



## ***Red Hat Enterprise Linux Release 9.2 Manual Pages on 'MSG\_LEN.3' command***

### ***\$ man MSG\_LEN.3***

MSG(3)                      Linux Programmer's Manual                      MSG(3)

#### **NAME**

MSG\_ALIGN, MSG\_SPACE, MSG\_NXTHDR, MSG\_FIRSTHDR - access ancillary data

#### **SYNOPSIS**

```
#include <sys/socket.h>

struct cmsghdr *MSG_FIRSTHDR(struct msghdr *msgh);

struct cmsghdr *MSG_NXTHDR(struct msghdr *msgh,
                             struct cmsghdr *cmsg);

size_t MSG_ALIGN(size_t length);

size_t MSG_SPACE(size_t length);

size_t MSG_LEN(size_t length);

unsigned char *MSG_DATA(struct cmsghdr *cmsg);
```

#### **DESCRIPTION**

These macros are used to create and access control messages (also called ancillary data) that are not a part of the socket payload. This control information may include the interface the packet was received on, various rarely used header fields, an extended error description, a set of file descriptors, or UNIX credentials. For instance, control messages can be used to send additional header fields such as IP options. Ancillary data is sent by calling `sendmsg(2)` and received by calling `recvmsg(2)`. See their manual pages for more information.

Ancillary data is a sequence of `cmsghdr` structures with appended data.

See the specific protocol man pages for the available control message types. The maximum ancillary buffer size allowed per socket can be set using `/proc/sys/net/core/optmem_max`; see `socket(7)`.

The `cmsghdr` structure is defined as follows:

```
struct cmsghdr {
    size_t cmsg_len; /* Data byte count, including header
                     (type is socklen_t in POSIX) */
    int cmsg_level; /* Originating protocol */
    int cmsg_type; /* Protocol-specific type */
    /* followed by
     unsigned char cmsg_data[]; */
};
```

The sequence of `cmsghdr` structures should never be accessed directly.

Instead, use only the following macros:

- \* `MSG_FIRSTHDR()` returns a pointer to the first `cmsghdr` in the ancillary data buffer associated with the passed `msg`. It returns `NULL` if there isn't enough space for a `cmsghdr` in the buffer.
- \* `MSG_NXTHDR()` returns the next valid `cmsghdr` after the passed `cmsghdr`. It returns `NULL` when there isn't enough space left in the buffer.

When initializing a buffer that will contain a series of `cmsghdr` structures (e.g., to be sent with `sendmsg(2)`), that buffer should first be zero-initialized to ensure the correct operation of `MSG_NXTHDR()`.

- \* `MSG_ALIGN()`, given a length, returns it including the required alignment. This is a constant expression.
- \* `MSG_SPACE()` returns the number of bytes an ancillary element with payload of the passed data length occupies. This is a constant expression.
- \* `MSG_DATA()` returns a pointer to the data portion of a `cmsghdr`. The pointer returned cannot be assumed to be suitably aligned for accessing arbitrary payload data types. Applications should not cast it to a pointer type matching the payload, but should instead use

memcpy(3) to copy data to or from a suitably declared object.

\* CMSG\_LEN() returns the value to store in the cmsg\_len member of the cmsghdr structure, taking into account any necessary alignment. It takes the data length as an argument. This is a constant expression.

To create ancillary data, first initialize the msg\_controllen member of the msghdr with the length of the control message buffer. Use CMSG\_FIRSTHDR() on the msghdr to get the first control message and CMSG\_NXTHDR() to get all subsequent ones. In each control message, initialize cmsg\_len (with CMSG\_LEN()), the other cmsghdr header fields, and the data portion using CMSG\_DATA(). Finally, the msg\_controllen field of the msghdr should be set to the sum of the CMSG\_SPACE() of the length of all control messages in the buffer. For more information on the msghdr, see recvmsg(2).

## CONFORMING TO

This ancillary data model conforms to the POSIX.1g draft, 4.4BSD-Lite, the IPv6 advanced API described in RFC 2292 and SUSv2. CMSG\_FIRSTHDR(), CMSG\_NXTHDR(), and CMSG\_DATA() are specified in POSIX.1-2008. CMSG\_SPACE() and CMSG\_LEN() will be included in the next POSIX release (Issue 8). CMSG\_ALIGN() is a Linux extension.

## NOTES

For portability, ancillary data should be accessed using only the macros described here. CMSG\_ALIGN() is a Linux extension and should not be used in portable programs.

In Linux, CMSG\_LEN(), CMSG\_DATA(), and CMSG\_ALIGN() are constant expressions (assuming their argument is constant), meaning that these values can be used to declare the size of global variables. This may not be portable, however.

## EXAMPLES

This code looks for the IP\_TTL option in a received ancillary buffer:

```
struct msghdr msgh;  
struct cmsghdr *cmsg;
```

```

int received_ttl;

/* Receive auxiliary data in msggh */

for (cmsg = CMSG_FIRSTHDR(&msggh); cmsg != NULL;
     cmsg = CMSG_NXTHDR(&msggh, cmsg)) {
    if (cmsg->cmsg_level == IPPROTO_IP
        && cmsg->cmsg_type == IP_TTL) {
        memcpy(&received_ttl, CMSG_DATA(cmsg), sizeof(received_ttl));
        break;
    }
}

if (cmsg == NULL) {
    /* Error: IP_TTL not enabled or small buffer or I/O error */
}

```

The code below passes an array of file descriptors over a UNIX domain socket using SCM\_RIGHTS:

```

struct msghdr msg = { 0 };
struct cmsghdr *cmsg;

int myfds[NUM_FD]; /* Contains the file descriptors to pass */

char iobuf[1];

struct iovec io = {
    .iov_base = iobuf,
    .iov_len = sizeof(iobuf)
};

union {
    /* Ancillary data buffer, wrapped in a union
       in order to ensure it is suitably aligned */
    char buf[CMSG_SPACE(sizeof(myfds))];
    struct cmsghdr align;
} u;

msg.msg_iov = &io;
msg.msg_iovlen = 1;
msg.msg_control = u.buf;
msg.msg_controllen = sizeof(u.buf);
cmsg = CMSG_FIRSTHDR(&msg);

```

```
cmsg->cmsg_level = SOL_SOCKET;  
cmsg->cmsg_type = SCM_RIGHTS;  
cmsg->cmsg_len = CMSG_LEN(sizeof(myfds));  
memcpy(CMSG_DATA(cmsg), myfds, sizeof(myfds));
```

#### SEE ALSO

recvmsg(2), sendmsg(2)

RFC 2292

#### COLOPHON

This page is part of release 5.10 of the Linux man-pages project. A description of the project, information about reporting bugs, and the latest version of this page, can be found at <https://www.kernel.org/doc/man-pages/>.

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