

**NAME**

**iflibtxrx** - Device Dependent Transmit and Receive Functions

**SYNOPSIS**

```
#include <ifdi_if.h>
```

**Interface Manipulation Functions**

*int*

```
isc_txd_encap(void *sc, if_pkt_info_t pi);
```

*void*

```
isc_txd_flush(void *sc, uint16_t qid, uint32_t _pid_x_or_credits_);
```

*int*

```
isc_txd_credits_update(void *sc, uint16_t qid, bool clear);
```

*int*

```
isc_rxd_available(void *sc, uint16_t qsid, uint32_t cid_x);
```

*void*

```
isc_rxd_refill(void *sc, uint16_t qsid, uint8_t flid, uint32_t pid_x, uint64_t *paddrs, caddr_t *vaddrs,
               uint16_t count);
```

*void*

```
isc_rxd_flush(void *sc, uint16_t qsid, uint8_t flid, uint32_t pid_x);
```

*int*

```
isc_rxd_pkt_get(void *sc, if_rxd_info_t ri);
```

**Global Variables**

*extern struct if\_txrx*

**DATA STRUCTURES**

The device dependent mechanisms for handling packet transmit and receive are primarily defined by the functions named above. The `if_pkt_info` data structure contains statistics and identifying info necessary for packet transmission. While the data structure for packet receipt is the `if_rxd_info` structure.

**The `if_pkt_info` Structure**

The fields of `struct if_pkt_info` are as follows:

<i>ipi_len</i>	( <i>uint32_t</i> ) Denotes the size of packet to be sent on the transmit queue.
<i>ipi_segs</i>	( <i>bus_dma_segment_t</i> *) A pointer to the <i>bus_dma_segment</i> of the device independent transfer queue defined in <i>iflib</i> .
<i>ipi_qsidx</i>	Unique index value assigned sequentially to each transmit queue. Used to reference the currently transmitting queue.
<i>ipi_nsegs</i>	( <i>uint16_t</i> ) Number of descriptors to be read into the device dependent transfer descriptors.
<i>ipi_ndescs</i>	( <i>uint16_t</i> ) Number of descriptors in use. Calculated by subtracting the old <i>pidx</i> value from the new <i>pidx</i> value.
<i>ipi_flags</i>	( <i>uint16_t</i> ) Flags defined on a per packet basis.
<i>ipi_pidx</i>	( <i>uint32_t</i> ) Value of first <i>pidx</i> sent to the <i>isc_encap</i> function for encapsulation and subsequent transmission.
<i>ipi_new_pidx</i>	( <i>uint32_t</i> ) Value set after the termination of the <i>isc_encap</i> function. This value will become the first <i>pidx</i> sent to the <i>isc-encap</i> the next time that the function is called.

### The Following Fields Are Used For Offload Handling

<i>ipi_csum_flags</i>	( <i>uint64_t</i> ) Flags describing the checksum values, used on a per packet basis.
<i>ipi_tso_segsz</i>	( <i>uint16_t</i> ) Size of the TSO Segment Size.
<i>ipi_mflags</i>	( <i>uint16_t</i> ) Flags describing the operational parameters of the mbuf.
<i>ipi_vtag</i>	( <i>uint16_t</i> ) Contains the VLAN information in the Ethernet Frame.
<i>ipi_etype</i>	( <i>uint16_t</i> ) Type of ethernet header protocol as contained by the struct <i>ether_vlan_header</i> .
<i>ipi_ehrdlen</i>	( <i>uint8_t</i> ) Length of the Ethernet Header.
<i>ipi_ip_hlen</i>	( <i>uint8_t</i> ) Length of the TCP Header

*ipi\_tcp\_hlen* (*uint8\_t*) Length of the TCP Header.

*ipi\_tcp\_hflags*

(*uint8\_t*) Flags describing the operational parameters of the TCP Header.

*ipi\_ipproto* (*uint8\_t*) Specifies the type of IP Protocol in use. Example TCP, UDP, or SCTP.

### The *if\_rxd\_info* Structure

The fields of *struct if\_rxd\_info* are as follows:

*iri\_qsidx* (*uint16\_t*) Unique index value assigned sequentially to each receive queue. Used to reference the currently receiving queue.

*iri\_vtag* (*uint16\_t*) Contains the VLAN information in the Ethernet Frame.

*iri\_len* (*uint16\_t*) Denotes the size of a received packet.

*iri\_next\_offset*

(*uint16\_t*) Denotes the offset value for the next packet to be receive. A Null value signifies the end of packet.

*iri\_cidx* (*uint32\_t*) Denotes the index value of the packet currently being processed in the consumer queue.

*iri\_flowid* (*uint32\_t*) Value of the RSS hash for the packet.

*iri\_flags* (*uint*)

Flags describing the operational parameters of the mbuf contained in the receive packet.

*iri\_csum\_flags*

(*uint32\_t*) Flags describing the checksum value contained in the receive packet.

*iri\_csum\_data* (*uint32\_t*) Checksum data contained in the mbuf(9) packet header.

*iri\_m* (*struct mbuf \**) A mbuf for drivers that manage their own receive queues.

*iri\_ifp* (*struct ifnet \**) A link back to the interface structure. Utilized by drivers that have multiple interface per softc.

- iri\_rstype* (*uint8\_t*) The value of the RSS hash type.
- iri\_pad* (*uint8\_t*) The length of any padding contained by the received data.
- iri\_qidx* (*uint8\_t*) Represents the type of queue event. If value  $\geq 0$  then it is the freelist id otherwise it is a completion queue event.

## FUNCTIONS

All function calls are associated exclusively with either packet transmission or receipt. The void *\*sc* passed as the first argument to all of the following functions represents the driver's softc.

### Transmit Packet Functions

#### **isc\_txd\_encap()**

Transmit function that sends a packet on an interface. The *if\_pkt\_info* data structure contains data information fields describing the packet. This function returns 0 if successful, otherwise an error value is returned.

#### **isc\_txd\_flush()**

Flush function is called immediately after the *isc\_txd\_encap* function transmits a packet. It updates the hardware producer index or increments the descriptors used to *pidx\_or\_credits* in the queue designated by the *qid* number. This is often referred to as poking the doorbell register.

#### **isc\_txd\_credits\_update()**

Credit function advances the buffer ring and calculates the credits (descriptors) processed. Until the I/O is complete it cleans the range in case of multisegments and updates the count of processed packets. The function returns the number of processed credits.

### Receive Packet Functions

#### **isc\_rxd\_available()**

Function calculates the remaining number of descriptors from a position given by *idx*. The function returns this value.

#### **isc\_rxd\_refill()**

Starting with the physical address *paddr*, the function reads a packet into the *rx\_ring* until a value designated by *count* is reached. *vaddr* is typically not needed and is provided for devices that place their own metadata in the packet header.

#### **isc\_rxd\_flush()**

Flush function updates the producer pointer on the free list *flid* in queue set number *qid* to *pidx* to reflect the presence of new buffers.

**isc\_rxd\_pkt\_get()**

Process a single software descriptor. `rxr->rx_base[i]` contains a descriptor that describes a received packet. Hardware specific information about the buffer referred to by `ri` is returned in the data structure `if_rxd_info`

**SEE ALSO**

`iflibdd(9)`, `iflibdi(9)`, `mbuf(9)`

**AUTHORS**

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