NAME

el – 3COM 3C503 Ethernet device driver

SYNOPSIS

```
#include <sys/stropts.h>
#include <sys/ethernet.h>
#include <sys/dlpi.h>
```

AVAILABILITY

x86

DESCRIPTION

The **el** Ethernet driver is a multi-threaded, loadable, clonable, STREAMS hardware driver supporting the connectionless Data Link Provider Interface, **dlpi**(7P), over 3COM 3C503 EtherLink II and EtherLink II/16 Ethernet controllers. Multiple EtherLink II controllers installed within the system are supported by the driver. The **el** driver provides basic support for the EtherLink II hardware. Functions include chip initialization, frame transmit and receive, multicast and "promiscuous" support, and error recovery and reporting.

The cloning, character-special device **/dev/el** is used to access all EtherLink II devices installed within the system.

The **el** driver is a "style 2" Data Link Service provider. All **M_PROTO** and **M_PCPROTO** type messages are interpreted as DLPI primitives. An explicit **DL_ATTACH_REQ** message by the user is required to associate the opened stream with a particular device (**ppa**). The **ppa** ID is interpreted as an unsigned long integer and indicates the corresponding device instance (unit) number. The unit numbers are assigned sequentially to each board found. The search order is determined by the order defined in the **el.conf** file. An error (**DL_ERROR_ACK**) is returned by the driver if the **ppa** field value does not correspond to a valid device instance number for this system. The device is initialized on first attach and de-initialized (stopped) on last detach.

The values returned by the driver in the **DL_INFO_ACK** primitive in response to the **DL_INFO_REQ** from the user are as follows:

The maximum SDU is 1500 (ETHERMTU).

The minimum SDU is 0. The driver will pad to the mandatory 60-octet minimum packet size.

The **dlsap** address length is 8.

The MAC type is **DL_ETHER.**

The **sap** length value is –2, meaning the physical address component is followed immediately by a 2-byte **sap** component within the DLSAP address.

The service mode is **DL_CLDLS.**

No optional quality of service (QOS) support is included at present, so the QOS fields are 0.

The provider style is **DL_STYLE2.**

The version is **DL_VERSION_2.**

The broadcast address value is Ethernet/IEEE broadcast address

(FF:FF:FF:FF:FF:FF).

Once in the **DL_ATTACHED** state, the user must send a **DL_BIND_REQ** to associate a particular Service Access Pointer (SAP) with the stream. The **el** driver interprets the **sap** field within the **DL_BIND_REQ** as an Ethernet "type;" therefore valid values for the **sap** field are in the [0-0xFFFF] range. Only one Ethernet type can be bound to the stream at any time.

In addition to Ethernet V2 service, an "802.3 mode" is also provided by the driver. In this mode, **sap** values in the range [0-1500] are treated as equivalent and represent a desire by the user for "802.3" mode. If the value of the **sap** field of the **DL_BIND_REQ** is within this range, then the driver expects that the destination DLSAP in a **DL_UNITDATA_REQ** will contain the *length* of the data rather than a **sap** value. All frames received from the media that have a "type" field in this range are assumed to be 802.3 frames, and they are routed up all open streams which are bound to any **sap** value within this range. If more than one stream is in "802.3 mode," then the frame will be duplicated and routed up multiple streams as **DL_UNITDATA_IND** messages.

The **el** driver DLSAP address format consists of the 6-byte physical (Ethernet) address component followed immediately by the 2-byte **sap** (type) component, producing an 8-byte DLSAP address. Applications should *not* hardcode to this particular implementation-specific DLSAP address format, but should instead use information returned in the **DL_INFO_ACK** primitive to compose and decompose DLSAP addresses. The **sap** length, full DLSAP length, and **sap**/physical ordering are included within the **DL_INFO_ACK.** The physical address length can be computed by subtracting the **sap** length from the full DLSAP address length or by issuing the **DL_PHYS_ADDR_REQ** to obtain the current physical address associated with the stream.

Once in the **DL_BOUND** state, the user may transmit frames on the Ethernet by sending **DL_UNITDATA_REQ** messages to the **el** driver. The **el** driver will route received Ethernet frames up all open and bound streams that have a **sap** which matches the Ethernet type as **DL_UNITDATA_IND** messages. Received Ethernet frames are duplicated and routed up multiple open streams if necessary. The DLSAP address contained within the **DL_UNITDATA_REQ** and **DL_UNITDATA_IND** messages consists of both the **sap** (type) and physical (Ethernet) components.

In addition to the mandatory connectionless DLPI message set, the driver also supports the following primitives:

The **DL_ENABMULTI_REQ** and **DL_DISABMULTI_REQ** primitives enable/disable reception of individual multicast group addresses. A set of multicast addresses may be iteratively created and modified on a per-stream basis using these primitives. These primitives are accepted by the driver in any state following **DL_ATTACHED.**

The **DL_PROMISCON_REQ** and **DL_PROMISCOFF_REQ** primitives with the **DL_PROMISC_PHYS** flag set in the **dl_level** field enables/disables reception of all "promiscuous mode" frames on the media including frames generated by the local host.

When used with the **DL_PROMISC_SAP** flag set, this enables/disables reception of all **sap** (Ethernet type) values. When used with the **DL_PROMISC_MULTI** flag set, this enables/disables reception of all multicast group addresses. The effect of each is always on a per-stream basis and independent of the other **sap** and physical level configurations on this stream or other streams.

The **DL_PHYS_ADDR_REQ** primitive returns the 6-octet Ethernet address currently associated (attached) to the stream in the **DL_PHYS_ADDR_ACK** primitive. This primitive is valid only in states following a successful **DL_ATTACH_REQ.**

The **DL_SET_PHYS_ADDR_REQ** primitive changes the 6-octet Ethernet address currently associated (attached) to this stream. The credentials of the process which originally opened this stream must be superuser or an **EPERM** error is returned in the **DL_ERROR_ACK.** This primitive is destructive in that it affects all other current and future streams attached to this device. An **M_ERROR** is sent up all other streams attached to this device when this primitive on this stream is successful. Once changed, all streams subsequently opened and attached to this device will obtain this new physical address. The new physical address will remain in effect until this primitive is used to change the physical address again or the system is rebooted, whichever comes first.

CONFIGURATION

The **/kernel/drv/el.conf** file supports the following options:

intr Specifies the IRQ level for the board.

media Specifies the media type. Defined values are:

- *''thick''* Use standard AUI interface.
- *''thin''* Use the BNC connector interface.
- *''tp''* Use the "twisted pair" interface.

reg Specifies the shared RAM the board is jumpered for.

It is important to ensure that there are no conflicts for the board's I/O port, shared RAM, or IRQ level.

FILES

/dev/el

SEE ALSO

dlpi(7P)