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# PCnet™ Software Version 4.51

## Release Documentation

April 6, 1999

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# 1 Introduction

This is the release notice for the PCnet™ Family Network Drivers Revision 4.51 software (object code and limited source code). The software will be available via the web ([www.amd.com](http://www.amd.com)) and CDROM shortly after release.

PCnet™ Driver Release 4.51 is a minor release that is intended to fulfill the following marketing and support requirements:

- Add support for AMD PCnet-FAST III device in the drivers
- Enhance existing PermaNet Server Link Fault Tolerant (LFT) drivers to support multiple switches.
- Add support for PermaNet Server Port Aggregation and Dynamic Load Balancing (PAg & DLB).
- Provide latest drivers that resolve some issues that have been found through internal testing and by external customers
- Synchronize all OEM/LT customers with the latest drivers and utilities

The elements of this release are the following. Drivers or utilities that have been enhanced or are new are indicated so in parenthesis:

- CHSM Driver for NetWare 4.1x and NetWare 5.00 **(enhanced)**
- AHSM Driver for NetWare 4.1x and NetWare 5.00 **(enhanced)**
- NDIS 2.0.1 Drivers (DOS version 6.x, OS/2 version 3.x and 4.x) **(OS/2 driver enhanced)**
- NDIS 3.x MAC Drivers (for WFW 3.11; NT versions 3.5, 3.51, 4.0; Win95)
- NDIS 3.x Miniport Drivers (for Windows 95 and Windows NT 3.51) **(enhanced)**
- NDIS 4.x Driver (for Windows NT 4.0 and Windows 95 OSR 2) **(enhanced)**
- NDIS 4 driver for Windows CE 2.x (for ISANet devices only)
- NDIS 4 driver for Windows NT 4.0 (for ISANet devices only)
- NDIS 4 driver for Windows CE 2.1 (for PCnet PCI devices only)
- NDIS 5 driver for Windows 98 and Windows 2000 Beta **(enhanced)**
- SCO UnixWare 7.0 **(enhanced)**
- SCO UNIX Drivers (SCO ODT 3.0, SCO Open Server 5.0) **(Open Server driver enhanced)**
- WindRiver x86 VxWorks driver
- Diagnostics Utility for PCnet PCI devices
- Sun Solaris Driver (for v2.4)
- Novell UnixWare Drivers (for v1.1 and 2.0)
- Packet Driver
- Generic BootROM
- AMInstall (Generic Installation utility)
- DMI 2.0 Instrumentation
- PCnet™ Magic Packet™ Utility

## 2 New Features and Enhancements

New features and enhancements have been added to numerous drivers.

The most important of these are the enhancement made to the PermaNet Server Technology. These enhancement and additions include:

- Support for PermaNet Server Link Fault Tolerance (LFT) Technology
- Support for PermaNet Server Dynamic Load Balancing and Port Aggregation (DLB/PAG) Technology
- Support for PermaNet Server Fast EtherChannel (FEC) Technology

For a detailed description of AMD's PermaNet Server Technology, please refer to the whitepaper:

**“PermaNet Server: Advanced Server Availability and Performance Features on AMD's PCnet Family of Ethernet Controllers”.**

The whitepaper can be accessed on AMD's corporate web site at <http://www.amd.com/products/npd/techdocs/22347.pdf>.

The following is a description of the new features and enhancements. User instructions are also included where applicable.

### 2.1 Enhancement to PermaNet Server Link Fault Tolerant (LFT) Drivers

**PermaNet Server Link Fault Tolerance (LFT) Technology** provides cost effective and reliable solution for a redundant network connection to enhance server availability. The current release augments the support for LFT by enhancing the LFT technology for existing drivers and providing support for LFT in new drivers.

**Enhancement of existing drivers:** Support for PermaNet Server LFT has been enhanced in release 4.51 to add support for multiple switch configurations. Following existing drivers now support this enhanced configuration:

- **NDIS4 Miniport PermaNet driver for Windows NT 4.0**
- **AODI Driver for Novell 4.11/4.2 and 5.x**
- **NDIS2 Driver for IBM OS2 3.x and 4.x**

There is no change in the installation instructions for PermaNet Server LFT for these drivers. Please refer to release 4.0 documentations on installation instructions.

**The MDI Driver for Unixware 7.0** driver supports PermaNet Server LFT by redistributing the traffic among good links, in case link on one of the adapters goes down. This configuration is possible when the driver is configured for Dynamic Load Balancing (DLB) or Fast EtherChannel (FEC) mode. The installation instructions are found in sections 2.2 and 2.3.

**The Windows NT Beta driver for PAG and FEC** also supports PermaNet Server Link Fault Tolerance by redistributing the traffic among good links, in case link on one of the adapters goes

down. The installation instructions are found in sections 2.2 and 2.3. Support for LFT without port aggregation, is planned for the final release.

**Support for PermaNet Server LFT is added to the CODI Driver** for Novell 4.11 / 4.2 and 5.0. Installation instructions and sample configurations can be found in the Examples.TXT file included with the driver release. The following is a sample of instructions needed to load CODI driver with LFT function. Here X is the PCI slot number of Primary adapter , Y is the PCI slot number of the Secondary adapter.

```
LOAD CPCNTNW PCI SLOT=X SECONDARY=Y FRAME=Ethernet_802.2 NAME=CPCNTNW_82
LOAD CPCNTNW PCI SLOT=X SECONDARY=Y FRAME=Ethernet_802.3 NAME=CPCNTNW_83
LOAD CPCNTNW PCI SLOT=X SECONDARY=Y FRAME=Ethernet_II NAME=CPCNTNW_II
LOAD CPCNTNW PCI SLOT=X SECONDARY=Y FRAME=Ethernet_SNAP NAME=CPCNTNW_SP
```

```
BIND IPX CPCNTNW_82 NET=11
BIND IPX CPCNTNW_83 NET=12
BIND IPX CPCNTNW_II NET=13
BIND IPX CPCNTNW_SP NET=14
```

## 2.2 Support for PermaNet Server Dynamic Load Balancing and Port Aggregation (DLB/PAG)

**Port Aggregation and Dynamic Load Balancing** is an enhanced feature of AMD's PermaNet Server Technology that balances and aggregates outgoing traffic from the server using multiple adapter links. It Provides scalable server bandwidth in 100 Mbps increments up to 400 Mbps of outgoing traffic. No special switch configuration is required. The driver can work with existing high-end switches to support aggregated bandwidth of up to 400 Mbps. For details please

The following PCnet device drivers provide support for DLB & PAG:

- **Novell 32 bit C-ODI driver for Netware 4.11/4.2 and 5.0**
- **SCO UnixWare 7.0 MDI driver**
- **NDIS 4 Miniport driver for Windows NT 4.0 and Windows 2000 (Beta Release)**

### 2.2.1 Novell CODI Configuration for PermaNet Server Dynamic Load Balancing and Port Aggregation (DLB/PAG)

The PCnet C-OCI driver (CPCNTNW.LAN) provides Dynamic Load Balancing and Port Aggregation (DLB/PAG) support for the PCnet-FAST, PCnet-FAST+, PCnet-FAST III and follow on PCnet PCI devices. The driver supports the Novell NetWare 4.11 and 5.0 operating system environments.

Feature provided includes the following:

- Dynamic Load Balancing (DLB) and Port Aggregation Technology (PAG) in a group of 2 or 4 adapters
- Partially filled DLB/PAG group with individual or PermaNet Server Link Fault Tolerant (LFT) adapters.

The following provides a description of the configuration process required for using the features listed above. There are two modes of installation and configuration – automatic and manual. Both processes are described below. Please refer to the driver Release.txt, Install.Txt and Examples.Txt files for more details on the DLB & PAg features, installation and configuration.

## **Definitions**

AGP2 - refers to a configuration of upto 2 adapters, which together provide the link aggregation & Link Fault Tolerance (LFT) features of the DLB/PAg or FEC implementation by AMD.

AGP4 - refers to a configuration of upto 4 adapters, which together provide the link aggregation & Link Fault Tolerance (LFT) features of the DLB/PAg or FEC implementation by AMD.

### **2.2.1.1 Automatic Installation and Configuration of the Dynamic Load Balancing and Port Aggregation DLB/PAg Feature**

Installation of the CPCNTNW.LAN C-ODI driver for DLB/PAg functionality would require the following procedure in the order specified.

1. Load the "portcfg" custom NLM to setup the required configuration. For details on how to use "portcfg", please refer to the subsequent section.
2. Read the file "sys:\system\agp.ncf" and modify or add any binding information in this file as per your requirement.
3. Reboot.

Before proceeding with the above installation procedure, please ensure that all the adapters which will be configured for DLB/PAg support are physically present in the PCI slots. The user should have all the physical slot numbers and grouping information before using the "portcfg" utility.

#### **2.2.1.1.1 Server Parameters for DLB/PAg implementation**

It is recommended that the AGP4 configurations be tried out on systems with at least 64 MB of RAM memory. Also the following NetWare parameters should be set to the values given below:

MAXIMUM PACKET RECEIVE BUFFERS 300 or higher  
MINIMUM PACKET RECEIVE BUFFERS 100 or higher

These parameters may be accessed by choosing the SERVER PARAMETERS menu and COMMUNICATIONS PARAMETERS CATEGORY sub-menu in the Novell supplied "monitor" utility.

#### **Portcfg.NLM**

The "portcfg" utility allow the user to group the adapters according to required FEC or PermaNet configurations. The output of this utility is the following file:

sys:\system\agp.ncf -

this is a script file generated by "portcfg" to load all the adapters in single-adapter or multi-adapter configurations.

All the adapters of any chosen configurations are loaded through the invocation of the script generated by the "portcfg" utility. An entry is made to the "sys:\system\autoexec.ncf" file to invoke this script automatically during boot time. The "portcfg" utility provides all the binding information required for the IPX protocol. Network numbers provided by the "portcfg" utility may be modified if required. Binding information for additional protocols such as IP may also be added in the "agp.ncf" script.

Invocation of the "portcfg" utility brings up a menu with the following options.

- Aggregated Group Of 4 Ports (DLB/PAg or FEC)
- Aggregated Group Of 2 Ports (DLB/PAg or FEC)
- PermaNet Port (LFT)
- Normal Port
- Display Configuration Information
- Cancel Configuration Chosen
- Exit

### **Aggregated Group Of 4 Ports**

Allows DLB/PAg functionality for a group of 4 adapters. This option brings up a sub menu where the user specifies the PCI slot numbers of the primary and secondary adapters. Also, partially filled groups may be specified by choosing a value of 0 for a secondary slot. For example if the user chooses to configure 3 adapters only in an aggregated groups of 4 adapters, he/she may do so by specifying a value of 0 for any one of the secondary slots.

### **Aggregated Group Of 2 Ports**

Same as above for a group of 2 adapters.

### **PermaNet Port**

Allows the user to specify the primary adapters and the corresponding backup for the LFT feature.

### **Normal Port**

Allows the user to load an adapter in the default mode.

### **Display Configuration Information**

Displays the configuration chosen up till the point of invocation of this option. Each group is shown under the appropriate group header within parentheses in terms of the PCI slot numbers chosen for that group. The primary adapter is shown first followed by the secondary adapters. For example an aggregated group of 4 adapters with slots numbers 2,3,5 & 7 is shown as

( 2, 3, 5, 7 )

Here the adapter in slot 2 is the primary adapter.

### **Cancel Configuration Chosen**



Allows the user to cancel all the configurations chosen till the point of invocation of this option.

### Exit

Allows the user to exit the utility. This brings up a sub-menu that allows the user to cancel the exit option, exit without saving any configuration information or exit and save the configurations specified. If the last option in the sub menu is chosen, it displays the location of the script generated by this utility and exits after saving all the configurations specified by the user.

## 2.2.1.2 Manual Installation and Configuring of the DLB/Pag Feature

### 2.2.1.2.1 Server Parameters for DLB/Pag implementation

It is recommended that the AGP4 configurations be tried out on systems with at least 64 MB of RAM memory. Also the following NetWare parameters should be set to the values given below:

MAXIMUM PACKET RECEIVE BUFFERS 300 or higher  
MINIMUM PACKET RECEIVE BUFFERS 100 or higher

These parameters may be accessed by choosing the SERVER PARAMETERS menu and COMMUNICATIONS PARAMETERS CATEGORY sub-menu in the Novell supplied "monitor" utility.

### Configuration

To configure a group of adapters for the DLB/Pag or FEC capability, the user will have to load the PCnet driver by specifying the primary and secondary slot numbers. For example, the user could use the following command:

Example for 4 card group:

```
LOAD CPCNTNW PCI SLOT=1 FRAME=Ethernet_802.2 CONFIGMODE=4 POSITION=0
NAME=CPCNTNW_82
LOAD CPCNTNW PCI SLOT=1 FRAME=Ethernet_802.3 CONFIGMODE=4 POSITION=0
NAME=CPCNTNW_83
LOAD CPCNTNW PCI SLOT=1 FRAME=Ethernet_II CONFIGMODE=4 POSITION=0
NAME=CPCNTNW_II
LOAD CPCNTNW PCI SLOT=1 FRAME=Ethernet_SNAP CONFIGMODE=4 POSITION=0
NAME=CPCNTNW_SP

LOAD CPCNTNW PCI SLOT=2 FRAME=Ethernet_802.2 CONFIGMODE=4 POSITION=1
LOAD CPCNTNW PCI SLOT=2 FRAME=Ethernet_802.3 CONFIGMODE=4 POSITION=1
LOAD CPCNTNW PCI SLOT=2 FRAME=Ethernet_II CONFIGMODE=4 POSITION=1
LOAD CPCNTNW PCI SLOT=2 FRAME=Ethernet_SNAP CONFIGMODE=4 POSITION=1

LOAD CPCNTNW PCI SLOT=3 FRAME=Ethernet_802.2 CONFIGMODE=4 POSITION=2
LOAD CPCNTNW PCI SLOT=3 FRAME=Ethernet_802.3 CONFIGMODE=4 POSITION=2
LOAD CPCNTNW PCI SLOT=3 FRAME=Ethernet_II CONFIGMODE=4 POSITION=2
LOAD CPCNTNW PCI SLOT=3 FRAME=Ethernet_SNAP CONFIGMODE=4 POSITION=2

LOAD CPCNTNW PCI SLOT=4 FRAME=Ethernet_802.2 CONFIGMODE=4 POSITION=3
LOAD CPCNTNW PCI SLOT=4 FRAME=Ethernet_802.3 CONFIGMODE=4 POSITION=3
LOAD CPCNTNW PCI SLOT=4 FRAME=Ethernet_II CONFIGMODE=4 POSITION=3
LOAD CPCNTNW PCI SLOT=4 FRAME=Ethernet_SNAP CONFIGMODE=4 POSITION=3
```

```

BIND IPX CPCNTNW_82 NET=11
BIND IPX CPCNTNW_83 NET=12
BIND IPX CPCNTNW_II NET=13
BIND IPX CPCNTNW_SP NET=14

```

If the slot number is not specified correctly, the Fast EtherChannel feature will not work.

The value of keyword *ConfigMode* should be 4 for four-card group and 2 for two-card group.

The value of keyword *Position* should be 0 for primary slot number, 1, 2, and 3 for secondaries.

Next, the user must Bind the protocol to the primary adapter. If the user wishes to use the IPX protocol, he/she can bind the protocol using the following command:

```

BIND IPX CPCNTNW_82 NET=11
BIND IPX CPCNTNW_83 NET=12
BIND IPX CPCNTNW_II NET=13
BIND IPX CPCNTNW_SP NET=14

```

where *NET* specifies the network number.

If the user wants to set a 2 card group instead, *ConfigMode* must be set to 2.

If the user wishes to add Ethernet\_II Frame Type to support the TCP/IP protocol, he/she can bind the protocol to the primary adapter using the following command:

#### **Load TCPIP**

```
Load CPCNTNW PCI slot=10001 ConfigMode=4 Position=0 frame=Ethernet_II Name=CPCNTNW_II
```

```
Bind IP CPCNTNW_II ADDR=129.221.156.78 mask=255.255.255.0
```

where *ADDR* specifies the IP address.

The user may go to the monitor console to verify the installation and status of the just installed driver. Only the primary adapter shows the sending and receipt of packets.

### **2.2.1.3 Using an Individual Adapter with DLB/PAG Pairs:**

If your server has multiple network interface adapters, and you wish to setup any of the following configurations:

- two DLB/PAG groups and an individual adapter
- a DLB/PAG group with a pair of PermaNet server Link Fault Tolerant (LFT) adapters and an individual adapter
- two pairs of PermaNet server (LFT) adapters and an individual adapter

It is recommended that you first load the driver for the PAG group or LFT group, then load the driver for the individual adapter. You can load the driver for PAG or LFT pair of adapters by using the slot numbers for the primary and secondary adapters (as mentioned previously in this document). You may now use the following command to load the driver for the individual adapter:

**2.2.1.4 CAUTION:**

*The Dynamic Load Balancing (DLB) and Port Aggregation (PAg) has been verified by AMD on high-end switches, such as Cisco Catalyst 2924 (in non-FEC switch setting), Nortel BayStack 350T, 3COM Super Stack II 3300 and CentreCOM FS709. The performance on entry level switches such as Intel 510T may be slow or unpredictable. This is because such switches are unable to update their address tables fast enough to process same MAC address on multiple ports as required by AMD's DLB/PAg implementation.*

**2.2.2 SCO Unixware 7.0 Configuration for Dynamic Load Balancing and Port Aggregation (DLB/PAg)**

SCO Unixware 7 driver supports PermaNet Server Dynamic Load Balancing and Port Aggregation (DLB/PAg) features. It also provides Link Fault Tolerance (LFT) by redistributing the traffic among good links, in case the link on one of the adapters goes down.

The switch to which the server is connected can be a non FEC aware switch. Upto 4 adapters may be configured to form a trunk.

**2.2.2.1 Definitions**

*Trunk:* A set of network adapters grouped into one logical network interface.

*Trunk Master:* Member of the trunk, configured with the netcfg utility.

*Trunk Slave:* Member of the trunk not configured through netcfg.

*Link Failover:* The ability to redirect the traffic from the failed link in the trunk to the working link without disturbing running applications.

All trunk master devices should be properly configured with netcfg. Slave devices are attached to corresponding master devices during system boot time using information specified in trunk configuration file etc/etherchannel/ethertrunk.conf.

**2.2.2.2 Package Installation:**

1. This release consists of two packages:

- Pnt2: This package contains the driver files
- Pnt2fec: This package contains installation support files for Fast EtherChannel or Dynamic Load Balancing with Port Aggregation. This package requires Perl programming language of 5.0 or above installed on your system.

2. To install these packages, untar the pnt\_driv.tar file into some temporary directory and execute pkgadd command there.

3. After that, use netcfg utility to configure the network cards.

Example:

```
cd /tmp
```

```
tar xvf pnt_driv.tar
pkgadd -d `pwd` (pwd is /tmp)
netcfg
```

4. All EtherChannel configuration is done in terms of PCI slots used by PCNet cards.

### 2.2.2.3 Configuration Steps:

Due to a bug in the netcfg implementation, specific steps should be performed to configure systems with several PCNet-fast adapters.

1. Use netcfg to configure trunk master device, select the EtherChannel (FEC/DLB and PAg) driver and add the protocols.
2. Run the command `resmgr | grep 10222000` to see all available PCNet cards in the system. The 3-d entry from the end will be PCI slot number and the first entry will be resource database key.
3. Use `resmgr -r -k <key>` command to remove each entry not configured by netcfg.
4. Run the command `/etc/conf/bin/idconfupdate` to permanently save resource manager information.
5. Edit the file `/etc/etherchannel/etherchannel.conf` and put a list of devices (including master and all slaves) for each trunk. A sample file called `/etc/etherchannel/etherchannel.conf.sample` is provided as an example.
6. Reboot the system.
7. Use `resmgr` utility to check your configuration.
8. Spanning Tree has to be disabled on the ports configured for DLB/Pag. If VLANs are configured, care should be taken that all ports in the DLB/Pag have to be in the same VLAN. Also, the regular pnt driver and the pnt2 driver cannot be used together on the server.
9. Connect all the adapters in the trunk to the switch.
10. Reboot the system. The file `/etc/.osm` should reflect current trunk configuration.

#### 2.2.2.3.1 Link Status Indication

When any trunks are configured, the driver will use syslog facility to log information about links going up and down. The driver will only detect status of used links. It will not show the status change of any link that is not currently in use by a driver.

#### 2.2.2.3.2 ethertrunk.conf Configuration File Format

The configuration of Fast EtherChannel groups is specified in the file `/etc/etherchannel/ethertrunk.conf`. The sample configuration file `/etc/etherchannel/ethertrunk.conf.sample` is provided for references.

This file contains description of each trunk, one per line. Each line consist of pairs of the type keyword = value, searated by semicolons.

Lines started with hash sign or semicolon are treated as comments.

Recognized keywords are:

1. trunk: An integer, specifying trunk number. It is a required keyword. Trunks should be enumerated from 0 to the maximum of 4.
2. name: A string, specifying trunk name.
3. slot: An Integer, specifying the PCI slot number of the adapter to be included in the trunk. All slots should be specified on the same line. All specified slots will be gathered in one trunk.

#### 2.2.2.3.3 Example configuration file:

```
# Example entries. Do not use as is!! Edit for your hardware configuration!
# Define two trunks, two cards in each.
# One trunk has cards in PCI slots 5 and 9, another trunk has cards in
# PCI slots 6 and 8.
#
trunk=0: name = t0; slot = 5, slot = 9;
trunk=1: name = t1; slot = 6, slot = 8;
```

#### 2.2.2.4 Limitations and Requirements

1. Spanning tree must be turned OFF on the ports connected to the trunk cards.
2. All the ports involved in the FEC or DLB/Pag have to be in the same VLAN.
3. Perl programming language of 5.0 or above has to be installed on the system.
4. The AMD PCnet Fast, Fast+ or Fast III are supported.
5. PNT2 driver can not be used together with the old PNT driver. The new driver should be used for all AMD PCNet network adapters!

#### 2.2.2.5 CAUTION:

*The Dynamic Load Balancing (DLB) and Port Aggregation (PAg) has been verified by AMD on high-end switches, such as Cisco Catalyst 2924 (in non-FEC switch setting), Nortel BayStack 350T, 3COM Super Stack II 3300 and CentreCOM FS709. The performance on entry level switches such as Intel 510T may be slow or unpredictable. This is because such switches are unable to update their address tables fast enough to process same MAC address on multiple ports as required by AMD's DLB/PAG implementation.*

### 2.2.3 Windows NT 4.0/Windows 2000 NDIS4 Driver for PermaNet Server DLB/PAG (Beta version)

This driver is available as a **BETA** version at this time. The released version is expected to be available soon. The Installation and GUI interface will change in the final version.

#### 2.2.3.1 Configuration for DLB/PAG:

The Windows NT driver can be configured as a single DLB/PAG group or two DLB/PAG groups. Each group can contain up to four adapters. One of these adapters will be configured as the Primary Adapter and the rest will be configured as Secondary Adapters.

To install the adapters, follow these instructions after physically installing the adapter:

1. Open Windows NT Control Panel -> Network setup program.
2. Under adapters, click on the Add button
3. Choose Have Disk and point to the directory with the driver files
4. Windows NT installation will install the multiple instances of the driver files
5. Highlight the driver and click on Properties to configure the adapter.
6. Choose Fast EtherChannel button on group 1 (if configuring a single group) or on both group 1 and group 2, if configuring multiple groups.
7. Choose the Primary Adapter for the group. The Primary Adapter has valid IP and other protocol configuration parameters for that group.
8. Choose the Secondary Adapters for the group.
9. Click OK to close the Properties box.
10. Click on Bindings to bind and configure the protocols.
11. Assign IP address and other protocol specific parameters only for the adapter chosen as the Primary. All the secondary adapters will assume the same values.
12. Click OK to close the protocol properties box and the network setup box.

## 2.3 Support for PermaNet Server Fast EtherChannel (FEC)

Fast EtherChannel is the name of a feature implementation and standard defined by Cisco. This feature aggregates multiple full-duplex fast EtherChannel links into a single logical channel between two devices (LAN switches, routers or servers). In combining multiple links, the connection can carry greater amounts of data and provide protection against link failures. Fast EtherChannel provides a scalable connection (used typically in a building "riser" or a backbone) comprised of two or more physical links. With two or more links, the AMD PermaNet Server Fast EtherChannel implementation can:

- transfer more data by balancing the load across the links
- achieve link redundancy by re-balancing the load around failed links
- provide fast convergence around failed or reconnected links, and

For more details on Fast EtherChannel specifications, please visit the Cisco Systems web site (<http://www.cisco.com>).

The following PCnet device drivers provide Fast EtherChannel support for port aggregation, link fault tolerance and load balancing:

- **Novell 32 bit C-ODI driver for Netware 4.11 and 5.0**
- **SCO UnixWare 7.0 driver**
- **NDIS 4 Miniport driver for Windows NT 4.0 and Windows 2000**

### 2.3.1 Novell CODI Configuration for PermaNet Server Fast EtherChannel (FEC)

The PCnet C-OCI driver (CPCNTNW.LAN) provides PermaNet Server FEC support for the PCnet-FAST, PCnet-FAST+, PCnet-FAST III and follow on PCnet PCI devices. The driver supports the Novell NetWare 4.11 and 5.0 operating system environments.

Feature provided includes the following:

- Fast EtherChannel Support in a group of 2 or 4 adapters
- Partially filled FEC group with individual or PermaNet Server Link Fault Tolerant (LFT) adapters.

The following provides a description of the configuration process required for using the features listed above. There are two modes of installation and configuration – automatic and manual. Both processes are described below. Please refer to the driver Release.txt, Install.Txt and Examples.Txt files for more details on the FEC features, installation and configuration.

#### **Definitions**

AGP2 - refers to a configuration of upto 2 adapters which together provide the link aggregation & Link Fault Tolerance (LFT) features of the FEC implementation by AMD.

AGP4 - refers to a configuration of upto 4 adapters which together provide the link aggregation & Link Fault Tolerance (LFT) features of the FEC implementation by AMD.

#### **2.3.1.1 Automatic Installation and Configuration of the Fast EtherChannel Feature**

Installation of the CPCNTNW.LAN C-ODI driver for LFT or FEC functionality would require the following procedure in the order specified.

4. Load the "portcfg" custom NLM to setup the required configuration. For details on how to use "portcfg", please refer to the subsequent section.
5. Read the file "sys:\system\agp.ncf" and modify or add any binding information in this file as per your requirement.
6. Reboot.

Before proceeding with the above installation procedure, please ensure that all the adapters which will be configured for DLB/PAG or FEC support are physically present in the PCI slots. The user should have all the physical slot numbers and grouping information before using the "portcfg" utility.

#### 2.3.1.1.1 Server Parameters for FEC implementation

It is recommended that the AGP4 configurations be tried out on systems with at least 64 MB of RAM memory. Also the following NetWare parameters should be set to the values given below:

MAXIMUM PACKET RECEIVE BUFFERS 300 or higher  
MINIMUM PACKET RECEIVE BUFFERS 100 or higher

These parameters may be accessed by choosing the SERVER PARAMETERS menu and COMMUNICATIONS PARAMETERS CATEGORY sub-menu in the Novell supplied "monitor" utility.

#### 2.3.1.1.2 Portcfg.NLM utility

The "portcfg" utility allow the user to group the adapters according to required FEC or PermaNet configurations. The output of this utility is the following file:

sys:\system\agp.ncf -  
this is a script file generated by "portcfg" to load all the adapters in single-adaptor or multi-adaptor configurations.

All the adapters of any chosen configurations are loaded through the invocation of the script generated by the "portcfg" utility. An entry is made to the "sys:\system\autoexec.ncf" file to invoke this script automatically during boot time. The "portcfg" utility provides all the binding information required for the IPX protocol. Network numbers provided by the "portcfg" utility may be modified if required. Binding information for additional protocols such as IP may also be added in the "agp.ncf" script.

Invocation of the "portcfg" utility brings up a menu with the following options.

- Aggregated Group Of 4 Ports (DLB/PAG or FEC)
- Aggregated Group Of 2 Ports (DLB/PAG or FEC)
- PermaNet Port (LFT)
- Normal Port
- Display Configuration Information
- Cancel Configuration Chosen
- Exit



**Aggregated Group Of 4 Ports**

Allows FEC functionality for a group of 4 adapters. This option brings up a sub menu where the user specifies the PCI slot numbers of the primary and secondary adapters. Also, partially filled groups may be specified by choosing a value of 0 for a secondary slot. For example if the user chooses to configure 3 adapters only in an aggregated groups of 4 adapters, he/she may do so by specifying a value of 0 for any one of the secondary slots.

**Aggregated Group Of 2 Ports**

Same as above for a group of 2 adapters.

**PermaNet Port**

Allows the user to specify the primary adapters and the corresponding backup for the PermaNet Server Link Fault Tolerance feature.

**Normal Port**

Allows the user to load an adapter in the default mode.

**Display Configuration Information**

Displays the configuration chosen up till the point of invocation of this option. Each group is shown under the appropriate group header within parentheses in terms of the PCI slot numbers chosen for that group. The primary adapter is shown first followed by the secondary adapters. For example an aggregated group of 4 adapters with slots numbers 2,3,5 & 7 is shown as

( 2, 3, 5, 7 )

Here the adapter in slot 2 is the primary adapter.

**Cancel Configuration Chosen**

Allows the user to cancel all the configurations chosen till the point of invocation of this option.

**Exit**

Allows the user to exit the utility. This brings up a sub-menu that allows the user to cancel the exit option, exit without saving any configuration information or exit and save the configurations specified. If the last option in the sub menu is chosen, it displays the location of the script generated by this utility and exits after saving all the configurations specified by the user.

### 2.3.1.2 Manual Installation and Configuring of the FEC Feature

### 2.3.1.2.1 Server Parameters for FEC implementation

It is recommended that the AGP4 configurations be tried out on systems with at least 64 MB of RAM memory. Also the following NetWare parameters should be set to the values given below:

MAXIMUM PACKET RECEIVE BUFFERS 300 or higher  
MINIMUM PACKET RECEIVE BUFFERS 100 or higher

These parameters may be accessed by choosing the SERVER PARAMETERS menu and COMMUNICATIONS PARAMETERS CATEGORY sub-menu in the Novell supplied "monitor" utility.

### 2.3.1.2.2 Configuration

To configure a group of adapters for the DLB/PAG or FEC capability, the user will have to load the PCnet driver by specifying the primary and secondary slot numbers. For example, the user could use the following command:

Example for 4 card group:

```
LOAD CPCNTNW PCI SLOT=1 FRAME=Ethernet_802.2 CONFIGMODE=4 POSITION=0
NAME=CPCNTNW_82
LOAD CPCNTNW PCI SLOT=1 FRAME=Ethernet_802.3 CONFIGMODE=4 POSITION=0
NAME=CPCNTNW_83
LOAD CPCNTNW PCI SLOT=1 FRAME=Ethernet_II CONFIGMODE=4 POSITION=0
NAME=CPCNTNW_II
LOAD CPCNTNW PCI SLOT=1 FRAME=Ethernet_SNAP CONFIGMODE=4 POSITION=0
NAME=CPCNTNW_SP

LOAD CPCNTNW PCI SLOT=2 FRAME=Ethernet_802.2 CONFIGMODE=4 POSITION=1
LOAD CPCNTNW PCI SLOT=2 FRAME=Ethernet_802.3 CONFIGMODE=4 POSITION=1
LOAD CPCNTNW PCI SLOT=2 FRAME=Ethernet_II CONFIGMODE=4 POSITION=1
LOAD CPCNTNW PCI SLOT=2 FRAME=Ethernet_SNAP CONFIGMODE=4 POSITION=1

LOAD CPCNTNW PCI SLOT=3 FRAME=Ethernet_802.2 CONFIGMODE=4 POSITION=2
LOAD CPCNTNW PCI SLOT=3 FRAME=Ethernet_802.3 CONFIGMODE=4 POSITION=2
LOAD CPCNTNW PCI SLOT=3 FRAME=Ethernet_II CONFIGMODE=4 POSITION=2
LOAD CPCNTNW PCI SLOT=3 FRAME=Ethernet_SNAP CONFIGMODE=4 POSITION=2

LOAD CPCNTNW PCI SLOT=4 FRAME=Ethernet_802.2 CONFIGMODE=4 POSITION=3
LOAD CPCNTNW PCI SLOT=4 FRAME=Ethernet_802.3 CONFIGMODE=4 POSITION=3
LOAD CPCNTNW PCI SLOT=4 FRAME=Ethernet_II CONFIGMODE=4 POSITION=3
LOAD CPCNTNW PCI SLOT=4 FRAME=Ethernet_SNAP CONFIGMODE=4 POSITION=3

BIND IPX CPCNTNW_82 NET=11
BIND IPX CPCNTNW_83 NET=12
BIND IPX CPCNTNW_II NET=13
BIND IPX CPCNTNW_SP NET=14
```

If the slot number is not specified correctly, the Fast EtherChannel feature will not work.

The value of keyword *ConfigMode* should be 4 for four-card group and 2 for two-card group.

The value of keyword *Position* should be 0 for primary slot number, 1, 2, and 3 for secondaries.

Next, the user must Bind the protocol to the primary adapter. If the user wishes to use the IPX protocol, he/she can bind the protocol using the following command:

```

BIND IPX CPCNTNW_82 NET=11
BIND IPX CPCNTNW_83 NET=12
BIND IPX CPCNTNW_II NET=13
BIND IPX CPCNTNW_SP NET=14

```

where *NET* specifies the network number.

If the user wants to set a 2 card group instead, *ConfigMode* must be set to 2.

If the user wishes to add Ethernet\_II Frame Type to support the TCP/IP protocol, he/she can bind the protocol to the primary adapter using the following command:

#### **Load TCPIP**

```
Load CPCNTNW PCI slot=10001 ConfigMode=4 Position=0 frame=Ethernet_II Name=CPCNTNW_II
```

```
Bind IP CPCNTNW_II ADDR=129.221.156.78 mask=255.255.255.0
```

where *ADDR* specifies the IP address.

The user may go to the monitor console to verify the installation and status of the just installed driver. Only the primary adapter shows the sending and receipt of packets.

### 2.3.1.3 Using an Individual Adapter with FEC Pairs:

If your server has multiple network interface adapters, and you wish to setup any of the following configurations:

- two FEC groups and an individual adapter
- a FEC group with a pair of PermaNet server Link Fault Tolerant (LFT) adapters and an individual adapter
- two pairs of PermaNet server (LFT) adapters and an individual adapter

It is recommended that you first load the driver for the FEC group or LFT group, then load the driver for the individual adapter. You can load the driver for FEC or LFT pair of adapters by using the slot numbers for the primary and secondary adapters (as mentioned previously in this document). You may now use the following command to load the driver for the individual adapter:

```
Load CPCNTNW
```

### 2.3.2 SCO Unixware 7.0 Configuration for PermaNet Server Fast EtherChannel (FEC)

SCO Unixware 7 driver supports PermaNet Server FEC features. It also provides Link Fault Tolerance (LFT) by redistributing the traffic among good links, in case the link on one of the adapters goes down.

The switch to which the server is connected should be an FEC-aware switch. Upto 4 adapters may be configured to form a trunk.

#### 2.3.2.1 Definitions

*Trunk:* A set of network adapters grouped into one logical network interface.

*Trunk Master:* Member of the trunk, configured with the netcfg utility.

*Trunk Slave:* Member of the trunk not configured through netcfg.

*Link Failover:* The ability to redirect the traffic from the failed link in the trunk to the working link without disturbing running applications.

All trunk master devices should be properly configured with netcfg. Slave devices are attached to corresponding master devices during system boot time using information specified in trunk configuration file etc/etherchannel/ethertrunk.conf.

#### 2.3.2.2 Package Installation:

1. This release consists of two packages:

- Pnt2: This package contains the driver files
- Pnt2fec: This package contains installation support files for Fast EtherChannel or Dynamic Load Balancing with Port Aggregation. This package requires Perl programming language of 5.0 or above installed on your system.

2. To install these packages, untar the pnt\_driv.tar file into some temporary directory and execute pkgadd command there.

3. After that, use netcfg utility to configure the network cards.

Example:

```
cd /tmp
tar xvf pnt_driv.tar
pkgadd -d `pwd` (pwd is /tmp)
netcfg
```

4. All EtherChannel configuration is done in terms of PCI slots used by PCNet cards.

### 2.3.2.3 Configuration Steps:

Due to a bug in the netcfg implementation, specific steps should be performed to configure systems with several PCNet-fast adapters.

1. Use netcfg to configure trunk master device, select the EtherChannel (FEC/DLB and PAg) driver and add the protocols.
2. Run the command `resmgr | grep 10222000` to see all available PCNet cards in the system. The 3-d entry from the end will be PCI slot number and the first entry will be resource database key.
3. Use `resmgr -r -k <key>` command to remove each entry not configured by netcfg.
4. Run the command `/etc/conf/bin/idconfupdate` to permanently save resource manager information.
5. Edit the file `/etc/etherchannel/etherchannel.conf` and put a list of devices (including master and all slaves) for each trunk. A sample file called `/etc/etherchannel/etherchannel.conf.sample` is provided as an example.
6. Reboot the system.
7. Use `resmgr` utility to check your configuration.
8. Spanning Tree has to be disabled on the ports configured for DLB/Pag. If VLANs are configured, care should be taken that all ports in the DLB/Pag have to be in the same VLAN. Also, the old `pnt` driver and the `pnt2` driver cannot be used together on the server.
9. Connect all the adapters in the trunk to the switch.
10. Reboot the system. The file `/etc/.osm` should reflect current trunk configuration.

#### 2.3.2.3.1 Link Status Indication

When any trunks are configured, the driver will use syslog facility to log information about links going up and down. The driver will only detect status of used links. It will not show the status change of any link that is not currently in use by a driver.

#### 2.3.2.3.2 ethertrunk.conf Configuration File Format

The configuration of Fast EtherChannel groups is specified in the file `/etc/etherchannel/ethertrunk.conf`. The sample configuration file `/etc/etherchannel/ethertrunk.conf.sample` is provided for references.

This file contains description of each trunk, one per line. Each line consist of pairs of the type `keyword = value`, searated by semicolons.

Lines started with hash sign or semicolon are treated as comments.

Recognized keywords are:

1. `trunk`: An integer, specifying trunk number. It is a required keyword. Trunks should be enumerated from 0 to the maximum of 4.
2. `name`: A string, specifying trunk name.

3. slot: An Integer, specifying the PCI slot number of the adapter to be included in the trunk. All slots should be specified on the same line. All specified slots will be gathered in one trunk.

#### 2.3.2.3.3 Example configuration file:

```
# Example entries. Do not use as is!! Edit for your hardware configuration!
# Define two trunks, two cards in each.
# One trunk has cards in PCI slots 5 and 9, another trunk has cards in
# PCI slots 6 and 8.
#
trunk=0: name = t0; slot = 5, slot = 9;
trunk=1: name = t1; slot = 6, slot = 8;
```

#### 2.3.2.3.4 Limitations and Requirements

1. Spanning tree must be turned OFF on the ports connected to the trunk cards.
2. All the ports involved in the FEC have to be in the same VLAN.
3. Perl programming language of 5.0 or above has to be installed on the system.
4. The AMD PCnet Fast, Fast+ or Fast III are supported.
5. PNT2 driver can not be used together with the old PNT driver. The new driver should be used for all AMD PCNet network adapters!

### 2.3.3 Windows NT 4.0/Windows 2000 NDIS4 Driver for FEC (Beta version)

This driver is available as a **BETA** version at this time. The released version is expected to be available soon. The Installation and GUI interface will change in the final version.

#### 2.3.3.1 Configuration for Fast EtherChannel:

The Windows NT driver can be configured as a single FEC group or two FEC groups. Each group can contain up to four adapters. One of these adapters will be configured as the Primary Adapter and the rest will be configured as Secondary Adapters.

To install the adapters, follow these instructions after physically installing the adapter:

1. Open Windows NT Control Panel -> Network setup program.
2. Under adapters, click on the Add button
3. Choose Have Disk and point to the directory with the driver files
4. Windows NT installation will install the multiple instances of the driver files
5. Highlight the driver and click on Properties to configure the adapter.
6. Choose Fast EtherChannel button on group 1 (if configuring a single group) or on both group 1 and group 2, if configuring multiple groups.

7. Choose the Primary Adapter for the group. The Primary Adapter has valid IP and other protocol configuration parameters for that group.
8. Choose the Secondary Adapters for the group.
9. Click OK to close the Properties box.
10. Click on Bindings to bind and configure the protocols.
11. Assign IP address and other protocol specific parameters only for the adapter chosen as the Primary. All the secondary adapters will assume the same values.
12. Click OK to close the protocol properties box and the network setup box.

## 2.4 Enhancements/Bug Fixes since Release 4.50

### 2.4.1 NDIS 4 Miniport Driver for Windows NT 4.0, Win 95 OSR2 and Win 98

- Support for Unattended Windows NT install has been added to the default OEMSETUP.INF file .
- OEMSETUP.INF file has been modified to fix a bug that appeared during fresh install of Windows NT and gave an error that pcnet.exe file was missing.
- RC file changed so that the driver reports correct version information under both 95 and NT.

### 2.4.2 NDIS 4 Miniport PermaNet Driver for Windows NT 4.0

- Support for Unattended Windows NT install has been added to the default OEMSETUP.INF file.
- OEMSETUP.INF file has been modified to fix a bug that appeared during fresh install of Windows NT and gave an error that pcnet.exe file was missing.
- Support for multiple switches for PermaNet Link Fault Tolerance added.
- RC file changed so that the driver reports correct version information.

### 2.4.3 NDIS 5 Miniport Driver for Windows 2000 (Beta)

- The NETAMD.INF file for the NDIS5 driver has been modified to include FDUP, MP, and TP keywords in addition to the EXTPHY keyword which was already available.
- The properties dialog box displayed the EXTPHY keyword in the middle of the box rather than at the top. We modified the NETAMD.INF file so that the EXTPHY keyword is displayed at the top.
- Memory tag no. added to comply with HCT certifications.

#### 2.4.4 NDIS2 Driver for IBM OS/2

- Support for PCnet-FAST III device added.
- Driver modified to report correct link speed using “netstat”.
- Support for multiple switches for PermaNet Link Fault Tolerance added.

#### 2.4.5 CODI Driver for Novell

- Support for multiple switches for PermaNet Link Fault Tolerance added.

#### 2.4.6 AODI Driver for Novell

- Support for multiple switches for PermaNet Link Fault Tolerance added.
- Support for PCnet-FAST III device added.

#### 2.4.7 Driver for Unixware 7

- Support for PCnet-FAST III device added.

#### 2.4.8 NDIS 3 Miniport Driver for Windows 95 and Windows NT 3.51

- The INF file updated to include support for EXTPHY keyword.



### 3 Documentation Updates

Revision 4.50 contains the following updated release documentation:

**What's New Document (WhatsNew.Doc)**

This document briefly describes the new features in this release.

**Release Documentation (Release.Doc)**

This is the document you are viewing currently. This document is supplemented by release documents available with the individual drivers.

## 4 Known Problems and Limitations

The following are brief descriptions of known problems and limitations in this release.

### 4.1 AmlInstal

- AmlInstal recognizes PCnet-FAST as PCnet-PCI (AM79C970), i.e., it has the following problems:
  - Device name is shown as PCI instead of PCnet-FAST
  - There is no additional option about Full Duplex Mode, Burst Mode, SRAM, etc.
- AmlInstal Diagnostics features are not functional when used with PCnet-FAST and follow on devices.
- If one runs AmlInstal with RomShield enabled in the BootROM, the terminal locks up. AmlInstall unmaps the boot ROM causing the system to lock up.

### 4.2 Novell C-ODI Driver

- NetWare 4.11 panics when the interrupt is shared by multiple instances of the same adapter. This is observed for C-ODI drivers only. This is currently under investigation by Novell Labs. Patches provided by Novell (MSM Version 3.90, Dec 8, 1998) have not been able to solve this issue successfully. This problem does not appear in Netware 5.0.
- Netware 4.11 and Netware 5.0: When four instances of the C-ODI driver is loaded (as is required when four adapters are grouped into a Fast EtherChannel group), and heavy stress is applied, the system sometimes abends. This has been identified to be a Novell MSM issue and AMD is awaiting a new MSM version to resolve this issue.
- NetWare 5.0 & 4.11 panics in some cases when enabling the PermaNet feature during link failover. Patches provided by Novell (MSM Version 3.90, January 19, 1999) have resolved this issue successfully.

### 4.3 Win 95 NDIS 3

- Win 95 NDIS 3 driver loads even though one tries to stop driver from loading by writing bad data to EEPROM.
- When the resources button in Device Manager is clicked, it may take 40 to 90 seconds for Windows 95 to display the resources. This problem is system specific (i.e., does not occur on all systems) and occurs with PCnet PCI II and PCnet-FAST device based NICs. This is an operating system problem that has been resolved in Windows 98.

### 4.4 Win NT NDIS 3

- When on board PCnet-Fast is disabled in the BIOS, system crashes. Occurs with NDIS 3 MAC driver in NT 4.0 environment.

### 4.5 DOS NDIS 2

- NDIS 2 driver fails to load when settings in netamd.inf are incorrect.

### 4.6 SCO UNIXWARE 2.x

- System panics when initstate is changed to 1 after u203 installed. Problem occurs with SCO UnixWare v2.0x as well as UnixWare v2.1.

### 4.7 Windows NT NDIS4 FEC Beta Driver

- System hangs when a drive is mapped from the server to the client
- Bugs in amdfodlg.dll -
  - The dialog box displays "group 1" for both the group boxes.
  - When you freshly configure 2 adapters for Fast Etherchannel and close the properties dialog box and the click again on properties, it does not show the current configuration - both the group boxes are greyed and neither FO nor FE is enabled - its basically not reading the configuration.

### 4.8 SCO UNIXWARE 7.0

- PNT2 driver can not be used together with the old PNT driver when the Fast EtherChannel configuration is used. New driver should be used for all AMD PCNet network adapters in the system.
- The Perl 5.0 package is required to be installed in the system for Fast EtherChannel configuration.

## 4.9 Win NT NDIS 4

- In Windows NT when using the PermaNet server driver, if properties button is clicked, Windows NT binds all protocols again, even though the user did not make any change.
- The “Update” driver button is not supported in Windows NT.

## 4.10 DMI 2.0 Instrumentation

- The current implementation of the DMI specification works only on Windows NT 4.0.

## 4.11 VxWorks Driver

- The VxWorks driver is compatible with PCnet-PCI II, PCnet-FAST and PCnet-FAST+ devices only. If there is an embedded PCnet PCI-I device in the system, and even if the device is disabled, the driver complains indicating that the board-type is unknown.