

**NAME**

htobe16, htole16, be16toh, le16toh, htobe32, htole32, be32toh, le32toh, htobe64, htole64, be64toh, le64toh - convert values between host and big-/little-endian byte order

**SYNOPSIS**

```
#define _BSD_SOURCE /* See feature\_test\_macros\(7\)
*/
#include <endian.h>

uint16_t htobe16(uint16_t host_16bits);
uint16_t htole16(uint16_t host_16bits);
uint16_t be16toh(uint16_t big_endian_16bits);
uint16_t le16toh(uint16_t little_endian_16bits);

uint32_t htobe32(uint32_t host_32bits);
uint32_t htole32(uint32_t host_32bits);
uint32_t be32toh(uint32_t big_endian_32bits);
uint32_t le32toh(uint32_t little_endian_32bits);

uint64_t htobe64(uint64_t host_64bits);
uint64_t htole64(uint64_t host_64bits);
uint64_t be64toh(uint64_t big_endian_64bits);
uint64_t le64toh(uint64_t little_endian_64bits);
```

**DESCRIPTION**

These functions convert the byte encoding of integer values from the byte order that the current CPU (the host) uses, to and from little-endian and big-endian byte order.

The number, *nn*, in the name of each function indicates the size of integer handled by the function, either 16, 32, or 64 bits.

The functions with names of the form *htobenn* convert from host byte order to big-endian order.

The functions with names of the form *htolenn* convert from host byte order to little-endian order.

The functions with names of the form *benntoh* convert from big-endian order to host byte order.

The functions with names of the form *lenntoh* convert from little-endian order to host byte order.

**VERSIONS**

These functions were added to glibc in version 2.9.

**CONFORMING TO**

These functions are nonstandard. Similar functions are present on the BSDs, where the required header file is *<sys/endian.h>* instead of *<endian.h>*. Unfortunately, NetBSD, FreeBSD, and glibc haven't followed the original OpenBSD naming convention for these functions, whereby the *nn* component always appears at the end of the function name (thus, for example, in NetBSD, FreeBSD, and glibc, the equivalent of OpenBSDs *betoh32* is *be32toh*).

**NOTES**

These functions are similar to the older [byteorder\(3\)](#) family of functions. For example, **be32toh()** is identical to **ntohl()**.

The advantage of the [byteorder\(3\)](#) functions is that they are standard functions available on all UNIX systems. On the other hand, the fact that they were designed for use in the context of TCP/IP means that they lack the 64-bit and little-endian variants described in this page.

**EXAMPLE**

The program below display the results of converting an integer from host byte order to both little-endian and big-endian byte order. Since host byte order is either little-endian or big-endian, only one of these conversions will have an effect. When we run this program on a little-endian system such as x86-32, we see the following:

```
$ ./a.out
x.u32 = 0x44332211
htole32(x.u32) = 0x44332211
htobe32(x.u32) = 0x11223344
```

### Program source

```
#include <endian.h>
#include <stdint.h>
#include <stdio.h>
#include <stdlib.h>

int
main(int argc, char *argv[])
{
    union {
        uint32_t u32;
        uint8_t arr[4];
    } x;

    x.arr[0] = 0x11; /* Lowest-address byte */
    x.arr[1] = 0x22;
    x.arr[2] = 0x33;
    x.arr[3] = 0x44; /* Highest-address byte */

    printf(x.u32 = 0x%xn, x.u32);
    printf(htole32(x.u32) = 0x%xn, htole32(x.u32));
    printf(htobe32(x.u32) = 0x%xn, htobe32(x.u32));

    exit(EXIT_SUCCESS);
}
```

### SEE ALSO

[byteorder\(3\)](#)

### COLOPHON

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