocation status of key.

**key** : the structure that contains the OpenPGP private key.

**Returns** : true (1) if the key has been revoked, or false (0) if it has not, or a negative error code indicates an error.

Since 2.4.0

**gnutls\_openpgp\_privkey\_get\_subkey\_pk\_algorithm ()**

```
gnutls_pk_algorithm_t gnutls_openpgp_privkey_get_subkey_pk_algorithm
                                                                (gnutls_openpgp_privkey_t key,
                                                                unsigned int idx,
                                                                unsigned int *bits);
```

This function will return the public key algorithm of a subkey of an OpenPGP certificate.

If bits is non null, it should have enough size to hold the parameters size in bits. For RSA the bits returned is the modulus. For DSA the bits returned are of the public exponent.

**key** : is an OpenPGP key

**idx** : is the subkey index

**bits** : if bits is non null it will hold the size of the parameters' in bits

**Returns** : a member of the [gnutls\\_pk\\_algorithm\\_t](#) enumeration on success, or a negative error code on error.

Since 2.4.0

**gnutls\_openpgp\_privkey\_get\_subkey\_expiration\_time ()**

```
time_t gnutls_openpgp_privkey_get_subkey_expiration_time
                                                                (gnutls_openpgp_privkey_t key,
                                                                unsigned int idx);
```

Get subkey expiration time. A value of '0' means that the key doesn't expire at all.

**key** : the structure that contains the OpenPGP private key.

**idx** : the subkey index

**Returns** : the time when the OpenPGP key expires.

Since 2.4.0

**gnutls\_openpgp\_privkey\_get\_subkey\_id ()**

```
int gnutls_openpgp_privkey_get_subkey_id
                                                                (gnutls_openpgp_privkey_t key,
                                                                unsigned int idx,
                                                                gnutls_openpgp_keyid_t keyid);
```

Get the key-id for the subkey.

**key** : the structure that contains the OpenPGP secret key.

**idx** : the subkey index

**keyid** : the buffer to save the keyid.

**Returns** : the 64-bit keyID of the OpenPGP key.

Since 2.4.0



**gnutls\_openpgp\_privkey\_get\_subkey\_creation\_time ()**

```
time_t          gnutls_openpgp_privkey_get_subkey_creation_time
                  (gnutls_openpgp_privkey_t key,
                   unsigned int idx);
```

Get subkey creation time.

**key** : the structure that contains the OpenPGP private key.

**idx** : the subkey index

**Returns** : the timestamp when the OpenPGP key was created.

Since 2.4.0

**gnutls\_openpgp\_privkey\_export\_subkey\_dsa\_raw ()**

```
int             gnutls_openpgp_privkey_export_subkey_dsa_raw
                  (gnutls_openpgp_privkey_t pkey,
                   unsigned int idx,
                   gnutls_datum_t *p,
                   gnutls_datum_t *q,
                   gnutls_datum_t *g,
                   gnutls_datum_t *y,
                   gnutls_datum_t *x);
```

This function will export the DSA private key's parameters found in the given certificate. The new parameters will be allocated using **gnutls\_malloc()** and will be stored in the appropriate datum.

**pkey** : Holds the certificate

**idx** : Is the subkey index

**p** : will hold the p

**q** : will hold the q

**g** : will hold the g

**y** : will hold the y

**x** : will hold the x

**Returns** : **GNUTLS\_E\_SUCCESS** on success, otherwise a negative error code.

Since 2.4.0

**gnutls\_openpgp\_privkey\_export\_subkey\_rsa\_raw ()**

```
int             gnutls_openpgp_privkey_export_subkey_rsa_raw
                  (gnutls_openpgp_privkey_t pkey,
                   unsigned int idx,
                   gnutls_datum_t *m,
                   gnutls_datum_t *e,
                   gnutls_datum_t *d,
                   gnutls_datum_t *p,
                   gnutls_datum_t *q,
                   gnutls_datum_t *u);
```

This function will export the RSA private key's parameters found in the given structure. The new parameters will be allocated using `gnutls_malloc()` and will be stored in the appropriate datum.

***pkey*** : Holds the certificate

***idx*** : Is the subkey index

***m*** : will hold the modulus

***e*** : will hold the public exponent

***d*** : will hold the private exponent

***p*** : will hold the first prime (p)

***q*** : will hold the second prime (q)

***u*** : will hold the coefficient

**Returns** : **GNUTLS\_E\_SUCCESS** on success, otherwise a negative error code.

Since 2.4.0

#### **gnutls\_openpgp\_privkey\_export\_dsa\_raw ()**

```
int gnutls_openpgp_privkey_export_dsa_raw
                                     (gnutls_openpgp_privkey_t pkey,
                                     gnutls_datum_t *p,
                                     gnutls_datum_t *q,
                                     gnutls_datum_t *g,
                                     gnutls_datum_t *y,
                                     gnutls_datum_t *x);
```

This function will export the DSA private key's parameters found in the given certificate. The new parameters will be allocated using `gnutls_malloc()` and will be stored in the appropriate datum.

***pkey*** : Holds the certificate

***p*** : will hold the p

***q*** : will hold the q

***g*** : will hold the g

***y*** : will hold the y

***x*** : will hold the x

**Returns** : **GNUTLS\_E\_SUCCESS** on success, otherwise a negative error code.

Since 2.4.0

**gnutls\_openpgp\_privkey\_export\_rsa\_raw ()**

```
int gnutls_openpgp_privkey_export_rsa_raw
(
    gnutls_openpgp_privkey_t pkey,
    gnutls_datum_t *m,
    gnutls_datum_t *e,
    gnutls_datum_t *d,
    gnutls_datum_t *p,
    gnutls_datum_t *q,
    gnutls_datum_t *u);
```

This function will export the RSA private key's parameters found in the given structure. The new parameters will be allocated using **gnutls\_malloc()** and will be stored in the appropriate datum.

**pkey** : Holds the certificate

**m** : will hold the modulus

**e** : will hold the public exponent

**d** : will hold the private exponent

**p** : will hold the first prime (p)

**q** : will hold the second prime (q)

**u** : will hold the coefficient

**Returns** : **GNUTLS\_E\_SUCCESS** on success, otherwise a negative error code.

Since 2.4.0

**gnutls\_openpgp\_privkey\_export ()**

```
int gnutls_openpgp_privkey_export
(
    gnutls_openpgp_privkey_t key,
    gnutls_openpgp_crt_fmt_t format,
    const char *password,
    unsigned int flags,
    void *output_data,
    size_t *output_data_size);
```

This function will convert the given key to RAW or Base64 format. If the buffer provided is not long enough to hold the output, then **GNUTLS\_E\_SHORT\_MEMORY\_BUFFER** will be returned.

**key** : Holds the key.

**format** : One of **gnutls\_openpgp\_crt\_fmt\_t** elements.

**password** : the password that will be used to encrypt the key. (unused for now)

**flags** : (0) for future compatibility

**output\_data** : will contain the key base64 encoded or raw

**output\_data\_size** : holds the size of output\_data (and will be replaced by the actual size of parameters)

**Returns** : **GNUTLS\_E\_SUCCESS** on success, or an error code.

Since 2.4.0

**gnutls\_openpgp\_privkey\_set\_preferred\_key\_id ()**

```
int gnutls_openpgp_privkey_set_preferred_key_id
                                     (gnutls_openpgp_privkey_t key,
                                     const gnutls_openpgp_keyid_t keyid ←
                                     );
```

This allows setting a preferred key id for the given certificate. This key will be used by functions that involve key handling.

**key** : the structure that contains the OpenPGP public key.

**keyid** : the selected keyid

**Returns** : On success, 0 is returned, or an error code.

**gnutls\_openpgp\_privkey\_get\_preferred\_key\_id ()**

```
int gnutls_openpgp_privkey_get_preferred_key_id
                                     (gnutls_openpgp_privkey_t key,
                                     gnutls_openpgp_keyid_t keyid);
```

Get the preferred key-id for the key.

**key** : the structure that contains the OpenPGP public key.

**keyid** : the struct to save the keyid.

**Returns** : the 64-bit preferred keyID of the OpenPGP key, or if it hasn't been set it returns **GNUTLS\_E\_INVALID\_REQUEST**.

**gnutls\_openpgp\_cert\_get\_auth\_subkey ()**

```
int gnutls_openpgp_cert_get_auth_subkey (gnutls_openpgp_cert_t crt,
                                           gnutls_openpgp_keyid_t keyid,
                                           unsigned int flag);
```

Returns the 64-bit keyID of the first valid OpenPGP subkey marked for authentication. If flag is non (0) and no authentication subkey exists, then a valid subkey will be returned even if it is not marked for authentication. Returns the 64-bit keyID of the first valid OpenPGP subkey marked for authentication. If flag is non (0) and no authentication subkey exists, then a valid subkey will be returned even if it is not marked for authentication.

**crt** : the structure that contains the OpenPGP public key.

**keyid** : the struct to save the keyid.

**flag** : Non (0) indicates that a valid subkey is always returned.

**Returns** : **GNUTLS\_E\_SUCCESS** on success, or an error code.

**gnutls\_openpgp\_keyring\_init ()**

```
int gnutls_openpgp_keyring_init (gnutls_openpgp_keyring_t *keyring) ←
;
```

This function will initialize an keyring structure.

**keyring** : The structure to be initialized

**Returns** : **GNUTLS\_E\_SUCCESS** on success, or an error code.

**gnutls\_openpgp\_keyring\_deinit ()**

```
void gnutls_openpgp_keyring_deinit (gnutls_openpgp_keyring_t keyring);
```

This function will deinitialize a keyring structure.

**keyring** : The structure to be initialized

**gnutls\_openpgp\_keyring\_import ()**

```
int gnutls_openpgp_keyring_import (gnutls_openpgp_keyring_t keyring,
                                   const gnutls_datum_t *data,
                                   gnutls_openpgp_cert_fmt_t format);
```

This function will convert the given RAW or Base64 encoded keyring to the native **gnutls\_openpgp\_keyring\_t** format. The output will be stored in 'keyring'.

**keyring** : The structure to store the parsed key.

**data** : The RAW or BASE64 encoded keyring.

**format** : One of **gnutls\_openpgp\_keyring\_fmt** elements.

**Returns** : **GNUTLS\_E\_SUCCESS** on success, or an error code.

**gnutls\_openpgp\_keyring\_check\_id ()**

```
int gnutls_openpgp_keyring_check_id (gnutls_openpgp_keyring_t ring,
                                     const gnutls_openpgp_keyid_t keyid ←
                                     ,
                                     unsigned int flags);
```

Check if a given key ID exists in the keyring.

**ring** : holds the keyring to check against

**keyid** : will hold the keyid to check for.

**flags** : unused (should be 0)

**Returns** : **GNUTLS\_E\_SUCCESS** on success (if keyid exists) and a negative error code on failure.

**gnutls\_openpgp\_cert\_verify\_ring ()**

```
int gnutls_openpgp_cert_verify_ring (gnutls_openpgp_cert_t key,
                                     gnutls_openpgp_keyring_t keyring,
                                     unsigned int flags,
                                     unsigned int *verify);
```

Verify all signatures in the key, using the given set of keys (keyring).

The key verification output will be put in *verify* and will be one or more of the **gnutls\_certificate\_status\_t** enumerated elements bitwise or'd.

**GNUTLS\_CERT\_INVALID**: A signature on the key is invalid.

**GNUTLS\_CERT\_REVOKED**: The key has been revoked.

Note that this function does not verify using any "web of trust". You may use GnuPG for that purpose, or any other external PGP application.

**key** : the structure that holds the key.

**keyring** : holds the keyring to check against

**flags** : unused (should be 0)

**verify** : will hold the certificate verification output.

**Returns** : **GNUTLS\_E\_SUCCESS** on success, or an error code.

#### **gnutls\_openpgp\_cert\_verify\_self ()**

```
int gnutls_openpgp_cert_verify_self (gnutls_openpgp_cert_t key,
                                     unsigned int flags,
                                     unsigned int *verify);
```

Verifies the self signature in the key. The key verification output will be put in *verify* and will be one or more of the `gnutls_certificate_status_t` enumerated elements bitwise or'd.

**GNUTLS\_CERT\_INVALID**: The self signature on the key is invalid.

**key** : the structure that holds the key.

**flags** : unused (should be 0)

**verify** : will hold the key verification output.

**Returns** : **GNUTLS\_E\_SUCCESS** on success, or an error code.

#### **gnutls\_openpgp\_keyring\_get\_cert ()**

```
int gnutls_openpgp_keyring_get_cert (gnutls_openpgp_keyring_t ring,
                                     unsigned int idx,
                                     gnutls_openpgp_cert_t *cert);
```

This function will extract an OpenPGP certificate from the given keyring. If the index given is out of range **GNUTLS\_E\_REQUESTED\_DATA\_NOT\_AVAILABLE** will be returned. The returned structure needs to be deinitied.

**ring** : Holds the keyring.

**idx** : the index of the certificate to export

**cert** : An uninitialized `gnutls_openpgp_cert_t` structure

**Returns** : **GNUTLS\_E\_SUCCESS** on success, or an error code.

#### **gnutls\_openpgp\_keyring\_get\_cert\_count ()**

```
int gnutls_openpgp_keyring_get_cert_count (gnutls_openpgp_keyring_t ring);
```

This function will return the number of OpenPGP certificates present in the given keyring.

**ring** : is an OpenPGP key ring

**Returns** : the number of subkeys, or a negative error code on error.

**gnutls\_openpgp\_recv\_key\_func ()**

```
int (*gnutls_openpgp_recv_key_func) (gnutls_session_t session,
                                     unsigned char *keyfpr,
                                     unsigned int keyfpr_length,
                                     gnutls_datum_t *key);
```

A callback of this type is used to retrieve OpenPGP keys. Only useful on the server, and will only be used if the peer send a key fingerprint instead of a full key. See also [gnutls\\_openpgp\\_set\\_recv\\_key\\_function\(\)](#).

**session** : a TLS session

**keyfpr** : key fingerprint

**keyfpr\_length** : length of key fingerprint

**key** : output key.

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (zero) is returned, otherwise an error code is returned.

**gnutls\_openpgp\_set\_recv\_key\_function ()**

```
void gnutls_openpgp_set_recv_key_function (gnutls_session_t session,
                                           gnutls_openpgp_recv_key_func func) ↵
                                           ;
```

This funtion will set a key retrieval function for OpenPGP keys. This callback is only useful in server side, and will be used if the peer sent a key fingerprint instead of a full key.

**session** : a TLS session

**func** : the callback

**gnutls\_certificate\_set\_openpgp\_key ()**

```
int gnutls_certificate_set_openpgp_key (gnutls_certificate_credentials_t ↵
    res,
                                       gnutls_openpgp_cert_t crt,
                                       gnutls_openpgp_privkey_t pkey);
```

This function sets a certificate/private key pair in the `gnutls_certificate_credentials_t` structure. This function may be called more than once (in case multiple keys/certificates exist for the server).

Note that this function requires that the preferred key ids have been set and be used. See [gnutls\\_openpgp\\_cert\\_set\\_preferred\\_key\\_id\(\)](#). Otherwise the master key will be used.

**res** : is a [gnutls\\_certificate\\_credentials\\_t](#) structure.

**crt** : contains an openpgp public key

**pkey** : is an openpgp private key

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error code is returned.

**gnutls\_certificate\_set\_openpgp\_key\_file ()**

```
int gnutls_certificate_set_openpgp_key_file
                                     (gnutls_certificate_credentials_t ↵
                                     res,
                                     const char *certfile,
                                     const char *keyfile,
                                     gnutls_openpgp_cert_fmt_t format);
```

This function is used to load OpenPGP keys into the GnuTLS credentials structure. The file should contain at least one valid non encrypted subkey.

**res** : the destination context to save the data.

**certfile** : the file that contains the public key.

**keyfile** : the file that contains the secret key.

**format** : the format of the keys

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

**gnutls\_certificate\_set\_openpgp\_key\_mem ()**

```
int gnutls_certificate_set_openpgp_key_mem
                                     (gnutls_certificate_credentials_t ↵
                                     res,
                                     const gnutls_datum_t *cert,
                                     const gnutls_datum_t *key,
                                     gnutls_openpgp_cert_fmt_t format);
```

This function is used to load OpenPGP keys into the GnuTLS credential structure. The datum should contain at least one valid non encrypted subkey.

**res** : the destination context to save the data.

**cert** : the datum that contains the public key.

**key** : the datum that contains the secret key.

**format** : the format of the keys

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

**gnutls\_certificate\_set\_openpgp\_key\_file2 ()**

```
int gnutls_certificate_set_openpgp_key_file2
                                     (gnutls_certificate_credentials_t ↵
                                     res,
                                     const char *certfile,
                                     const char *keyfile,
                                     const char *subkey_id,
                                     gnutls_openpgp_cert_fmt_t format);
```

This function is used to load OpenPGP keys into the GnuTLS credential structure. The file should contain at least one valid non encrypted subkey.

The special keyword "auto" is also accepted as *subkey\_id*. In that case the **gnutls\_openpgp\_cert\_get\_auth\_subkey()** will be used to retrieve the subkey.



**res** : the destination context to save the data.

**certfile** : the file that contains the public key.

**keyfile** : the file that contains the secret key.

**subkey\_id** : a hex encoded subkey id

**format** : the format of the keys

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

Since 2.4.0

### gnutls\_certificate\_set\_openpgp\_key\_mem2 ()

```
int gnutls_certificate_set_openpgp_key_mem2
(
    gnutls_certificate_credentials_t c ← res,
    const gnutls_datum_t *cert,
    const gnutls_datum_t *key,
    const char *subkey_id,
    gnutls_openpgp_cert_fmt_t format);
```

This function is used to load OpenPGP keys into the GnuTLS credentials structure. The datum should contain at least one valid non encrypted subkey.

The special keyword "auto" is also accepted as *subkey\_id*. In that case the **gnutls\_openpgp\_cert\_get\_auth\_subkey()** will be used to retrieve the subkey.

**res** : the destination context to save the data.

**cert** : the datum that contains the public key.

**key** : the datum that contains the secret key.

**subkey\_id** : a hex encoded subkey id

**format** : the format of the keys

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

Since 2.4.0

### gnutls\_certificate\_set\_openpgp\_keyring\_mem ()

```
int gnutls_certificate_set_openpgp_keyring_mem
(
    gnutls_certificate_credentials_t c ← ,
    unsigned char *data,
    size_t dlen,
    gnutls_openpgp_cert_fmt_t format);
```

The function is used to set keyrings that will be used internally by various OpenPGP functions. For example to find a key when it is needed for an operations. The keyring will also be used at the verification functions.

**c** : A certificate credentials structure

**data** : buffer with keyring data.

**dlen** : length of data buffer.

**format** : the format of the keyring

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

**gnutls\_certificate\_set\_openpgp\_keyring\_file ()**

```
int gnutls_certificate_set_openpgp_keyring_file
                                     (gnutls_certificate_credentials_t c ←
                                     ,
                                     const char *file,
                                     gnutls_openpgp_cert_fmt_t format);
```

The function is used to set keyrings that will be used internally by various OpenPGP functions. For example to find a key when it is needed for an operations. The keyring will also be used at the verification functions.

**c** : A certificate credentials structure

**file** : filename of the keyring.

**format** : format of keyring.

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

## 1.5 dtls

dtls —

### Synopsis

```
#define GNUTLS_COOKIE_KEY_SIZE
void gnutls_dtls_set_timeouts
                                     (gnutls_session_t session,
                                     unsigned int retrans_timeout,
                                     unsigned int total_timeout);

unsigned int gnutls_dtls_get_mtu
                                     (gnutls_session_t session);
unsigned int gnutls_dtls_get_data_mtu
                                     (gnutls_session_t session);
void gnutls_dtls_set_mtu
                                     (gnutls_session_t session,
                                     unsigned int mtu);

int gnutls_dtls_cookie_send
                                     (gnutls_datum_t *key,
                                     void *client_data,
                                     size_t client_data_size,
                                     gnutls_dtls_prestate_st *prestate,
                                     gnutls_transport_ptr_t ptr,
                                     gnutls_push_func push_func);

int gnutls_dtls_cookie_verify
                                     (gnutls_datum_t *key,
                                     void *client_data,
                                     size_t client_data_size,
                                     void *_msg,
                                     size_t msg_size,
                                     gnutls_dtls_prestate_st *prestate);

void gnutls_dtls_prestate_set
                                     (gnutls_session_t session,
                                     gnutls_dtls_prestate_st *prestate);

unsigned int gnutls_record_get_discarded
                                     (gnutls_session_t session);
```

### Description

### Details

#### GNUTLS\_COOKIE\_KEY\_SIZE

```
#define GNUTLS_COOKIE_KEY_SIZE 16
```

**gnutls\_dtls\_set\_timeouts ()**

```
void                gnutls_dtls_set_timeouts      (gnutls_session_t session,
                                                    unsigned int retrans_timeout,
                                                    unsigned int total_timeout);
```

This function will set the timeouts required for the DTLS handshake protocol. The retransmission timeout is the time after which a message from the peer is not received, the previous messages will be retransmitted. The total timeout is the time after which the handshake will be aborted with **GNUTLS\_E\_TIMEDOUT**.

The DTLS protocol recommends the values of 1 sec and 60 seconds respectively.

If the retransmission timeout is zero then the handshake will operate in a non-blocking way, i.e., return **GNUTLS\_E\_AGAIN**.

**session** : is a **gnutls\_session\_t** structure.

**retrans\_timeout** : The time at which a retransmission will occur in milliseconds

**total\_timeout** : The time at which the connection will be aborted, in milliseconds.

Since 3.0.0

**gnutls\_dtls\_get\_mtu ()**

```
unsigned int        gnutls_dtls_get_mtu          (gnutls_session_t session);
```

This function will return the MTU size as set with **gnutls\_dtls\_set\_mtu()**. This is not the actual MTU of data you can transmit. Use **gnutls\_dtls\_get\_data\_mtu()** for that reason.

**session** : is a **gnutls\_session\_t** structure.

**Returns** : the set maximum transfer unit.

Since 3.0.0

**gnutls\_dtls\_get\_data\_mtu ()**

```
unsigned int        gnutls_dtls_get_data_mtu     (gnutls_session_t session);
```

This function will return the actual maximum transfer unit for application data. I.e. DTLS headers are subtracted from the actual MTU.

**session** : is a **gnutls\_session\_t** structure.

**Returns** : the maximum allowed transfer unit.

Since 3.0.0

**gnutls\_dtls\_set\_mtu ()**

```
void                gnutls_dtls_set_mtu         (gnutls_session_t session,
                                                    unsigned int mtu);
```

This function will set the maximum transfer unit of the interface that DTLS packets are expected to leave from.

**session** : is a **gnutls\_session\_t** structure.

**mtu** : The maximum transfer unit of the interface

Since 3.0.0

**gnutls\_dtls\_cookie\_send ()**

```
int                gnutls_dtls_cookie_send      (gnutls_datum_t *key,
                                                void *client_data,
                                                size_t client_data_size,
                                                gnutls_dtls_prestate_st *prestate,
                                                gnutls_transport_ptr_t ptr,
                                                gnutls_push_func push_func);
```

This function can be used to prevent denial of service attacks to a DTLS server by requiring the client to reply using a cookie sent by this function. That way it can be ensured that a client we allocated resources for (i.e. [gnutls\\_session\\_t](#)) is the one that the original incoming packet was originated from.

**key** : is a random key to be used at cookie generation

**client\_data** : contains data identifying the client (i.e. address)

**client\_data\_size** : The size of client's data

**prestate** : The previous cookie returned by [gnutls\\_dtls\\_cookie\\_verify\(\)](#)

**ptr** : A transport pointer to be used by *push\_func*

**push\_func** : A function that will be used to reply

**Returns** : the number of bytes sent, or a negative error code.

Since 3.0.0

**gnutls\_dtls\_cookie\_verify ()**

```
int                gnutls_dtls_cookie_verify   (gnutls_datum_t *key,
                                                void *client_data,
                                                size_t client_data_size,
                                                void *_msg,
                                                size_t msg_size,
                                                gnutls_dtls_prestate_st *prestate) ←
                                                ;
```

This function will verify an incoming message for a valid cookie. If a valid cookie is returned then it should be associated with the session using [gnutls\\_dtls\\_prestate\\_set\(\)](#);

**key** : is a random key to be used at cookie generation

**client\_data** : contains data identifying the client (i.e. address)

**client\_data\_size** : The size of client's data

**\_msg** : An incoming message that initiates a connection.

**msg\_size** : The size of the message.

**prestate** : The cookie of this client.

**Returns** : [GNUTLS\\_E\\_SUCCESS](#) (0) on success, or a negative error code.

Since 3.0.0

**gnutls\_dtls\_prestate\_set ()**

```
void                gnutls_dtls_prestate_set                (gnutls_session_t session,
                                                            gnutls_dtls_prestate_st *prestate) ←
                                                            ;
```

This function will associate the prestate acquired by the cookie authentication with the client, with the newly established session.

**session** : a new session

**prestate** : contains the client's prestate

Since 3.0.0

**gnutls\_record\_get\_discarded ()**

```
unsigned int        gnutls_record_get_discarded            (gnutls_session_t session);
```

Returns the number of discarded packets in a DTLS connection.

**session** : is a [gnutls\\_session\\_t](#) structure.

**Returns** : The number of discarded packets.

Since 3.0.0

## 1.6 crypto

crypto —

### Synopsis

```
typedef                gnutls_cipher_hd_t;
int                    gnutls_cipher_init                  (gnutls_cipher_hd_t *handle,
                                                            gnutls_cipher_algorithm_t cipher,
                                                            const gnutls_datum_t *key,
                                                            const gnutls_datum_t *iv);

int                    gnutls_cipher_encrypt                (const gnutls_cipher_hd_t handle,
                                                            void *text,
                                                            size_t textlen);

int                    gnutls_cipher_decrypt                (const gnutls_cipher_hd_t handle,
                                                            void *ciphertext,
                                                            size_t ciphertextlen);

int                    gnutls_cipher_decrypt2              (gnutls_cipher_hd_t handle,
                                                            const void *ciphertext,
                                                            size_t ciphertextlen,
                                                            void *text,
                                                            size_t textlen);

int                    gnutls_cipher_encrypt2              (gnutls_cipher_hd_t handle,
                                                            const void *text,
                                                            size_t textlen,
                                                            void *ciphertext,
                                                            size_t ciphertextlen);

void                   gnutls_cipher_set_iv                (gnutls_cipher_hd_t handle,
```

		void *iv, size_t ivlen);
int	gnutls_cipher_tag	(gnutls_cipher_hd_t handle, void *tag, size_t tag_size);
int	gnutls_cipher_add_auth	(gnutls_cipher_hd_t handle, const void *text, size_t text_size);
void	gnutls_cipher_deinit	(gnutls_cipher_hd_t handle);
int	gnutls_cipher_get_block_size	(gnutls_cipher_algorithm_t algorithm,
typedef	gnutls_hash_hd_t;	
typedef	gnutls_hmac_hd_t;	
int	gnutls_hmac_init	(gnutls_hmac_hd_t *dig, gnutls_digest_algorithm_t algorithm, const void *key, size_t keylen);
int	gnutls_hmac	(gnutls_hmac_hd_t handle, const void *text, size_t textlen);
void	gnutls_hmac_output	(gnutls_hmac_hd_t handle, void *digest);
void	gnutls_hmac_deinit	(gnutls_hmac_hd_t handle, void *digest);
int	gnutls_hmac_get_len	(gnutls_mac_algorithm_t algorithm,
int	gnutls_hmac_fast	(gnutls_mac_algorithm_t algorithm, const void *key, size_t keylen, const void *text, size_t textlen, void *digest);
int	gnutls_hash_init	(gnutls_hash_hd_t *dig, gnutls_digest_algorithm_t algorithm,
int	gnutls_hash	(gnutls_hash_hd_t handle, const void *text, size_t textlen);
void	gnutls_hash_output	(gnutls_hash_hd_t handle, void *digest);
void	gnutls_hash_deinit	(gnutls_hash_hd_t handle, void *digest);
int	gnutls_hash_get_len	(gnutls_digest_algorithm_t algorithm,
int	gnutls_hash_fast	(gnutls_digest_algorithm_t algorithm, const void *text, size_t textlen, void *digest);
enum	gnutls_rnd_level_t;	
int	gnutls_rnd	(gnutls_rnd_level_t level, void *data, size_t len);

## Description

## Details

### gnutls\_cipher\_hd\_t

```
typedef struct api_cipher_hd_st *gnutls_cipher_hd_t;
```

**gnutls\_cipher\_init ()**

```
int                gnutls_cipher_init                (gnutls_cipher_hd_t *handle,
                                                    gnutls_cipher_algorithm_t cipher,
                                                    const gnutls_datum_t *key,
                                                    const gnutls_datum_t *iv);
```

This function will initialize an context that can be used for encryption/decryption of data. This will effectively use the current crypto backend in use by gnutls or the cryptographic accelerator in use.

**handle** : is a **gnutls\_cipher\_hd\_t** structure.

**cipher** : the encryption algorithm to use

**key** : The key to be used for encryption

**iv** : The IV to use (if not applicable set NULL)

**Returns** : Zero or a negative error code on error.

Since 2.10.0

**gnutls\_cipher\_encrypt ()**

```
int                gnutls_cipher_encrypt            (const gnutls_cipher_hd_t handle,
                                                    void *text,
                                                    size_t textlen);
```

This function will encrypt the given data using the algorithm specified by the context.

**handle** : is a **gnutls\_cipher\_hd\_t** structure.

**text** : the data to encrypt

**textlen** : The length of data to encrypt

**Returns** : Zero or a negative error code on error.

Since 2.10.0

**gnutls\_cipher\_decrypt ()**

```
int                gnutls_cipher_decrypt            (const gnutls_cipher_hd_t handle,
                                                    void *ciphertext,
                                                    size_t ciphertextlen);
```

This function will decrypt the given data using the algorithm specified by the context.

**handle** : is a **gnutls\_cipher\_hd\_t** structure.

**ciphertext** : the data to encrypt

**ciphertextlen** : The length of data to encrypt

**Returns** : Zero or a negative error code on error.

Since 2.10.0

**gnutls\_cipher\_decrypt2 ()**

```
int                gnutls_cipher_decrypt2      (gnutls_cipher_hd_t handle,
                                                const void *ciphertext,
                                                size_t ciphertextlen,
                                                void *text,
                                                size_t textlen);
```

This function will decrypt the given data using the algorithm specified by the context.

**handle** : is a **gnutls\_cipher\_hd\_t** structure.

**ciphertext** : the data to encrypt

**ciphertextlen** : The length of data to encrypt

**text** : the decrypted data

**textlen** : The available length for decrypted data

**Returns** : Zero or a negative error code on error.

Since 2.12.0

**gnutls\_cipher\_encrypt2 ()**

```
int                gnutls_cipher_encrypt2     (gnutls_cipher_hd_t handle,
                                                const void *text,
                                                size_t textlen,
                                                void *ciphertext,
                                                size_t ciphertextlen);
```

This function will encrypt the given data using the algorithm specified by the context.

**handle** : is a **gnutls\_cipher\_hd\_t** structure.

**text** : the data to encrypt

**textlen** : The length of data to encrypt

**ciphertext** : the encrypted data

**ciphertextlen** : The available length for encrypted data

**Returns** : Zero or a negative error code on error.

Since 2.12.0

**gnutls\_cipher\_set\_iv ()**

```
void               gnutls_cipher_set_iv      (gnutls_cipher_hd_t handle,
                                                void *iv,
                                                size_t ivlen);
```

This function will set the IV to be used for the next encryption block.

**handle** : is a **gnutls\_cipher\_hd\_t** structure.

**iv** : the IV to set

**ivlen** : The length of the IV

Since 3.0.0



**gnutls\_cipher\_tag ()**

```
int gnutls_cipher_tag (gnutls_cipher_hd_t handle,
                      void *tag,
                      size_t tag_size);
```

This function operates on authenticated encryption with associated data (AEAD) ciphers and will return the output tag.

**handle** : is a `gnutls_cipher_hd_t` structure.

**tag** : will hold the tag

**tag\_size** : The length of the tag to return

**Returns** : Zero or a negative error code on error.

Since 3.0.0

**gnutls\_cipher\_add\_auth ()**

```
int gnutls_cipher_add_auth (gnutls_cipher_hd_t handle,
                           const void *text,
                           size_t text_size);
```

This function operates on authenticated encryption with associated data (AEAD) ciphers and authenticate the input data. This function can only be called once and before any encryption operations.

**handle** : is a `gnutls_cipher_hd_t` structure.

**text** : the data to be authenticated

**text\_size** : The length of the data

**Returns** : Zero or a negative error code on error.

Since 3.0.0

**gnutls\_cipher\_deinit ()**

```
void gnutls_cipher_deinit (gnutls_cipher_hd_t handle);
```

This function will deinitialize all resources occupied by the given encryption context.

**handle** : is a `gnutls_cipher_hd_t` structure.

Since 2.10.0

**gnutls\_cipher\_get\_block\_size ()**

```
int gnutls_cipher_get_block_size (gnutls_cipher_algorithm_t algorithm);
```

Get block size for encryption algorithm.

**algorithm** : is an encryption algorithm

**Returns** : block size for encryption algorithm.

Since 2.10.0

**gnutls\_hash\_hd\_t**

```
typedef struct hash_hd_st *gnutls_hash_hd_t;
```

**gnutls\_hmac\_hd\_t**

```
typedef struct hmac_hd_st *gnutls_hmac_hd_t;
```

**gnutls\_hmac\_init ()**

```
int gnutls_hmac_init (gnutls_hmac_hd_t *dig,
                     gnutls_digest_algorithm_t algorithm,
                     const void *key,
                     size_t keylen);
```

This function will initialize an context that can be used to produce a Message Authentication Code (MAC) of data. This will effectively use the current crypto backend in use by gnutls or the cryptographic accelerator in use.

**dig** : is a [gnutls\\_hmac\\_hd\\_t](#) structure.

**algorithm** : the HMAC algorithm to use

**key** : The key to be used for encryption

**keylen** : The length of the key

**Returns** : Zero or a negative error code on error.

Since 2.10.0

**gnutls\_hmac ()**

```
int gnutls_hmac (gnutls_hmac_hd_t handle,
                 const void *text,
                 size_t textlen);
```

This function will hash the given data using the algorithm specified by the context.

**handle** : is a [gnutls\\_cipher\\_hd\\_t](#) structure.

**text** : the data to hash

**textlen** : The length of data to hash

**Returns** : Zero or a negative error code on error.

Since 2.10.0

**gnutls\_hmac\_output ()**

```
void gnutls_hmac_output (gnutls_hmac_hd_t handle,
                         void *digest);
```

This function will output the current MAC value.

**handle** : is a [gnutls\\_hmac\\_hd\\_t](#) structure.

**digest** : is the output value of the MAC

Since 2.10.0

**gnutls\_hmac\_deinit ()**

```
void gnutls_hmac_deinit (gnutls_hmac_hd_t handle, void *digest);
```

This function will deinitialize all resources occupied by the given hmac context.

**handle** : is a [gnutls\\_hmac\\_hd\\_t](#) structure.

**digest** : is the output value of the MAC

Since 2.10.0

**gnutls\_hmac\_get\_len ()**

```
int gnutls_hmac_get_len (gnutls_mac_algorithm_t algorithm);
```

This function will return the length of the output data of the given hmac algorithm.

**algorithm** : the hmac algorithm to use

**Returns** : The length or zero on error.

Since 2.10.0

**gnutls\_hmac\_fast ()**

```
int gnutls_hmac_fast (gnutls_mac_algorithm_t algorithm, const void *key, size_t keylen, const void *text, size_t textlen, void *digest);
```

This convenience function will hash the given data and return output on a single call.

**algorithm** : the hash algorithm to use

**key** : the key to use

**keylen** : The length of the key

**text** : the data to hash

**textlen** : The length of data to hash

**digest** : is the output value of the hash

**Returns** : Zero or a negative error code on error.

Since 2.10.0

**gnutls\_hash\_init ()**

```
int                gnutls_hash_init                (gnutls_hash_hd_t *dig,
                                                    gnutls_digest_algorithm_t ↔
                                                    algorithm);
```

This function will initialize an context that can be used to produce a Message Digest of data. This will effectively use the current crypto backend in use by gnutls or the cryptographic accelerator in use.

**dig** : is a [gnutls\\_hash\\_hd\\_t](#) structure.

**algorithm** : the hash algorithm to use

**Returns** : Zero or a negative error code on error.

Since 2.10.0

**gnutls\_hash ()**

```
int                gnutls_hash                    (gnutls_hash_hd_t handle,
                                                    const void *text,
                                                    size_t textlen);
```

This function will hash the given data using the algorithm specified by the context.

**handle** : is a [gnutls\\_cipher\\_hd\\_t](#) structure.

**text** : the data to hash

**textlen** : The length of data to hash

**Returns** : Zero or a negative error code on error.

Since 2.10.0

**gnutls\_hash\_output ()**

```
void                gnutls_hash_output            (gnutls_hash_hd_t handle,
                                                    void *digest);
```

This function will output the current hash value.

**handle** : is a [gnutls\\_hash\\_hd\\_t](#) structure.

**digest** : is the output value of the hash

Since 2.10.0

**gnutls\_hash\_deinit ()**

```
void                gnutls_hash_deinit            (gnutls_hash_hd_t handle,
                                                    void *digest);
```

This function will deinitialize all resources occupied by the given hash context.

**handle** : is a [gnutls\\_hash\\_hd\\_t](#) structure.

**digest** : is the output value of the hash

Since 2.10.0

**gnutls\_hash\_get\_len ()**

```
int gnutls_hash_get_len (gnutls_digest_algorithm_t algorithm);
```

This function will return the length of the output data of the given hash algorithm.

**algorithm** : the hash algorithm to use

**Returns** : The length or zero on error.

Since 2.10.0

**gnutls\_hash\_fast ()**

```
int gnutls_hash_fast (gnutls_digest_algorithm_t algorithm,
                      const void *text,
                      size_t textlen,
                      void *digest);
```

This convenience function will hash the given data and return output on a single call.

**algorithm** : the hash algorithm to use

**text** : the data to hash

**textlen** : The length of data to hash

**digest** : is the output value of the hash

**Returns** : Zero or a negative error code on error.

Since 2.10.0

**enum gnutls\_rnd\_level\_t**

```
typedef enum gnutls_rnd_level
{
    GNUTLS_RND_NONCE = 0,
    GNUTLS_RND_RANDOM = 1,
    GNUTLS_RND_KEY = 2
} gnutls_rnd_level_t;
```

Enumeration of random quality levels.

**GNUTLS\_RND\_NONCE** Non-predictable random number. Fatal in parts of session if broken, i.e., vulnerable to statistical analysis.

**GNUTLS\_RND\_RANDOM** Pseudo-random cryptographic random number. Fatal in session if broken.

**GNUTLS\_RND\_KEY** Fatal in many sessions if broken.

**gnutls\_rnd ()**

```
int          gnutls_rnd          (gnutls_rnd_level_t level,
                                void *data,
                                size_t len);
```

This function will generate random data and store it to output buffer.

**level** : a security level

**data** : place to store random bytes

**len** : The requested size

**Returns** : Zero or a negative error code on error.

Since 2.12.0

## 1.7 pkcs11

pkcs11 —

### Synopsis

```
#define          GNUTLS_PKCS11_MAX_PIN_LEN
int             (*gnutls_pkcs11_token_callback_t) (void *const userdata,
                                                    const char *const label,
                                                    unsigned retry);

enum            gnutls_pkcs11_pin_flag_t;
int             (*gnutls_pkcs11_pin_callback_t) (void *userdata,
                                                    int attempt,
                                                    const char *token_url,
                                                    const char *token_label,
                                                    unsigned int flags,
                                                    char *pin,
                                                    size_t pin_max);

struct          gnutls_pkcs11_obj_st;
typedef         gnutls_pkcs11_obj_t;
#define         GNUTLS_PKCS11_FLAG_MANUAL
#define         GNUTLS_PKCS11_FLAG_AUTO
int             gnutls_pkcs11_init (unsigned int flags,
                                    const char *deprecated_config_file);
void            gnutls_pkcs11_deinit (void);
void            gnutls_pkcs11_set_token_function (gnutls_pkcs11_token_callback_t fn,
                                                  void *userdata);
void            gnutls_pkcs11_set_pin_function (gnutls_pkcs11_pin_callback_t fn,
                                                 void *userdata);
int             gnutls_pkcs11_add_provider (const char *name,
                                             const char *params);
int             gnutls_pkcs11_obj_init (gnutls_pkcs11_obj_t *obj);
#define         GNUTLS_PKCS11_OBJ_FLAG_LOGIN
#define         GNUTLS_PKCS11_OBJ_FLAG_MARK_TRUSTED
#define         GNUTLS_PKCS11_OBJ_FLAG_MARK_SENSITIVE
#define         GNUTLS_PKCS11_OBJ_FLAG_LOGIN_SO
#define         GNUTLS_PKCS11_OBJ_FLAG_MARK_PRIVATE
```

---

```

#define          GNUTLS_PKCS11_OBJ_FLAG_MARK_NOT_PRIVATE
enum            gnutls_pkcs11_url_type_t;
int             gnutls_pkcs11_obj_import_url      (gnutls_pkcs11_obj_t cert,
                                                    const char *url,
                                                    unsigned int flags);
int             gnutls_pkcs11_obj_export_url      (gnutls_pkcs11_obj_t obj,
                                                    gnutls_pkcs11_url_type_t detailed,
                                                    char **url);
void            gnutls_pkcs11_obj_deinit         (gnutls_pkcs11_obj_t obj);
int             gnutls_pkcs11_obj_export         (gnutls_pkcs11_obj_t obj,
                                                    void *output_data,
                                                    size_t *output_data_size);
int             gnutls_pkcs11_copy_x509_cert     (const char *token_url,
                                                    gnutls_x509_cert_t crt,
                                                    const char *label,
                                                    unsigned int flags);
int             gnutls_pkcs11_copy_x509_privkey  (const char *token_url,
                                                    gnutls_x509_privkey_t key,
                                                    const char *label,
                                                    unsigned int key_usage,
                                                    unsigned int flags);
int             gnutls_pkcs11_delete_url         (const char *object_url,
                                                    unsigned int flags);
int             gnutls_pkcs11_copy_secret_key    (const char *token_url,
                                                    gnutls_datum_t *key,
                                                    const char *label,
                                                    unsigned int key_usage,
                                                    unsigned int flags);

enum            gnutls_pkcs11_obj_info_t;
int             gnutls_pkcs11_obj_get_info       (gnutls_pkcs11_obj_t crt,
                                                    gnutls_pkcs11_obj_info_t itype,
                                                    void *output,
                                                    size_t *output_size);

enum            gnutls_pkcs11_obj_attr_t;
enum            gnutls_pkcs11_token_info_t;
enum            gnutls_pkcs11_obj_type_t;
int             gnutls_pkcs11_token_init         (const char *token_url,
                                                    const char *so_pin,
                                                    const char *label);
int             gnutls_pkcs11_token_get_mechanism (const char *url,
                                                    int idx,
                                                    unsigned long *mechanism);
int             gnutls_pkcs11_token_set_pin      (const char *token_url,
                                                    const char *oldpin,
                                                    const char *newpin,
                                                    unsigned int flags);
int             gnutls_pkcs11_token_get_url      (unsigned int seq,
                                                    gnutls_pkcs11_url_type_t detailed,
                                                    char **url);
int             gnutls_pkcs11_token_get_info     (const char *url,
                                                    gnutls_pkcs11_token_info_t ttype,
                                                    void *output,
                                                    size_t *output_size);

#define          GNUTLS_PKCS11_TOKEN_HW
int             gnutls_pkcs11_token_get_flags   (const char *url,
                                                    unsigned int *flags);
int             gnutls_pkcs11_obj_list_import_url (gnutls_pkcs11_obj_t *p_list,

```

---

		unsigned int *const n_list, const char *url, gnutls_pkcs11_obj_attr_t attrs, unsigned int flags);
int	gnutls_x509_crt_import_pkcs11	(gnutls_x509_crt_t crt, gnutls_pkcs11_obj_t pkcs11_crt);
int	gnutls_x509_crt_import_pkcs11_url	(gnutls_x509_crt_t crt, const char *url, unsigned int flags);
gnutls_pkcs11_obj_type_t	gnutls_pkcs11_obj_get_type	(gnutls_pkcs11_obj_t obj);
const char *	gnutls_pkcs11_type_get_name	(gnutls_pkcs11_obj_type_t type);
int	gnutls_x509_crt_list_import_pkcs11	(gnutls_x509_crt_t *certs, unsigned int cert_max, gnutls_pkcs11_obj_t * const objs, unsigned int flags);
int	gnutls_pkcs11_privkey_init	(gnutls_pkcs11_privkey_t *key);
void	gnutls_pkcs11_privkey_deinit	(gnutls_pkcs11_privkey_t key);
int	gnutls_pkcs11_privkey_get_pk_algorithm	(gnutls_pkcs11_privkey_t key, unsigned int *bits);
int	gnutls_pkcs11_privkey_get_info	(gnutls_pkcs11_privkey_t pkey, gnutls_pkcs11_obj_info_t itype, void *output, size_t *output_size);
int	gnutls_pkcs11_privkey_import_url	(gnutls_pkcs11_privkey_t pkey, const char *url, unsigned int flags);
int	gnutls_pkcs11_privkey_export_url	(gnutls_pkcs11_privkey_t key, gnutls_pkcs11_url_type_t detailed, char **url);
int	gnutls_pkcs11_privkey_generate	(const char *url, gnutls_pk_algorithm_t pk, unsigned int bits, const char *label, unsigned int flags);

## Description

## Details

### GNUTLS\_PKCS11\_MAX\_PIN\_LEN

```
#define GNUTLS_PKCS11_MAX_PIN_LEN 32
```

### gnutls\_pkcs11\_token\_callback\_t()

```
int (*gnutls_pkcs11_token_callback_t) (void *const userdata,  
const char *const label,  
unsigned retry);
```

Token callback function. The callback will be used to ask the user to re-insert the token with given (null terminated) label. The callback should return zero if token has been inserted by user and a negative error code otherwise. It might be called multiple times if the token is not detected and the retry counter will be increased.

**userdata**: user-controlled data from [gnutls\\_pkcs11\\_set\\_token\\_function\(\)](#).



**label** : token label.

**retry** : retry counter, initially 0.

**Returns** : **GNUTLS\_E\_SUCCESS** (0) on success or a negative error code on error.

Since 2.12.0

### enum gnutls\_pkcs11\_pin\_flag\_t

```
typedef enum
{
    GNUTLS_PKCS11_PIN_USER = (1 << 0),
    GNUTLS_PKCS11_PIN_SO = (1 << 1),
    GNUTLS_PKCS11_PIN_FINAL_TRY = (1 << 2),
    GNUTLS_PKCS11_PIN_COUNT_LOW = (1 << 3),
    GNUTLS_PKCS11_PIN_CONTEXT_SPECIFIC = (1 << 4),
    GNUTLS_PKCS11_PIN_WRONG = (1 << 5),
} gnutls_pkcs11_pin_flag_t;
```

Enumeration of different PIN flags.

**GNUTLS\_PKCS11\_PIN\_USER** The PIN for the user.

**GNUTLS\_PKCS11\_PIN\_SO** The PIN for the security officer.

**GNUTLS\_PKCS11\_PIN\_FINAL\_TRY** This is the final try before blocking.

**GNUTLS\_PKCS11\_PIN\_COUNT\_LOW** Few tries remain before token blocks.

**GNUTLS\_PKCS11\_PIN\_CONTEXT\_SPECIFIC** The PIN is for a specific action and key like signing.

**GNUTLS\_PKCS11\_PIN\_WRONG** Last given PIN was not correct.

### gnutls\_pkcs11\_pin\_callback\_t()

```
int (*gnutls_pkcs11_pin_callback_t)(void *userdata,
                                     int attempt,
                                     const char *token_url,
                                     const char *token_label,
                                     unsigned int flags,
                                     char *pin,
                                     size_t pin_max);
```

Callback function type for PKCS11 PIN entry. It is set by **gnutls\_pkcs11\_set\_pin\_function()**.

The callback should provides the PIN code to unlock the token with label *token\_label*, specified by the URL *token\_url*.

The PIN code, as a NUL-terminated ASCII string, should be copied into the *pin* buffer (of maximum size *pin\_max*), and return 0 to indicate success. Alternatively, the callback may return a negative gnutls error code to indicate failure and cancel PIN entry (in which case, the contents of the *pin* parameter are ignored).

When a PIN is required, the callback will be invoked repeatedly (and indefinitely) until either the returned PIN code is correct, the callback returns failure, or the token refuses login (e.g. when the token is locked due to too many incorrect PINs!). For the first such invocation, the *attempt* counter will have value zero; it will increase by one for each subsequent attempt.

**userdata** : user-controlled data from **gnutls\_pkcs11\_set\_pin\_function()**.

**attempt** : pin-attempt counter, initially 0.

**token\_url** : PKCS11 URL.

***token\_label*** : label of PKCS11 token.

***flags*** : a `gnutls_pkcs11_pin_flag_t` flag.

***pin*** : buffer to hold PIN, of size *pin\_max*.

***pin\_max*** : size of *pin* buffer.

**Returns** : `GNUTLS_E_SUCCESS` (0) on success or a negative error code on error.

Since 2.12.0

### **struct gnutls\_pkcs11\_obj\_st**

```
struct gnutls_pkcs11_obj_st;
```

### **gnutls\_pkcs11\_obj\_t**

```
typedef struct gnutls_pkcs11_obj_st *gnutls_pkcs11_obj_t;
```

### **GNUTLS\_PKCS11\_FLAG\_MANUAL**

```
#define GNUTLS_PKCS11_FLAG_MANUAL 0      /* Manual loading of libraries */
```

### **GNUTLS\_PKCS11\_FLAG\_AUTO**

```
#define GNUTLS_PKCS11_FLAG_AUTO 1      /* Automatically load libraries by reading /etc/ ↵  
    gnutls/pkcs11.conf */
```

### **gnutls\_pkcs11\_init ()**

```
int                                gnutls_pkcs11_init                (unsigned int flags,  
                                                                    const char *deprecated_config_file ↵  
                                                                    );
```

This function will initialize the PKCS 11 subsystem in gnutls. It will read configuration files if `GNUTLS_PKCS11_FLAG_AUTO` is used or allow you to independently load PKCS 11 modules using `gnutls_pkcs11_add_provider()` if `GNUTLS_PKCS11_FLAG_MANUAL` is specified.

Normally you don't need to call this function since it is being called by `gnutls_global_init()` using the `GNUTLS_PKCS11_FLAG_AUTO`. If other option is required then it must be called before it.

***flags*** : `GNUTLS_PKCS11_FLAG_MANUAL` or `GNUTLS_PKCS11_FLAG_AUTO`

***deprecated\_config\_file*** : either NULL or the location of a deprecated configuration file

**Returns** : On success, `GNUTLS_E_SUCCESS` (0) is returned, otherwise a negative error value.

Since 2.12.0

**gnutls\_pkcs11\_deinit ()**

```
void                gnutls_pkcs11_deinit                (void);
```

This function will deinitialize the PKCS 11 subsystem in gnutls.

Since 2.12.0

**gnutls\_pkcs11\_set\_token\_function ()**

```
void                gnutls_pkcs11_set_token_function    (gnutls_pkcs11_token_callback_t fn,  
                                                        void *userdata);
```

This function will set a callback function to be used when a token needs to be inserted to continue PKCS 11 operations.

**fn** : The token callback

**userdata** : data to be supplied to callback

Since 2.12.0

**gnutls\_pkcs11\_set\_pin\_function ()**

```
void                gnutls_pkcs11_set_pin_function     (gnutls_pkcs11_pin_callback_t fn,  
                                                        void *userdata);
```

This function will set a callback function to be used when a PIN is required for PKCS 11 operations. See [gnutls\\_pkcs11\\_pin\\_callback\\_t\(\)](#) on how the callback should behave.

**fn** : The PIN callback, a [gnutls\\_pkcs11\\_pin\\_callback\\_t\(\)](#) function.

**userdata** : data to be supplied to callback

Since 2.12.0

**gnutls\_pkcs11\_add\_provider ()**

```
int                gnutls_pkcs11_add_provider          (const char *name,  
                                                        const char *params);
```

This function will load and add a PKCS 11 module to the module list used in gnutls. After this function is called the module will be used for PKCS 11 operations.

**name** : The filename of the module

**params** : should be NULL

**Returns** : On success, [GNUTLS\\_E\\_SUCCESS](#) (0) is returned, otherwise a negative error value.

Since 2.12.0

**gnutls\_pkcs11\_obj\_init ()**

```
int gnutls_pkcs11_obj_init (gnutls_pkcs11_obj_t *obj);
```

This function will initialize a pkcs11 certificate structure.

**obj** : The structure to be initialized

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

Since 2.12.0

**GNUTLS\_PKCS11\_OBJ\_FLAG\_LOGIN**

```
#define GNUTLS_PKCS11_OBJ_FLAG_LOGIN (1<<0) /* force login in the token for the ↵  
operation */
```

**GNUTLS\_PKCS11\_OBJ\_FLAG\_MARK\_TRUSTED**

```
#define GNUTLS_PKCS11_OBJ_FLAG_MARK_TRUSTED (1<<1) /* object marked as trusted */
```

**GNUTLS\_PKCS11\_OBJ\_FLAG\_MARK\_SENSITIVE**

```
#define GNUTLS_PKCS11_OBJ_FLAG_MARK_SENSITIVE (1<<2) /* object marked as sensitive ( ↵  
unexportable) */
```

**GNUTLS\_PKCS11\_OBJ\_FLAG\_LOGIN\_SO**

```
#define GNUTLS_PKCS11_OBJ_FLAG_LOGIN_SO (1<<3) /* force login as a security officer in ↵  
the token for the operation */
```

**GNUTLS\_PKCS11\_OBJ\_FLAG\_MARK\_PRIVATE**

```
#define GNUTLS_PKCS11_OBJ_FLAG_MARK_PRIVATE (1<<4) /* marked as private (requires PIN to ↵  
access) */
```

**GNUTLS\_PKCS11\_OBJ\_FLAG\_MARK\_NOT\_PRIVATE**

```
#define GNUTLS_PKCS11_OBJ_FLAG_MARK_NOT_PRIVATE (1<<5) /* marked as not private */
```

**enum gnutls\_pkcs11\_url\_type\_t**

```
typedef enum
{
    GNUTLS_PKCS11_URL_GENERIC,      /* URL specifies the object on token level */
    GNUTLS_PKCS11_URL_LIB,          /* URL specifies the object on module level */
    GNUTLS_PKCS11_URL_LIB_VERSION /* URL specifies the object on module and version level ←
    */
} gnutls_pkcs11_url_type_t;
```

Enumeration of different URL extraction flags.

**GNUTLS\_PKCS11\_URL\_GENERIC** A generic-purpose URL.

**GNUTLS\_PKCS11\_URL\_LIB** A URL that specifies the library used as well.

**GNUTLS\_PKCS11\_URL\_LIB\_VERSION** A URL that specifies the library and its version.

**gnutls\_pkcs11\_obj\_import\_url()**

```
int gnutls_pkcs11_obj_import_url(gnutls_pkcs11_obj_t cert,
                                const char *url,
                                unsigned int flags);
```

This function will "import" a PKCS 11 URL identifying a certificate key to the **gnutls\_pkcs11\_obj\_t** structure. This does not involve any parsing (such as X.509 or OpenPGP) since the **gnutls\_pkcs11\_obj\_t** is format agnostic. Only data are transferred.

**cert** : The structure to store the parsed certificate

**url** : a PKCS 11 url identifying the key

**flags** : One of GNUTLS\_PKCS11\_OBJ\_\* flags

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

Since 2.12.0

**gnutls\_pkcs11\_obj\_export\_url()**

```
int gnutls_pkcs11_obj_export_url(gnutls_pkcs11_obj_t obj,
                                gnutls_pkcs11_url_type_t detailed,
                                char **url);
```

This function will export a URL identifying the given certificate.

**obj** : Holds the PKCS 11 certificate

**detailed** : non zero if a detailed URL is required

**url** : will contain an allocated url

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

Since 2.12.0

**gnutls\_pkcs11\_obj\_deinit ()**

```
void gnutls_pkcs11_obj_deinit (gnutls_pkcs11_obj_t obj);
```

This function will deinitialize a certificate structure.

**obj**: The structure to be initialized

Since 2.12.0

**gnutls\_pkcs11\_obj\_export ()**

```
int gnutls_pkcs11_obj_export (gnutls_pkcs11_obj_t obj,  
void *output_data,  
size_t *output_data_size);
```

This function will export the PKCS11 object data. It is normal for data to be inaccessible and in that case **GNUTLS\_E\_INVALID\_REQUEST** will be returned.

If the buffer provided is not long enough to hold the output, then *\*output\_data\_size* is updated and **GNUTLS\_E\_SHORT\_MEMORY\_BUFFER** will be returned.

If the structure is PEM encoded, it will have a header of "BEGIN CERTIFICATE".

**obj**: Holds the object

**output\_data**: will contain a certificate PEM or DER encoded

**output\_data\_size**: holds the size of output\_data (and will be replaced by the actual size of parameters)

**Returns**: In case of failure a negative error code will be returned, and **GNUTLS\_E\_SUCCESS** (0) on success.

Since 2.12.0

**gnutls\_pkcs11\_copy\_x509\_cert ()**

```
int gnutls_pkcs11_copy_x509_cert (const char *token_url,  
gnutls_x509_cert_t crt,  
const char *label,  
unsigned int flags);
```

This function will copy a certificate into a PKCS 11 token specified by a URL. The certificate can be marked as trusted or not.

**token\_url**: A PKCS 11 URL specifying a token

**crt**: A certificate

**label**: A name to be used for the stored data

**flags**: One of GNUTLS\_PKCS11\_OBJ\_FLAG\_\*

**Returns**: On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

Since 2.12.0

**gnutls\_pkcs11\_copy\_x509\_privkey ()**

```
int gnutls_pkcs11_copy_x509_privkey (const char *token_url,
                                     gnutls_x509_privkey_t key,
                                     const char *label,
                                     unsigned int key_usage,
                                     unsigned int flags);
```

This function will copy a private key into a PKCS 11 token specified by a URL. It is highly recommended flags to contain **GNUTLS\_PKCS11\_OBJ\_FLAG\_MARK\_SENSITIVE** unless there is a strong reason not to.

**token\_url** : A PKCS 11 URL specifying a token

**key** : A private key

**label** : A name to be used for the stored data

**key\_usage** : One of GNUTLS\_KEY\_\*

**flags** : One of GNUTLS\_PKCS11\_OBJ\_\* flags

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

Since 2.12.0

**gnutls\_pkcs11\_delete\_url ()**

```
int gnutls_pkcs11_delete_url (const char *object_url,
                              unsigned int flags);
```

This function will delete objects matching the given URL. Note that not all tokens support the delete operation.

**object\_url** : The URL of the object to delete.

**flags** : One of GNUTLS\_PKCS11\_OBJ\_\* flags

**Returns** : On success, the number of objects deleted is returned, otherwise a negative error value.

Since 2.12.0

**gnutls\_pkcs11\_copy\_secret\_key ()**

```
int gnutls_pkcs11_copy_secret_key (const char *token_url,
                                    gnutls_datum_t *key,
                                    const char *label,
                                    unsigned int key_usage,
                                    unsigned int flags);
```

This function will copy a raw secret (symmetric) key into a PKCS 11 token specified by a URL. The key can be marked as sensitive or not.

**token\_url** : A PKCS 11 URL specifying a token

**key** : The raw key

**label** : A name to be used for the stored data

**key\_usage** : One of GNUTLS\_KEY\_\*

**flags** : One of GNUTLS\_PKCS11\_OBJ\_FLAG\_\*

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

Since 2.12.0

**enum gnutls\_pkcs11\_obj\_info\_t**

```
typedef enum
{
    GNUTLS_PKCS11_OBJ_ID_HEX = 1,
    GNUTLS_PKCS11_OBJ_LABEL,
    GNUTLS_PKCS11_OBJ_TOKEN_LABEL,
    GNUTLS_PKCS11_OBJ_TOKEN_SERIAL,
    GNUTLS_PKCS11_OBJ_TOKEN_MANUFACTURER,
    GNUTLS_PKCS11_OBJ_TOKEN_MODEL,
    GNUTLS_PKCS11_OBJ_ID,
    /* the pkcs11 provider library info */
    GNUTLS_PKCS11_OBJ_LIBRARY_VERSION,
    GNUTLS_PKCS11_OBJ_LIBRARY_DESCRIPTION,
    GNUTLS_PKCS11_OBJ_LIBRARY_MANUFACTURER
} gnutls_pkcs11_obj_info_t;
```

Enumeration of several object information types.

**GNUTLS\_PKCS11\_OBJ\_ID\_HEX** The object ID in hex.

**GNUTLS\_PKCS11\_OBJ\_LABEL** The object label.

**GNUTLS\_PKCS11\_OBJ\_TOKEN\_LABEL** The token's label.

**GNUTLS\_PKCS11\_OBJ\_TOKEN\_SERIAL** The token's serial number.

**GNUTLS\_PKCS11\_OBJ\_TOKEN\_MANUFACTURER** The token's manufacturer.

**GNUTLS\_PKCS11\_OBJ\_TOKEN\_MODEL** The token's model.

**GNUTLS\_PKCS11\_OBJ\_ID** The object ID.

**GNUTLS\_PKCS11\_OBJ\_LIBRARY\_VERSION** The library's used to access the object version.

**GNUTLS\_PKCS11\_OBJ\_LIBRARY\_DESCRIPTION** The library's used to access the object description (name).

**GNUTLS\_PKCS11\_OBJ\_LIBRARY\_MANUFACTURER** The library's used to access the object manufacturer name.

**gnutls\_pkcs11\_obj\_get\_info ()**

```
int gnutls_pkcs11_obj_get_info (gnutls_pkcs11_obj_t crt,
                                gnutls_pkcs11_obj_info_t itype,
                                void *output,
                                size_t *output_size);
```

This function will return information about the PKCS11 certificate such as the label, id as well as token information where the key is stored. When output is text it returns null terminated string although *output\_size* contains the size of the actual data only.

**crt** : should contain a **gnutls\_pkcs11\_obj\_t** structure

**itype** : Denotes the type of information requested

**output** : where output will be stored

**output\_size** : contains the maximum size of the output and will be overwritten with actual

**Returns** : **GNUTLS\_E\_SUCCESS** (0) on success or a negative error code on error.

Since 2.12.0



**enum gnutls\_pkcs11\_obj\_attr\_t**

```
typedef enum
{
    GNUTLS_PKCS11_OBJ_ATTR_CERT_ALL = 1,    /* all certificates */
    GNUTLS_PKCS11_OBJ_ATTR_CERT_TRUSTED,    /* certificates marked as trusted */
    GNUTLS_PKCS11_OBJ_ATTR_CERT_WITH_PRIVKEY, /* certificates with corresponding ↵
        private key */
    GNUTLS_PKCS11_OBJ_ATTR_PUBKEY,          /* public keys */
    GNUTLS_PKCS11_OBJ_ATTR_PRIVKEY,         /* private keys */
    GNUTLS_PKCS11_OBJ_ATTR_ALL              /* everything! */
} gnutls_pkcs11_obj_attr_t;
```

Enumeration of several attributes for object enumeration.

**GNUTLS\_PKCS11\_OBJ\_ATTR\_CERT\_ALL** Specify all certificates.

**GNUTLS\_PKCS11\_OBJ\_ATTR\_CERT\_TRUSTED** Specify all certificates marked as trusted.

**GNUTLS\_PKCS11\_OBJ\_ATTR\_CERT\_WITH\_PRIVKEY** Specify all certificates with a corresponding private key.

**GNUTLS\_PKCS11\_OBJ\_ATTR\_PUBKEY** Specify all public keys.

**GNUTLS\_PKCS11\_OBJ\_ATTR\_PRIVKEY** Specify all private keys.

**GNUTLS\_PKCS11\_OBJ\_ATTR\_ALL** Specify all objects.

**enum gnutls\_pkcs11\_token\_info\_t**

```
typedef enum
{
    GNUTLS_PKCS11_TOKEN_LABEL,
    GNUTLS_PKCS11_TOKEN_SERIAL,
    GNUTLS_PKCS11_TOKEN_MANUFACTURER,
    GNUTLS_PKCS11_TOKEN_MODEL
} gnutls_pkcs11_token_info_t;
```

Enumeration of types for retrieving token information.

**GNUTLS\_PKCS11\_TOKEN\_LABEL** The token's label

**GNUTLS\_PKCS11\_TOKEN\_SERIAL** The token's serial number

**GNUTLS\_PKCS11\_TOKEN\_MANUFACTURER** The token's manufacturer

**GNUTLS\_PKCS11\_TOKEN\_MODEL** The token's model

**enum gnutls\_pkcs11\_obj\_type\_t**

```
typedef enum
{
    GNUTLS_PKCS11_OBJ_UNKNOWN,
    GNUTLS_PKCS11_OBJ_X509_CERT,
    GNUTLS_PKCS11_OBJ_PUBKEY,
    GNUTLS_PKCS11_OBJ_PRIVKEY,
    GNUTLS_PKCS11_OBJ_SECRET_KEY,
    GNUTLS_PKCS11_OBJ_DATA
} gnutls_pkcs11_obj_type_t;
```

Enumeration of object types.

**GNUTLS\_PKCS11\_OBJ\_UNKNOWN** Unknown PKCS11 object.

**GNUTLS\_PKCS11\_OBJ\_X509\_CRT** X.509 certificate.

**GNUTLS\_PKCS11\_OBJ\_PUBKEY** Public key.

**GNUTLS\_PKCS11\_OBJ\_PRIVKEY** Private key.

**GNUTLS\_PKCS11\_OBJ\_SECRET\_KEY** Secret key.

**GNUTLS\_PKCS11\_OBJ\_DATA** Data object.

### **gnutls\_pkcs11\_token\_init ()**

```
int gnutls_pkcs11_token_init (const char *token_url,
                              const char *so_pin,
                              const char *label);
```

This function will initialize (format) a token. If the token is at a factory defaults state the security officer's PIN given will be set to be the default. Otherwise it should match the officer's PIN.

**token\_url** : A PKCS 11 URL specifying a token

**so\_pin** : Security Officer's PIN

**label** : A name to be used for the token

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

### **gnutls\_pkcs11\_token\_get\_mechanism ()**

```
int gnutls_pkcs11_token_get_mechanism (const char *url,
                                       int idx,
                                       unsigned long *mechanism);
```

This function will return the names of the supported mechanisms by the token. It should be called with an increasing index until it return **GNUTLS\_E\_REQUESTED\_DATA\_NOT\_AVAILABLE**.

**url** : should contain a PKCS 11 URL

**idx** : The index of the mechanism

**mechanism** : The PKCS 11 mechanism ID

**Returns** : **GNUTLS\_E\_SUCCESS** (0) on success or a negative error code on error.

Since 2.12.0

### **gnutls\_pkcs11\_token\_set\_pin ()**

```
int gnutls_pkcs11_token_set_pin (const char *token_url,
                                  const char *oldpin,
                                  const char *newpin,
                                  unsigned int flags);
```

This function will modify or set a user's PIN for the given token. If it is called to set a user pin for first time the oldpin must be NULL.

**token\_url** : A PKCS 11 URL specifying a token

**oldpin** : old user's PIN

**newpin** : new user's PIN

**flags** : one of `gnutls_pkcs11_pin_flag_t`.

**Returns** : On success, `GNUTLS_E_SUCCESS` (0) is returned, otherwise a negative error value.

#### **gnutls\_pkcs11\_token\_get\_url ()**

```
int gnutls_pkcs11_token_get_url (unsigned int seq,
                                gnutls_pkcs11_url_type_t detailed,
                                char **url);
```

This function will return the URL for each token available in system. The url has to be released using `gnutls_free()`

**seq** : sequence number starting from 0

**detailed** : non zero if a detailed URL is required

**url** : will contain an allocated url

**Returns** : On success, `GNUTLS_E_SUCCESS` (0) is returned, `GNUTLS_E_REQUESTED_DATA_NOT_AVAILABLE` if the sequence number exceeds the available tokens, otherwise a negative error value.

Since 2.12.0

#### **gnutls\_pkcs11\_token\_get\_info ()**

```
int gnutls_pkcs11_token_get_info (const char *url,
                                  gnutls_pkcs11_token_info_t ttype,
                                  void *output,
                                  size_t *output_size);
```

This function will return information about the PKCS 11 token such as the label, id, etc.

**url** : should contain a PKCS 11 URL

**ttype** : Denotes the type of information requested

**output** : where output will be stored

**output\_size** : contains the maximum size of the output and will be overwritten with actual

**Returns** : `GNUTLS_E_SUCCESS` (0) on success or a negative error code on error.

Since 2.12.0

#### **GNUTLS\_PKCS11\_TOKEN\_HW**

```
#define GNUTLS_PKCS11_TOKEN_HW 1
```

**gnutls\_pkcs11\_token\_get\_flags ()**

```
int gnutls_pkcs11_token_get_flags (const char *url,
                                   unsigned int *flags);
```

This function will return information about the PKCS 11 token flags. The flags from the `gnutls_pkcs11_token_info_t` enumeration.

**url** : should contain a PKCS 11 URL

**flags** : The output flags (GNUTLS\_PKCS11\_TOKEN\_\*)

**Returns** : `GNUTLS_E_SUCCESS` (0) on success or a negative error code on error.

Since 2.12.0

**gnutls\_pkcs11\_obj\_list\_import\_url ()**

```
int gnutls_pkcs11_obj_list_import_url (gnutls_pkcs11_obj_t *p_list,
                                       unsigned int *const n_list,
                                       const char *url,
                                       gnutls_pkcs11_obj_attr_t attrs,
                                       unsigned int flags);
```

This function will initialize and set values to an object list by using all objects identified by a PKCS 11 URL.

**p\_list** : An uninitialized object list (may be NULL)

**n\_list** : initially should hold the maximum size of the list. Will contain the actual size.

**url** : A PKCS 11 url identifying a set of objects

**attrs** : Attributes of type `gnutls_pkcs11_obj_attr_t` that can be used to limit output

**flags** : One of GNUTLS\_PKCS11\_OBJ\_\* flags

**Returns** : On success, `GNUTLS_E_SUCCESS` (0) is returned, otherwise a negative error value.

Since 2.12.0

**gnutls\_x509\_cert\_import\_pkcs11 ()**

```
int gnutls_x509_cert_import_pkcs11 (gnutls_x509_cert_t crt,
                                     gnutls_pkcs11_obj_t pkcs11_cert);
```

This function will import a PKCS 11 certificate to a `gnutls_x509_cert_t` structure.

**crt** : A certificate of type `gnutls_x509_cert_t`

**pkcs11\_cert** : A PKCS 11 object that contains a certificate

**Returns** : On success, `GNUTLS_E_SUCCESS` (0) is returned, otherwise a negative error value.

Since 2.12.0

**gnutls\_x509\_cert\_import\_pkcs11\_url ()**

```
int gnutls_x509_cert_import_pkcs11_url (gnutls_x509_cert_t crt,
                                         const char *url,
                                         unsigned int flags);
```

This function will import a PKCS 11 certificate directly from a token without involving the `gnutls_pkcs11_obj_t` structure. This function will fail if the certificate stored is not of X.509 type.

**crt** : A certificate of type `gnutls_x509_cert_t`

**url** : A PKCS 11 url

**flags** : One of GNUTLS\_PKCS11\_OBJ\_\* flags

**Returns** : On success, `GNUTLS_E_SUCCESS` (0) is returned, otherwise a negative error value.

Since 2.12.0

**gnutls\_pkcs11\_obj\_get\_type ()**

```
gnutls_pkcs11_obj_type_t gnutls_pkcs11_obj_get_type (gnutls_pkcs11_obj_t obj);
```

This function will return the type of the certificate being stored in the structure.

**obj** : Holds the PKCS 11 object

**Returns** : The type of the certificate.

Since 2.12.0

**gnutls\_pkcs11\_type\_get\_name ()**

```
const char * gnutls_pkcs11_type_get_name (gnutls_pkcs11_obj_type_t type);
```

This function will return a human readable description of the PKCS11 object type `obj`. It will return "Unknown" for unknown types.

**type** : Holds the PKCS 11 object type, a `gnutls_pkcs11_obj_type_t`.

**Returns** : human readable string labeling the PKCS11 object type `type`.

Since 2.12.0

**gnutls\_x509\_cert\_list\_import\_pkcs11 ()**

```
int gnutls_x509_cert_list_import_pkcs11 (gnutls_x509_cert_t *certs,
                                           unsigned int cert_max,
                                           gnutls_pkcs11_obj_t * const objs,
                                           unsigned int flags);
```

This function will import a PKCS 11 certificate list to a list of `gnutls_x509_cert_t` structure. These must not be initialized.

**certs** : A list of certificates of type `gnutls_x509_cert_t`

**cert\_max** : The maximum size of the list

**objs** : A list of PKCS 11 objects

**flags** : 0 for now

**Returns** : On success, `GNUTLS_E_SUCCESS` (0) is returned, otherwise a negative error value.

Since 2.12.0

**gnutls\_pkcs11\_privkey\_init ()**

```
int gnutls_pkcs11_privkey_init (gnutls_pkcs11_privkey_t *key);
```

This function will initialize an private key structure.

**key** : The structure to be initialized

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

**gnutls\_pkcs11\_privkey\_deinit ()**

```
void gnutls_pkcs11_privkey_deinit (gnutls_pkcs11_privkey_t key);
```

This function will deinitialize a private key structure.

**key** : The structure to be initialized

**gnutls\_pkcs11\_privkey\_get\_pk\_algorithm ()**

```
int gnutls_pkcs11_privkey_get_pk_algorithm (gnutls_pkcs11_privkey_t key,
                                             unsigned int *bits);
```

This function will return the public key algorithm of a private key.

**key** : should contain a **gnutls\_pkcs11\_privkey\_t** structure

**bits** : if bits is non null it will hold the size of the parameters' in bits

**Returns** : a member of the **gnutls\_pk\_algorithm\_t** enumeration on success, or a negative error code on error.

**gnutls\_pkcs11\_privkey\_get\_info ()**

```
int gnutls_pkcs11_privkey_get_info (gnutls_pkcs11_privkey_t pkey,
                                     gnutls_pkcs11_obj_info_t itype,
                                     void *output,
                                     size_t *output_size);
```

This function will return information about the PKCS 11 private key such as the label, id as well as token information where the key is stored. When output is text it returns null terminated string although **output\_size** contains the size of the actual data only.

**pkey** : should contain a **gnutls\_pkcs11\_privkey\_t** structure

**itype** : Denotes the type of information requested

**output** : where output will be stored

**output\_size** : contains the maximum size of the output and will be overwritten with actual

**Returns** : **GNUTLS\_E\_SUCCESS** (0) on success or a negative error code on error.

**gnutls\_pkcs11\_privkey\_import\_url ()**

```
int gnutls_pkcs11_privkey_import_url (gnutls_pkcs11_privkey_t pkey,
                                     const char *url,
                                     unsigned int flags);
```

This function will "import" a PKCS 11 URL identifying a private key to the **gnutls\_pkcs11\_privkey\_t** structure. In reality since in most cases keys cannot be exported, the private key structure is being associated with the available operations on the token.

**pkey** : The structure to store the parsed key

**url** : a PKCS 11 url identifying the key

**flags** : sequence of GNUTLS\_PKCS\_PRIVKEY\_\*

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

**gnutls\_pkcs11\_privkey\_export\_url ()**

```
int gnutls_pkcs11_privkey_export_url (gnutls_pkcs11_privkey_t key,
                                       gnutls_pkcs11_url_type_t detailed,
                                       char **url);
```

This function will export a URL identifying the given key.

**key** : Holds the PKCS 11 key

**detailed** : non zero if a detailed URL is required

**url** : will contain an allocated url

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

**gnutls\_pkcs11\_privkey\_generate ()**

```
int gnutls_pkcs11_privkey_generate (const char *url,
                                     gnutls_pk_algorithm_t pk,
                                     unsigned int bits,
                                     const char *label,
                                     unsigned int flags);
```

This function will generate a private key in the specified by the *url* token. The private key will be generate within the token and will not be exportable.

**url** : a token URL

**pk** : the public key algorithm

**bits** : the security bits

**label** : a label

**flags** : should be zero

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

Since 3.0.0





```

int          gnutls_pkcs12_bag_get_friendly_name (const gnutls_datum_t *id);
                                                    (gnutls_pkcs12_bag_t bag,
int          gnutls_pkcs12_bag_set_friendly_name (int indx,
                                                    char **name);
int          gnutls_pkcs12_bag_set_friendly_name (gnutls_pkcs12_bag_t bag,
                                                    int indx,
                                                    const char *name);

```

## Description

## Details

### struct gnutls\_pkcs12\_int

```
struct gnutls_pkcs12_int;
```

### gnutls\_pkcs12\_t

```
typedef struct gnutls_pkcs12_int *gnutls_pkcs12_t;
```

### struct gnutls\_pkcs12\_bag\_int

```
struct gnutls_pkcs12_bag_int;
```

### gnutls\_pkcs12\_bag\_t

```
typedef struct gnutls_pkcs12_bag_int *gnutls_pkcs12_bag_t;
```

### gnutls\_pkcs12\_init ()

```
int          gnutls_pkcs12_init (gnutls_pkcs12_t *pkcs12);
```

This function will initialize a PKCS12 structure. PKCS12 structures usually contain lists of X.509 Certificates and X.509 Certificate revocation lists.

**pkcs12** : The structure to be initialized

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

### gnutls\_pkcs12\_deinit ()

```
void          gnutls_pkcs12_deinit (gnutls_pkcs12_t pkcs12);
```

This function will deinitialize a PKCS12 structure.

**pkcs12** : The structure to be initialized

**gnutls\_pkcs12\_import ()**

```
int gnutls_pkcs12_import (gnutls_pkcs12_t pkcs12,
                          const gnutls_datum_t *data,
                          gnutls_x509_crt_fmt_t format,
                          unsigned int flags);
```

This function will convert the given DER or PEM encoded PKCS12 to the native gnutls\_pkcs12\_t format. The output will be stored in 'pkcs12'.

If the PKCS12 is PEM encoded it should have a header of "PKCS12".

**pkcs12** : The structure to store the parsed PKCS12.

**data** : The DER or PEM encoded PKCS12.

**format** : One of DER or PEM

**flags** : an Ored sequence of gnutls\_privkey\_pkcs8\_flags

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

**gnutls\_pkcs12\_export ()**

```
int gnutls_pkcs12_export (gnutls_pkcs12_t pkcs12,
                          gnutls_x509_crt_fmt_t format,
                          void *output_data,
                          size_t *output_data_size);
```

This function will export the pkcs12 structure to DER or PEM format.

If the buffer provided is not long enough to hold the output, then \*output\_data\_size will be updated and GNUTLS\_E\_SHORT\_MEMORY will be returned.

If the structure is PEM encoded, it will have a header of "BEGIN PKCS12".

**pkcs12** : Holds the pkcs12 structure

**format** : the format of output params. One of PEM or DER.

**output\_data** : will contain a structure PEM or DER encoded

**output\_data\_size** : holds the size of output\_data (and will be replaced by the actual size of parameters)

**Returns** : In case of failure a negative error code will be returned, and 0 on success.

**gnutls\_pkcs12\_get\_bag ()**

```
int gnutls_pkcs12_get_bag (gnutls_pkcs12_t pkcs12,
                           int indx,
                           gnutls_pkcs12_bag_t bag);
```

This function will return a Bag from the PKCS12 structure.

After the last Bag has been read **GNUTLS\_E\_REQUESTED\_DATA\_NOT\_AVAILABLE** will be returned.

**pkcs12** : should contain a gnutls\_pkcs12\_t structure

**indx** : contains the index of the bag to extract

**bag** : An initialized bag, where the contents of the bag will be copied

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

**gnutls\_pkcs12\_set\_bag ()**

int	gnutls_pkcs12_set_bag	(gnutls_pkcs12_t pkcs12, gnutls_pkcs12_bag_t bag);
-----	-----------------------	---

This function will insert a Bag into the PKCS12 structure.

**pkcs12** : should contain a gnutls\_pkcs12\_t structure

**bag** : An initialized bag

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

**gnutls\_pkcs12\_generate\_mac ()**

int	gnutls_pkcs12_generate_mac	(gnutls_pkcs12_t pkcs12, const char *pass);
-----	----------------------------	--

This function will generate a MAC for the PKCS12 structure.

**pkcs12** : should contain a gnutls\_pkcs12\_t structure

**pass** : The password for the MAC

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

**gnutls\_pkcs12\_verify\_mac ()**

int	gnutls_pkcs12_verify_mac	(gnutls_pkcs12_t pkcs12, const char *pass);
-----	--------------------------	--

This function will verify the MAC for the PKCS12 structure.

**pkcs12** : should contain a gnutls\_pkcs12\_t structure

**pass** : The password for the MAC

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

**gnutls\_pkcs12\_bag\_decrypt ()**

int	gnutls_pkcs12_bag_decrypt	(gnutls_pkcs12_bag_t bag, const char *pass);
-----	---------------------------	---

This function will decrypt the given encrypted bag and return 0 on success.

**bag** : The bag

**pass** : The password used for encryption, must be ASCII.

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error code is returned.

**gnutls\_pkcs12\_bag\_encrypt ()**

```
int gnutls_pkcs12_bag_encrypt (gnutls_pkcs12_bag_t bag,
                               const char *pass,
                               unsigned int flags);
```

This function will encrypt the given bag.

**bag** : The bag

**pass** : The password used for encryption, must be ASCII

**flags** : should be one of [gnutls\\_pkcs\\_encrypt\\_flags\\_t](#) elements bitwise or'd

**Returns** : On success, [GNUTLS\\_E\\_SUCCESS](#) (0) is returned, otherwise a negative error code is returned.

**enum gnutls\_pkcs12\_bag\_type\_t**

```
typedef enum gnutls_pkcs12_bag_type_t
{
    GNUTLS_BAG_EMPTY = 0,
    GNUTLS_BAG_PKCS8_ENCRYPTED_KEY = 1,
    GNUTLS_BAG_PKCS8_KEY = 2,
    GNUTLS_BAG_CERTIFICATE = 3,
    GNUTLS_BAG_CRL = 4,
    GNUTLS_BAG_SECRET = 5,      /* Secret data. Underspecified in pkcs-12,
                                * gnutls extension. We use the PKCS-9
                                * random nonce ID 1.2.840.113549.1.9.25.3
                                * to store randomly generated keys.
                                */
    GNUTLS_BAG_ENCRYPTED = 10,
    GNUTLS_BAG_UNKNOWN = 20
} gnutls_pkcs12_bag_type_t;
```

Enumeration of different PKCS 12 bag types.

**GNUTLS\_BAG\_EMPTY** Empty PKCS-12 bag.

**GNUTLS\_BAG\_PKCS8\_ENCRYPTED\_KEY** PKCS-12 bag with PKCS-8 encrypted key.

**GNUTLS\_BAG\_PKCS8\_KEY** PKCS-12 bag with PKCS-8 key.

**GNUTLS\_BAG\_CERTIFICATE** PKCS-12 bag with certificate.

**GNUTLS\_BAG\_CRL** PKCS-12 bag with CRL.

**GNUTLS\_BAG\_SECRET** PKCS-12 bag with secret PKCS-9 keys.

**GNUTLS\_BAG\_ENCRYPTED** Encrypted PKCS-12 bag.

**GNUTLS\_BAG\_UNKNOWN** Unknown PKCS-12 bag.

**gnutls\_pkcs12\_bag\_get\_type ()**

```
gnutls_pkcs12_bag_type_t gnutls_pkcs12_bag_get_type (gnutls_pkcs12_bag_t bag,
                                                       int idx);
```

This function will return the bag's type.

**bag** : The bag

**idx** : The element of the bag to get the type

**Returns** : One of the [gnutls\\_pkcs12\\_bag\\_type\\_t](#) enumerations.

**gnutls\_pkcs12\_bag\_get\_data ()**

```
int gnutls_pkcs12_bag_get_data (gnutls_pkcs12_bag_t bag,
                                int indx,
                                gnutls_datum_t *data);
```

This function will return the bag's data. The data is a constant that is stored into the bag. Should not be accessed after the bag is deleted.

**bag** : The bag

**indx** : The element of the bag to get the data from

**data** : where the bag's data will be. Should be treated as constant.

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

**gnutls\_pkcs12\_bag\_set\_data ()**

```
int gnutls_pkcs12_bag_set_data (gnutls_pkcs12_bag_t bag,
                                 gnutls_pkcs12_bag_type_t type,
                                 const gnutls_datum_t *data);
```

This function will insert the given data of the given type into the bag.

**bag** : The bag

**type** : The data's type

**data** : the data to be copied.

**Returns** : the index of the added bag on success, or a negative value on error.

**gnutls\_pkcs12\_bag\_set\_crl ()**

```
int gnutls_pkcs12_bag_set_crl (gnutls_pkcs12_bag_t bag,
                                gnutls_x509_crl_t crl);
```

This function will insert the given CRL into the bag. This is just a wrapper over **gnutls\_pkcs12\_bag\_set\_data()**.

**bag** : The bag

**crl** : the CRL to be copied.

**Returns** : the index of the added bag on success, or a negative error code on failure.

**gnutls\_pkcs12\_bag\_set\_cert ()**

```
int gnutls_pkcs12_bag_set_cert (gnutls_pkcs12_bag_t bag,
                                 gnutls_x509_cert_t crt);
```

This function will insert the given certificate into the bag. This is just a wrapper over **gnutls\_pkcs12\_bag\_set\_data()**.

**bag** : The bag

**crt** : the certificate to be copied.

**Returns** : the index of the added bag on success, or a negative value on failure.

**gnutls\_pkcs12\_bag\_init ()**

```
int gnutls_pkcs12_bag_init (gnutls_pkcs12_bag_t *bag);
```

This function will initialize a PKCS12 bag structure. PKCS12 Bags usually contain private keys, lists of X.509 Certificates and X.509 Certificate revocation lists.

**bag** : The structure to be initialized

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

**gnutls\_pkcs12\_bag\_deinit ()**

```
void gnutls_pkcs12_bag_deinit (gnutls_pkcs12_bag_t bag);
```

This function will deinitialize a PKCS12 Bag structure.

**bag** : The structure to be initialized

**gnutls\_pkcs12\_bag\_get\_count ()**

```
int gnutls_pkcs12_bag_get_count (gnutls_pkcs12_bag_t bag);
```

This function will return the number of the elements withing the bag.

**bag** : The bag

**Returns** : Number of elements in bag, or an negative error code on error.

**gnutls\_pkcs12\_bag\_get\_key\_id ()**

```
int gnutls_pkcs12_bag_get_key_id (gnutls_pkcs12_bag_t bag,  
int indx,  
gnutls_datum_t *id);
```

This function will return the key ID, of the specified bag element. The key ID is usually used to distinguish the local private key and the certificate pair.

**bag** : The bag

**indx** : The bag's element to add the id

**id** : where the ID will be copied (to be treated as const)

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value. or a negative error code on error.

**gnutls\_pkcs12\_bag\_set\_key\_id ()**

```
int gnutls_pkcs12_bag_set_key_id (gnutls_pkcs12_bag_t bag,
                                   int indx,
                                   const gnutls_datum_t *id);
```

This function will add the given key ID, to the specified, by the index, bag element. The key ID will be encoded as a 'Local key identifier' bag attribute, which is usually used to distinguish the local private key and the certificate pair.

**bag** : The bag

**indx** : The bag's element to add the id

**id** : the ID

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value. or a negative error code on error.

**gnutls\_pkcs12\_bag\_get\_friendly\_name ()**

```
int gnutls_pkcs12_bag_get_friendly_name (gnutls_pkcs12_bag_t bag,
                                           int indx,
                                           char **name);
```

This function will return the friendly name, of the specified bag element. The key ID is usually used to distinguish the local private key and the certificate pair.

**bag** : The bag

**indx** : The bag's element to add the id

**name** : will hold a pointer to the name (to be treated as const)

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value. or a negative error code on error.

**gnutls\_pkcs12\_bag\_set\_friendly\_name ()**

```
int gnutls_pkcs12_bag_set_friendly_name (gnutls_pkcs12_bag_t bag,
                                           int indx,
                                           const char *name);
```

This function will add the given key friendly name, to the specified, by the index, bag element. The name will be encoded as a 'Friendly name' bag attribute, which is usually used to set a user name to the local private key and the certificate pair.

**bag** : The bag

**indx** : The bag's element to add the id

**name** : the name

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value. or a negative error code on error.

## 1.9 ocsp

ocsp —





int	gnutls_ocsp_resp_export	(gnutls_ocsp_resp_t resp, gnutls_datum_t *data);
int	gnutls_ocsp_resp_print	(gnutls_ocsp_resp_t resp, gnutls_ocsp_print_formats_t format, gnutls_datum_t *out);
int	gnutls_ocsp_resp_get_status	(gnutls_ocsp_resp_t resp);
int	gnutls_ocsp_resp_get_response	(gnutls_ocsp_resp_t resp, gnutls_datum_t *response_type_oid, gnutls_datum_t *response);
int	gnutls_ocsp_resp_get_version	(gnutls_ocsp_resp_t resp);
int	gnutls_ocsp_resp_get_responder	(gnutls_ocsp_resp_t resp, gnutls_datum_t *dn);
time_t	gnutls_ocsp_resp_get_produced	(gnutls_ocsp_resp_t resp);
int	gnutls_ocsp_resp_get_single	(gnutls_ocsp_resp_t resp, unsigned indx, gnutls_digest_algorithm_t *digest, gnutls_datum_t *issuer_name_hash, gnutls_datum_t *issuer_key_hash, gnutls_datum_t *serial_number, int *cert_status, time_t *this_update, time_t *next_update, time_t *revocation_time, int *revocation_reason);
int	gnutls_ocsp_resp_get_extension	(gnutls_ocsp_resp_t resp, unsigned indx, gnutls_datum_t *oid, unsigned int *critical, gnutls_datum_t *data);
int	gnutls_ocsp_resp_get_nonce	(gnutls_ocsp_resp_t resp, unsigned int *critical, gnutls_datum_t *nonce);
int	gnutls_ocsp_resp_get_signature_algorithm	(gnutls_ocsp_resp_t resp);
int	gnutls_ocsp_resp_get_signature	(gnutls_ocsp_resp_t resp, gnutls_datum_t *sig);
int	gnutls_ocsp_resp_get_certs	(gnutls_ocsp_resp_t resp, gnutls_x509_crt_t **certs, size_t *ncerts);
int	gnutls_ocsp_resp_verify_direct	(gnutls_ocsp_resp_t resp, gnutls_x509_crt_t signercert, unsigned *verify, int flags);
int	gnutls_ocsp_resp_verify	(gnutls_ocsp_resp_t resp, gnutls_x509_trust_list_t trustlist, unsigned *verify, int flags);

## Description

## Details

### GNUTLS\_OCSP\_NONCE

```
#define GNUTLS_OCSP_NONCE "1.3.6.1.5.5.7.48.1.2"
```

**enum gnutls\_ocsp\_print\_formats\_t**

```
typedef enum gnutls_ocsp_print_formats_t
{
    GNUTLS_OCSP_PRINT_FULL = 0,
} gnutls_ocsp_print_formats_t;
```

Enumeration of different OCSP printing variants.

**GNUTLS\_OCSP\_PRINT\_FULL** Full information about OCSP request/response.

**enum gnutls\_ocsp\_resp\_status\_t**

```
typedef enum gnutls_ocsp_resp_status_t
{
    GNUTLS_OCSP_RESP_SUCCESSFUL = 0,
    GNUTLS_OCSP_RESP_MALFORMEDREQUEST = 1,
    GNUTLS_OCSP_RESP_INTERNALERROR = 2,
    GNUTLS_OCSP_RESP_TRYLATER = 3,
    GNUTLS_OCSP_RESP_SIGREQUIRED = 5,
    GNUTLS_OCSP_RESP_UNAUTHORIZED = 6
} gnutls_ocsp_resp_status_t;
```

Enumeration of different OCSP response status codes.

**GNUTLS\_OCSP\_RESP\_SUCCESSFUL** Response has valid confirmations.

**GNUTLS\_OCSP\_RESP\_MALFORMEDREQUEST** Illegal confirmation request

**GNUTLS\_OCSP\_RESP\_INTERNALERROR** Internal error in issuer

**GNUTLS\_OCSP\_RESP\_TRYLATER** Try again later

**GNUTLS\_OCSP\_RESP\_SIGREQUIRED** Must sign the request

**GNUTLS\_OCSP\_RESP\_UNAUTHORIZED** Request unauthorized

**enum gnutls\_ocsp\_cert\_status\_t**

```
typedef enum gnutls_ocsp_cert_status_t
{
    GNUTLS_OCSP_CERT_GOOD = 0,
    GNUTLS_OCSP_CERT_REVOKED = 1,
    GNUTLS_OCSP_CERT_UNKNOWN = 2
} gnutls_ocsp_cert_status_t;
```

Enumeration of different OCSP response certificate status codes.

**GNUTLS\_OCSP\_CERT\_GOOD** Positive response to status inquiry.

**GNUTLS\_OCSP\_CERT\_REVOKED** Certificate has been revoked.

**GNUTLS\_OCSP\_CERT\_UNKNOWN** The responder doesn't know about the certificate.

**enum gnutls\_x509\_crl\_reason\_t**

```
typedef enum gnutls_x509_crl_reason_t
{
    GNUTLS_X509_CRLREASON_UNSPECIFIED = 0,
    GNUTLS_X509_CRLREASON_KEYCOMPROMISE = 1,
    GNUTLS_X509_CRLREASON_CACOMPROMISE = 2,
    GNUTLS_X509_CRLREASON_AFFILIATIONCHANGED = 3,
    GNUTLS_X509_CRLREASON_SUPERSEDED = 4,
    GNUTLS_X509_CRLREASON_CESSATIONOFOPERATION = 5,
    GNUTLS_X509_CRLREASON_CERTIFICATEHOLD = 6,
    /* -- value 7 is not used */
    GNUTLS_X509_CRLREASON_REMOVEFROMCRL = 8,
    GNUTLS_X509_CRLREASON_PRIVILEGEWITHDRAWN = 9,
    GNUTLS_X509_CRLREASON_AACOMPROMISE = 10
} gnutls_x509_crl_reason_t;
```

Enumeration of different reason codes. Note that this corresponds to the CRLReason ASN.1 enumeration type, and not the ReasonFlags ASN.1 bit string.

**GNUTLS\_X509\_CRLREASON\_UNSPECIFIED** Unspecified reason.

**GNUTLS\_X509\_CRLREASON\_KEYCOMPROMISE** Private key compromised.

**GNUTLS\_X509\_CRLREASON\_CACOMPROMISE** CA compromised.

**GNUTLS\_X509\_CRLREASON\_AFFILIATIONCHANGED** Affiliation has changed.

**GNUTLS\_X509\_CRLREASON\_SUPERSEDED** Certificate superseded.

**GNUTLS\_X509\_CRLREASON\_CESSATIONOFOPERATION** Operation has ceased.

**GNUTLS\_X509\_CRLREASON\_CERTIFICATEHOLD** Certificate is on hold.

**GNUTLS\_X509\_CRLREASON\_REMOVEFROMCRL** Will be removed from delta CRL.

**GNUTLS\_X509\_CRLREASON\_PRIVILEGEWITHDRAWN** Privilege withdrawn.

**GNUTLS\_X509\_CRLREASON\_AACOMPROMISE** AA compromised.

**enum gnutls\_ocsp\_verify\_reason\_t**

```
typedef enum gnutls_ocsp_verify_reason_t
{
    GNUTLS_OCSP_VERIFY_SIGNER_NOT_FOUND = 1,
    GNUTLS_OCSP_VERIFY_SIGNER_KEYUSAGE_ERROR = 2,
    GNUTLS_OCSP_VERIFY_UNTRUSTED_SIGNER = 4,
    GNUTLS_OCSP_VERIFY_INSECURE_ALGORITHM = 8,
    GNUTLS_OCSP_VERIFY_SIGNATURE_FAILURE = 16,
    GNUTLS_OCSP_VERIFY_CERT_NOT_ACTIVATED = 32,
    GNUTLS_OCSP_VERIFY_CERT_EXPIRED = 64
} gnutls_ocsp_verify_reason_t;
```

Enumeration of OCSP verify status codes, used by [gnutls\\_ocsp\\_resp\\_verify\(\)](#) and [gnutls\\_ocsp\\_resp\\_verify\\_direct\(\)](#).

**GNUTLS\_OCSP\_VERIFY\_SIGNER\_NOT\_FOUND** Signer cert not found.

**GNUTLS\_OCSP\_VERIFY\_SIGNER\_KEYUSAGE\_ERROR** Signer keyusage bits incorrect.

**GNUTLS\_OCSP\_VERIFY\_UNTRUSTED\_SIGNER** Signer is not trusted.

**GNUTLS\_OCSP\_VERIFY\_INSECURE\_ALGORITHM** Signature using insecure algorithm.

**GNUTLS\_OCSP\_VERIFY\_SIGNATURE\_FAILURE** Signature mismatch.

**GNUTLS\_OCSP\_VERIFY\_CERT\_NOT\_ACTIVATED** Signer cert is not yet activated.

**GNUTLS\_OCSP\_VERIFY\_CERT\_EXPIRED** Signer cert has expired.

### struct gnutls\_ocsp\_req\_int

```
struct gnutls_ocsp_req_int;
```

### gnutls\_ocsp\_req\_t

```
typedef struct gnutls_ocsp_req_int *gnutls_ocsp_req_t;
```

### gnutls\_ocsp\_req\_init ()

```
int gnutls_ocsp_req_init (gnutls_ocsp_req_t *req);
```

This function will initialize an OCSF request structure.

**req** : The structure to be initialized

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

### gnutls\_ocsp\_req\_deinit ()

```
void gnutls_ocsp_req_deinit (gnutls_ocsp_req_t req);
```

This function will deinitialize a OCSF request structure.

**req** : The structure to be deinitialized

### gnutls\_ocsp\_req\_import ()

```
int gnutls_ocsp_req_import (gnutls_ocsp_req_t req,  
                           const gnutls_datum_t *data);
```

This function will convert the given DER encoded OCSF request to the native **gnutls\_ocsp\_req\_t** format. The output will be stored in *req*.

**req** : The structure to store the parsed request.

**data** : DER encoded OCSF request.

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

### gnutls\_ocsp\_req\_export ()

```
int gnutls_ocsp_req_export (gnutls_ocsp_req_t req,  
                           gnutls_datum_t *data);
```

This function will export the OCSF request to DER format.

**req** : Holds the OCSF request

**data** : newly allocate buffer holding DER encoded OCSF request

**Returns** : In case of failure a negative error code will be returned, and 0 on success.

**gnutls\_ocsp\_req\_print ()**

```
int gnutls_ocsp_req_print (gnutls_ocsp_req_t req,
                           gnutls_ocsp_print_formats_t format ←
                           ,
                           gnutls_datum_t *out);
```

This function will pretty print a OCSP request, suitable for display to a human.

If the format is **GNUTLS\_PRINT\_FULL** then all fields of the request will be output, on multiple lines.

The output *out*->data needs to be deallocate using **gnutls\_free()**.

**req** : The structure to be printed

**format** : Indicate the format to use

**out** : Newly allocated datum with (0) terminated string.

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

**gnutls\_ocsp\_req\_get\_version ()**

```
int gnutls_ocsp_req_get_version (gnutls_ocsp_req_t req);
```

This function will return the version of the OCSP request. Typically this is always 1 indicating version 1.

**req** : should contain a **gnutls\_ocsp\_req\_t** structure

**Returns** : version of OCSP request, or a negative error code on error.

**gnutls\_ocsp\_req\_get\_cert\_id ()**

```
int gnutls_ocsp_req_get_cert_id (gnutls_ocsp_req_t req,
                                  unsigned indx,
                                  gnutls_digest_algorithm_t *digest,
                                  gnutls_datum_t *issuer_name_hash,
                                  gnutls_datum_t *issuer_key_hash,
                                  gnutls_datum_t *serial_number);
```

This function will return the certificate information of the *indx*'ed request in the OCSP request. The information returned corresponds to the CertID structure:

```
<informalexample><programlisting> CertID ::= SEQUENCE { hashAlgorithm AlgorithmIdentifier, issuerNameHash OCTET
STRING, -- Hash of Issuer's DN issuerKeyHash OCTET STRING, -- Hash of Issuers public key serialNumber CertificateSeri-
alNumber } </programlisting></informalexample>
```

Each of the pointers to output variables may be NULL to indicate that the caller is not interested in that value.

**req** : should contain a **gnutls\_ocsp\_req\_t** structure

**indx** : Specifies which extension OID to get. Use (0) to get the first one.

**digest** : output variable with **gnutls\_digest\_algorithm\_t** hash algorithm

**issuer\_name\_hash** : output buffer with hash of issuer's DN

**issuer\_key\_hash** : output buffer with hash of issuer's public key

**serial\_number** : output buffer with serial number of certificate to check

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error code is returned. If you have reached the last CertID available **GNUTLS\_E\_REQUESTED\_DATA\_NOT\_AVAILABLE** will be returned.

## gnutls\_ocsp\_req\_add\_cert\_id ()

[illegible]

This function will add another request to the OCSP request for a particular certificate having the issuer name hash of *issuer\_name\_hash* and issuer key hash of *issuer\_key\_hash* (both hashed using *digest*) and serial number *serial\_number*.

The information needed corresponds to the CertID structure:

```
<informalexample><programlisting> CertID ::= SEQUENCE { hashAlgorithm AlgorithmIdentifier, issuerNameHash OCTET
STRING, -- Hash of Issuer's DN issuerKeyHash OCTET STRING, -- Hash of Issuers public key serialNumber CertificateSerialNumber } </programlisting></informalexample>
```

**req**: should contain a **gnutls\_ocsp\_req\_t** structure

**digest** : hash algorithm, a `gnutls_digest_algorithm_t` value

***issuer\_name\_hash***: hash of issuer's DN

***issuer\_key\_hash***: hash of issuer's public key

***serial\_number***: serial number of certificate to check

**Returns :** On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error code is returned.

## gnutls\_ocsp\_req\_add\_cert ()

[illegible]

This function will add another request to the OCSP request for a particular certificate. The issuer name hash, issuer key hash, and serial number fields is populated as follows. The issuer name and the serial number is taken from *cert*. The issuer key is taken from *issuer*. The hashed values will be hashed using the *digest* algorithm, normally **GNUTLS\_DIG\_SHA1**.

**req**: should contain a `gnutls_ocsp_req_t` structure

**digest** : hash algorithm, a `gnutls_digest_algorithm_t` value

**issuer**: issuer of *subject* certificate

**cert** : certificate to request status for

**Returns :** On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error code is returned.

## gnutls\_ocsp\_req\_get\_extension()

[illegible]

This function will return all information about the requested extension in the OCSF request. The information returned is the OID, the critical flag, and the data itself. The extension OID will be stored as a string. Any of *oid*, *critical*, and *data* may be NULL which means that the caller is not interested in getting that information back.

The caller needs to deallocate memory by calling `gnutls_free()` on *oid*->data and *data*->data.

**req** : should contain a `gnutls_ocsp_req_t` structure

**indx** : Specifies which extension OID to get. Use (0) to get the first one.

**oid** : will hold newly allocated buffer with OID of extension, may be NULL

**critical** : output variable with critical flag, may be NULL.

**data** : will hold newly allocated buffer with extension data, may be NULL

**Returns** : On success, `GNUTLS_E_SUCCESS` (0) is returned, otherwise a negative error code is returned. If you have reached the last extension available `GNUTLS_E_REQUESTED_DATA_NOT_AVAILABLE` will be returned.

### `gnutls_ocsp_req_set_extension ()`

```
int                gnutls_ocsp_req_set_extension      (gnutls_ocsp_req_t req,
                                                       const char *oid,
                                                       unsigned int critical,
                                                       const gnutls_datum_t *data);
```

This function will add an extension to the OCSF request. Calling this function multiple times for the same OID will overwrite values from earlier calls.

**req** : should contain a `gnutls_ocsp_req_t` structure

**oid** : buffer with OID of extension as a string.

**critical** : critical flag, normally false.

**data** : the extension data

**Returns** : On success, `GNUTLS_E_SUCCESS` (0) is returned, otherwise a negative error code is returned.

### `gnutls_ocsp_req_get_nonce ()`

```
int                gnutls_ocsp_req_get_nonce        (gnutls_ocsp_req_t req,
                                                       unsigned int *critical,
                                                       gnutls_datum_t *nonce);
```

This function will return the OCSF request nonce extension data.

The caller needs to deallocate memory by calling `gnutls_free()` on *nonce*->data.

**req** : should contain a `gnutls_ocsp_req_t` structure

**critical** : whether nonce extension is marked critical, or NULL

**nonce** : will hold newly allocated buffer with nonce data

**Returns** : On success, `GNUTLS_E_SUCCESS` (0) is returned, otherwise a negative error code is returned.

**gnutls\_ocsp\_req\_set\_nonce ()**

```
int gnutls_ocsp_req_set_nonce (gnutls_ocsp_req_t req,
                               unsigned int critical,
                               const gnutls_datum_t *nonce);
```

This function will add an nonce extension to the OCSP request. Calling this function multiple times will overwrite values from earlier calls.

**req** : should contain a **gnutls\_ocsp\_req\_t** structure

**critical** : critical flag, normally false.

**nonce** : the nonce data

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error code is returned.

**gnutls\_ocsp\_req\_randomize\_nonce ()**

```
int gnutls_ocsp_req_randomize_nonce (gnutls_ocsp_req_t req);
```

This function will add or update an nonce extension to the OCSP request with a newly generated random value.

**req** : should contain a **gnutls\_ocsp\_req\_t** structure

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error code is returned.

**struct gnutls\_ocsp\_resp\_int**

```
struct gnutls_ocsp_resp_int;
```

**gnutls\_ocsp\_resp\_t**

```
typedef struct gnutls_ocsp_resp_int *gnutls_ocsp_resp_t;
```

**gnutls\_ocsp\_resp\_init ()**

```
int gnutls_ocsp_resp_init (gnutls_ocsp_resp_t *resp);
```

This function will initialize an OCSP response structure.

**resp** : The structure to be initialized

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

**gnutls\_ocsp\_resp\_deinit ()**

```
void gnutls_ocsp_resp_deinit (gnutls_ocsp_resp_t resp);
```

This function will deinitialize a OCSP response structure.

**resp** : The structure to be deinitialized



**gnutls\_ocsp\_resp\_import ()**

```
int gnutls_ocsp_resp_import (gnutls_ocsp_resp_t resp,
                             const gnutls_datum_t *data);
```

This function will convert the given DER encoded OCSP response to the native **gnutls\_ocsp\_resp\_t** format. It also decodes the Basic OCSP Response part, if any. The output will be stored in *resp*.

**resp** : The structure to store the parsed response.

**data** : DER encoded OCSP response.

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

**gnutls\_ocsp\_resp\_export ()**

```
int gnutls_ocsp_resp_export (gnutls_ocsp_resp_t resp,
                             gnutls_datum_t *data);
```

This function will export the OCSP response to DER format.

**resp** : Holds the OCSP response

**data** : newly allocate buffer holding DER encoded OCSP response

**Returns** : In case of failure a negative error code will be returned, and 0 on success.

**gnutls\_ocsp\_resp\_print ()**

```
int gnutls_ocsp_resp_print (gnutls_ocsp_resp_t resp,
                            gnutls_ocsp_print_formats_t format ←
                            ,
                            gnutls_datum_t *out);
```

This function will pretty print a OCSP response, suitable for display to a human.

If the format is **GNUTLS\_PRINT\_FULL** then all fields of the response will be output, on multiple lines.

The output *out*->data needs to be deallocate using **gnutls\_free()**.

**resp** : The structure to be printed

**format** : Indicate the format to use

**out** : Newly allocated datum with (0) terminated string.

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

**gnutls\_ocsp\_resp\_get\_status ()**

```
int gnutls_ocsp_resp_get_status (gnutls_ocsp_resp_t resp);
```

This function will return the status of a OCSP response, an **gnutls\_ocsp\_resp\_status\_t** enumeration.

**resp** : should contain a **gnutls\_ocsp\_resp\_t** structure

**Returns** : status of OCSP request as a **gnutls\_ocsp\_resp\_status\_t**, or a negative error code on error.

**gnutls\_ocsp\_resp\_get\_response ()**

```
int gnutls_ocsp_resp_get_response (gnutls_ocsp_resp_t resp,
                                   gnutls_datum_t *response_type_oid,
                                   gnutls_datum_t *response);
```

This function will extract the response type OID in and the response data from an OCSP response. Normally the *response\_type\_oid* is always "1.3.6.1.5.5.7.48.1.1" which means the *response* should be decoded as a Basic OCSP Response, but technically other response types could be used.

This function is typically only useful when you want to extract the response type OID of an response for diagnostic purposes. Otherwise **gnutls\_ocsp\_resp\_import()** will decode the basic OCSP response part and the caller need not worry about that aspect.

**resp** : should contain a **gnutls\_ocsp\_resp\_t** structure

**response\_type\_oid** : newly allocated output buffer with response type OID

**response** : newly allocated output buffer with DER encoded response

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

**gnutls\_ocsp\_resp\_get\_version ()**

```
int gnutls_ocsp_resp_get_version (gnutls_ocsp_resp_t resp);
```

This function will return the version of the Basic OCSP Response. Typically this is always 1 indicating version 1.

**resp** : should contain a **gnutls\_ocsp\_resp\_t** structure

**Returns** : version of Basic OCSP response, or a negative error code on error.

**gnutls\_ocsp\_resp\_get\_responder ()**

```
int gnutls_ocsp_resp_get_responder (gnutls_ocsp_resp_t resp,
                                     gnutls_datum_t *dn);
```

This function will extract the name of the Basic OCSP Response in the provided buffer. The name will be in the form "C=xxx,O=yyy,CN=zzzz" as described in RFC2253. The output string will be ASCII or UTF-8 encoded, depending on the certificate data.

The caller needs to deallocate memory by calling **gnutls\_free()** on *dn->data*.

**resp** : should contain a **gnutls\_ocsp\_resp\_t** structure

**dn** : newly allocated buffer with name

**Returns** : On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error code is returned.

**gnutls\_ocsp\_resp\_get\_produced ()**

```
time_t gnutls_ocsp_resp_get_produced (gnutls_ocsp_resp_t resp);
```

This function will return the time when the OCSP response was signed.

**resp** : should contain a **gnutls\_ocsp\_resp\_t** structure

**Returns** : signing time, or (time\_t)-1 on error.



This function will return all information about the requested extension in the OCSF response. The information returned is the OID, the critical flag, and the data itself. The extension OID will be stored as a string. Any of *oid*, *critical*, and *data* may be NULL which means that the caller is not interested in getting that information back.

The caller needs to deallocate memory by calling `gnutls_free()` on *oid*->data and *data*->data.

**resp** : should contain a `gnutls_ocsp_resp_t` structure

**indx** : Specifies which extension OID to get. Use (0) to get the first one.

**oid** : will hold newly allocated buffer with OID of extension, may be NULL

**critical** : output variable with critical flag, may be NULL.

**data** : will hold newly allocated buffer with extension data, may be NULL

**Returns** : On success, `GNUTLS_E_SUCCESS` (0) is returned, otherwise a negative error code is returned. If you have reached the last extension available `GNUTLS_E_REQUESTED_DATA_NOT_AVAILABLE` will be returned.

### gnutls\_ocsp\_resp\_get\_nonce ()

```
int gnutls_ocsp_resp_get_nonce (gnutls_ocsp_resp_t resp,
                                unsigned int *critical,
                                gnutls_datum_t *nonce);
```

This function will return the Basic OCSF Response nonce extension data.

The caller needs to deallocate memory by calling `gnutls_free()` on *nonce*->data.

**resp** : should contain a `gnutls_ocsp_resp_t` structure

**critical** : whether nonce extension is marked critical

**nonce** : will hold newly allocated buffer with nonce data

**Returns** : On success, `GNUTLS_E_SUCCESS` (0) is returned, otherwise a negative error code is returned.

### gnutls\_ocsp\_resp\_get\_signature\_algorithm ()

```
int gnutls_ocsp_resp_get_signature_algorithm (gnutls_ocsp_resp_t resp);
```

This function will return a value of the `gnutls_sign_algorithm_t` enumeration that is the signature algorithm that has been used to sign the OCSF response.

**resp** : should contain a `gnutls_ocsp_resp_t` structure

**Returns** : a `gnutls_sign_algorithm_t` value, or a negative error code on error.

### gnutls\_ocsp\_resp\_get\_signature ()

```
int gnutls_ocsp_resp_get_signature (gnutls_ocsp_resp_t resp,
                                     gnutls_datum_t *sig);
```

This function will extract the signature field of a OCSF response.

**resp** : should contain a `gnutls_ocsp_resp_t` structure

**sig** : newly allocated output buffer with signature data

**Returns** : On success, `GNUTLS_E_SUCCESS` (0) is returned, otherwise a negative error value.

## gnutls\_ocsp\_resp\_get\_certs ()

```
int gnutls_ocsp_resp_get_certs(gnutls_ocsp_resp_t resp,
                               gnutls_x509_crt_t **certs,
                               size_t *ncerts);
```

This function will extract the X.509 certificates found in the Basic OCSP Response. The *certs* output variable will hold a newly allocated zero-terminated array with X.509 certificates.

Every certificate in the array needs to be de-allocated with `gnutls_x509_cert_deinit()` and the array itself must be freed using `gnutls_free()`.

Both the *certs* and *ncerts* variables may be NULL. Then the function will work as normal but will not return the NULL:d information. This can be used to get the number of certificates only, or to just get the certificate array without its size.

**resp**: should contain a **gnutls\_ocsp\_resp\_t** structure

**certs**: newly allocated array with `gnutls_x509_crt_t` certificates

***ncerts***: output variable with number of allocated certs.

**Returns :** On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

## gnutls\_ocsp\_resp\_verify\_direct ()

```
int gnutls_ocsp_resp_verify_direct(gnutls_ocsp_resp_t resp,
                                   gnutls_x509_crt_t signer_cert,
                                   unsigned *verify,
                                   int flags);
```

Verify signature of the Basic OCSP Response against the public key in the *signercert* certificate.

The output `verify` variable will hold verification status codes (e.g., `GNUTLS_OCSHP_VERIFY_SIGNER_NOT_FOUND`, `GNUTLS_OCSHP_VERIFY_INSECURE_ALGORITHM`) which are only valid if the function returned `GNUTLS_E_SUCCESS`.

Note that the function returns **GNUTLS\_E\_SUCCESS** even when verification failed. The caller must always inspect the *verify* variable to find out the verification status.

The *flags* variable should be 0 for now.

**resp**: should contain a `gnutls_ocsp_resp_t` structure

**signercert**: certificate believed to have signed the response

**verify**: output variable with verification status, an `gnutls_ocsp_cert_status_t`

**flags**: verification flags, 0 for now.

**Returns :** On success, **GNUTLS\_E\_SUCCESS** (0) is returned, otherwise a negative error value.

```
gnutls_ocsp_resp_verify()
```

```
int gnutls_ocsp_resp_verify(gnutls_ocsp_resp_t resp,
                           gnutls_x509_trust_list_t trustlist ↵
                           ,
                           unsigned *verify,
                           int flags);
```

Verify signature of the Basic OCSP Response against the public key in the certificate of a trusted signer. The *trustlist* should be populated with trust anchors. The function will extract the signer certificate from the Basic OCSP Response and will verify it against the *trustlist*. A trusted signer is a certificate that is either in *trustlist*, or it is signed directly by a certificate in *trustlist* and has the id-ad-ocspSigning Extended Key Usage bit set.

The output *verify* variable will hold verification status codes (e.g., `GNUTLS_OCSP_VERIFY_SIGNER_NOT_FOUND`, `GNUTLS_OCSP_VERIFY_INSECURE_ALGORITHM`) which are only valid if the function returned `GNUTLS_E_SUCCESS`.

Note that the function returns `GNUTLS_E_SUCCESS` even when verification failed. The caller must always inspect the *verify* variable to find out the verification status.

The *flags* variable should be 0 for now.

***resp*** : should contain a `gnutls_ocsp_resp_t` structure

***trustlist*** : trust anchors as a `gnutls_x509_trust_list_t` structure

***verify*** : output variable with verification status, an `gnutls_ocsp_cert_status_t`

***flags*** : verification flags, 0 for now.

**Returns** : On success, `GNUTLS_E_SUCCESS` (0) is returned, otherwise a negative error value.

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## Chapter 2

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