

**NAME**

**sctp\_sendmsg**, **sctp\_sendmsgx** - send a message from an SCTP socket

**LIBRARY**

Standard C Library (libc, -lc)

**SYNOPSIS**

```
#include <sys/types.h>
#include <sys/socket.h>
#include <netinet/sctp.h>
```

*ssize\_t*

```
sctp_sendmsg(int s, const void *msg, size_t len, const struct sockaddr *to, socklen_t tolen,
             uint32_t ppid, uint32_t flags, uint16_t stream_no, uint32_t timetolive, uint32_t context);
```

*ssize\_t*

```
sctp_sendmsgx(int s, const void *msg, size_t len, const struct sockaddr *to, int addrrent, uint32_t ppid,
              uint32_t flags, uint16_t stream_no, uint32_t timetolive, uint32_t context);
```

**DESCRIPTION**

The **sctp\_sendmsg()** system call is used to transmit a message to another SCTP endpoint. The **sctp\_sendmsg()** may be used at any time. If the socket is a one-to-many type (SOCK\_SEQPACKET) socket then an attempt to send to an address that no association exists to will implicitly create a new association. Data sent in such an instance will result in the data being sent on the third leg of the SCTP four-way handshake. Note that if the socket is a one-to-one type (SOCK\_STREAM) socket then an association must be in existence (by use of the connect(2) system call). Calling **sctp\_sendmsg()** or **sctp\_sendmsgx()** on a non-connected one-to-one socket will result in *errno* being set to ENOTCONN, -1 being returned, and the message not being transmitted.

The address of the target is given by *to* with *tolen* specifying its size. The length of the message *msg* is given by *len*. If the message is too long to pass atomically through the underlying protocol, *errno* is set to EMSGSIZE, -1 is returned, and the message is not transmitted.

No indication of failure to deliver is implicit in a sctp\_sendmsg(3) call. Locally detected errors are indicated by a return value of -1.

If no space is available at the socket to hold the message to be transmitted, then sctp\_sendmsg(3) normally blocks, unless the socket has been placed in non-blocking I/O mode. The select(2) system call may be used to determine when it is possible to send more data on one-to-one type (SOCK\_STREAM) sockets.

The *ppid* argument is an opaque 32 bit value that is passed transparently through the stack to the peer endpoint. It will be available on reception of a message (see `sctp_rcvmsg(3)`). Note that the stack passes this value without regard to byte order.

The *flags* argument may include one or more of the following:

```
#define SCTP_EOF          0x0100 /* Start a shutdown procedures */
#define SCTP_ABORT       0x0200 /* Send an ABORT to peer */
#define SCTP_UNORDERED   0x0400 /* Message is un-ordered */
#define SCTP_ADDR_OVER   0x0800 /* Override the primary-address */
#define SCTP_SENDALL     0x1000 /* Send this on all associations */
                               /* for the endpoint */
/* The lower byte is an enumeration of PR-SCTP policies */
#define SCTP_PR_SCTP_TTL 0x0001 /* Time based PR-SCTP */
#define SCTP_PR_SCTP_BUF 0x0002 /* Buffer based PR-SCTP */
#define SCTP_PR_SCTP_RTX 0x0003 /* Number of retransmissions based PR-SCTP */
```

The flag `SCTP_EOF` is used to instruct the SCTP stack to queue this message and then start a graceful shutdown of the association. All remaining data in queue will be sent after which the association will be shut down.

`SCTP_ABORT` is used to immediately terminate an association. An abort is sent to the peer and the local TCB is destroyed.

`SCTP_UNORDERED` is used to specify that the message being sent has no specific order and should be delivered to the peer application as soon as possible. When this flag is absent messages are delivered in order within the stream they are sent, but without respect to order to peer streams.

The flag `SCTP_ADDR_OVER` is used to specify that an specific address should be used. Normally SCTP will use only one of a multi-homed peers addresses as the primary address to send to. By default, no matter what the *to* argument is, this primary address is used to send data. By specifying this flag, the user is asking the stack to ignore the primary address and instead use the specified address not only as a lookup mechanism to find the association but also as the actual address to send to.

For a one-to-many type (`SOCK_SEQPACKET`) socket the flag `SCTP_SENDALL` can be used as a convenient way to make one send call and have all associations that are under the socket get a copy of the message. Note that this mechanism is quite efficient and makes only one actual copy of the data which is shared by all the associations for sending.

The remaining flags are used for the partial reliability extension (RFC3758) and will only be effective if

the peer endpoint supports this extension. This option specifies what local policy the local endpoint should use in skipping data. If none of these options are set, then data is never skipped over.

`SCTP_PR_SCTP_TTL` is used to indicate that a time based lifetime is being applied to the data. The *timetolive* argument is then a number of milliseconds for which the data is attempted to be transmitted. If that many milliseconds elapse and the peer has not acknowledged the data, the data will be skipped and no longer transmitted. Note that this policy does not even assure that the data will ever be sent. In times of a congestion with large amounts of data being queued, the *timetolive* may expire before the first transmission is ever made.

The `SCTP_PR_SCTP_BUF` based policy transforms the *timetolive* field into a total number of bytes allowed on the outbound send queue. If that number or more bytes are in queue, then other buffer based sends are looked to be removed and skipped. Note that this policy may also result in the data never being sent if no buffer based sends are in queue and the maximum specified by *timetolive* bytes is in queue.

The `SCTP_PR_SCTP_RTX` policy transforms the *timetolive* into a number of retransmissions to allow. This policy always assures that at a minimum one send attempt is made of the data. After which no more than *timetolive* retransmissions will be made before the data is skipped.

*stream\_no* is the SCTP stream that you wish to send the message on. Streams in SCTP are reliable (or partially reliable) flows of ordered messages. The *context* field is used only in the event the message cannot be sent. This is an opaque value that the stack retains and will give to the user when a failed send is given if that notification is enabled (see `sctp(4)`). Normally a user process can use this value to index some application specific data structure when a send cannot be fulfilled. `sctp_sendmsgx()` is identical to `sctp_sendmsg()` with the exception that it takes an array of `sockaddr` structures in the argument *to* and adds the additional argument *addrcnt* which specifies how many addresses are in the array. This allows a caller to implicitly set up an association passing multiple addresses as if `sctp_connectx()` had been called to set up the association.

## RETURN VALUES

The call returns the number of characters sent, or -1 if an error occurred.

## ERRORS

The `sctp_sendmsg()` system call fails if:

[EBADF]           An invalid descriptor was specified.

[ENOTSOCK]        The argument *s* is not a socket.

- [EFAULT] An invalid user space address was specified for an argument.
- [EMSGSIZE] The socket requires that message be sent atomically, and the size of the message to be sent made this impossible.
- [EAGAIN] The socket is marked non-blocking and the requested operation would block.
- [ENOBUFS] The system was unable to allocate an internal buffer. The operation may succeed when buffers become available.
- [ENOBUFS] The output queue for a network interface was full. This generally indicates that the interface has stopped sending, but may be caused by transient congestion.
- [EHOSTUNREACH] The remote host was unreachable.
- [ENOTCONN] On a one-to-one style socket no association exists.
- [ECONNRESET] An abort was received by the stack while the user was attempting to send data to the peer.
- [ENOENT] On a one-to-many style socket no address is specified so that the association cannot be located or the SCTP\_ABORT flag was specified on a non-existing association.
- [EPIPE] The socket is unable to send anymore data (SBS\_CANTSENDMORE has been set on the socket). This typically means that the socket is not connected and is a one-to-one style socket.

**SEE ALSO**

connect(2), getsockopt(2), recv(2), select(2), sendmsg(2), socket(2), write(2), sctp\_connectx(3), sctp(4)

**BUGS**

Because in the one-to-many style socket `sctp_sendmsg()` or `sctp_sendmsgx()` may have multiple associations under one endpoint, a select on write will only work for a one-to-one style socket.