Rugged CF 10/100 Driver Porting Notes

Overview

The Socket Rugged CF 10/100 card is largely NE2000 compatible. NE2000 compatible drivers should function with this card after some small changes are implemented. These changes involve the initialization process and are limited in scope. Small differences exist in the NE2000 compatible register set but these do not affect general operation of the Ethernet card. The Rugged CF 10/100 card utilizes the **Asix AX88790 L 10/100BASE 3-in-1 PCMCIA Fast Ethernet Controller**. The technical specification for this controller details all registers that differ from their NE2000 counterparts.

This document describes the two significant changes necessary to modify an existing NE2000 driver to work with the Rugged CF 10/100 card.

Initialization Changes

Standard NE2000 initialization code performs workarounds for problems that have existed since the original NE2000 hardware was developed. One of these workarounds causes an issue with the Rugged CF 10/100 as described below. The second required change is due to a necessary workaround of the Asix AX88790 L.

a) Remove Code for NE2000 Errata

Standard Microsoft NE2000 initialization code found in the `CardInitialize (card.c)` function performs a DMA read of 55 bytes. This code is as follows:

```
//
// Do initialization errata
//
NdisRawWritePortUchar(Adapter->IoPAddr + NIC_RMT_COUNT_LSB, 55);

//
// Setup for a read
//
NdisRawWritePortUchar(Adapter->IoPAddr + NIC_COMMAND, CR_DMA_READ |
CR_START);
```

This presents an issue with the Rugged CF 10/100 as setting the CR_START bit clears the ISR_RESET bit in the NIC_INTR_STATUS register. Code later in the same function checks this bit to ensure the card has been reset but since the above errata code has cleared it, the check for reset never succeeds and eventually the loop times out which does allow the routine to continue but can take quite a while to complete.

The Rugged CF 10/100 works correctly without the NE2000 errata code so the fix is to simply remove the code that performs the 55 byte DMA read.

b) Perform Workaround for Auto-Negotiation Problem

The Asix AX88790 L has a problem where auto-negotiation of the link will never succeed if the initial attempt fails. In practical use, this means that if the Ethernet cable is not connected to the network and the Rugged CF 10/100 when the card is inserted into a device, the link will never be successfully negotiated if the cable is later attached. Asix has identified a workaround that solves this issue and is implemented in the initialization code. This code is executed only once per initialization and fixes the issue for all subsequent disconnections/connections of the Ethernet cable.

The fix involves communicating with the internal PHY of the Asix AX88790 L. Included with this document is sample "C" code that can be integrated with your driver to communicate with the PHY and perform the workaround. The current Socket Communications Windows CE drivers perform this workaround as the first action in the `CardInitialize (card.c)` function.

The workaround performs the following actions:

- Power down the PHY
- Wait 2.5 seconds
- Enable auto-negotiation and restart it

This workaround does cause the initialization process to take an additional 2.5 seconds. Once the above process is performed, the cable can be plugged and unplugged as usual and the link will be negotiated without further changes to the driver.