Lanner

Lanner's Advanced Generation LAN Bypass for Reliable Network Traffic

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Overview

Many of today's networking devices are built with LAN bypass function to prevent failed LAN transmission from impeding important in-flow critical data. The function is to ensure fault-tolerance for network appliances so that essential communications can be still continued even when software, hardware or power failure occurs. The basic idea of bypass is "cross-connection". When an Ethernet port fails, the dysfunctional port will be temporarily disconnected from the system interface and all the in-line data will flow into the other LAN port so that data is still received.

LAN bypass is extremely important in enterprise environments where multiple network appliances are inter-connected. If the Ethernet function of an appliance fails, the bypass function can ensure that the precious data will travel to another appliance, while the failed part is being diagnosed. Especially in high-availability, mission-critical applications, a reliable LAN bypass design that automatically activates itself without human intervention is the ideal function mode to eliminate interruptions.

How Lanner Bypass Works

Lanner's network appliances are built in with bypass modules that support both fiber and copper RJ-45 and include a watchdog timer controller and bypass switch. Software wise, the modules contain scalable SDK (Software Development Kit) that allows system designers to program their bypass mechanism. With an effective watchdog control, Lanner's LAN bypass provide the following advantages:

• Communication via SMBUS (I2C): manages between the system interface and the micro-controller.
• Independent Bypass Status Control for Each Pair: with the watchdog timer, we can monitor and control the bypass status for each pair independently. This will add reliability and availability when encountering potential failure.
• Three-states System Design: Just-On, Run-Time, and System-Off
• Software Programmable: since it is programmable by software methods, system designers will have the flexibility to design their bypass functions.
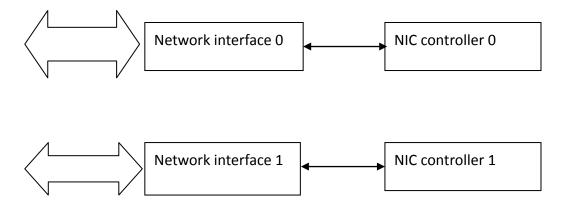
In Lanner's latest Generation 3 Bypass, we have integrated a dedicated micro-controller, or "uController" in short, as an enhancement over the previous generations of Lanner bypass, which utilized jumper pins, GPIO and BIOS configurations. With the uController, we can easily program the communication

status into "Normal Status" and "Bypass Status". Normal status indicates the normal network traffic, whereas in bypass status, the connections of the LAN ports are disconnected from the system interface and switched over to the other port(s) to establish a crossed connection loop-back between the Ethernet ports. In other words, in bypass mode, all packets received from one LAN port are transmitted and carried over to the other port(s).

Due to its programmable nature, Lanner Generation 3 Bypass can be controlled under 3 states: System-Off, Just-On (the brief moment of boot-up), and Run-Time. Since there are 3 controllable stances, Lanner's bypass mechanism integrates 3 watchdog timer controls. Watchdog1 and Watchdog2 are implemented for Run-Time stance whereas Watchdog3 is applied for Just-On. With drivers provided by Lanner, system designers can leverage these benefits to shorten their development lead-time.
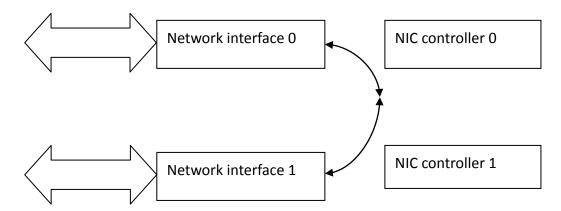
Introduction to Generation 3 Bypass
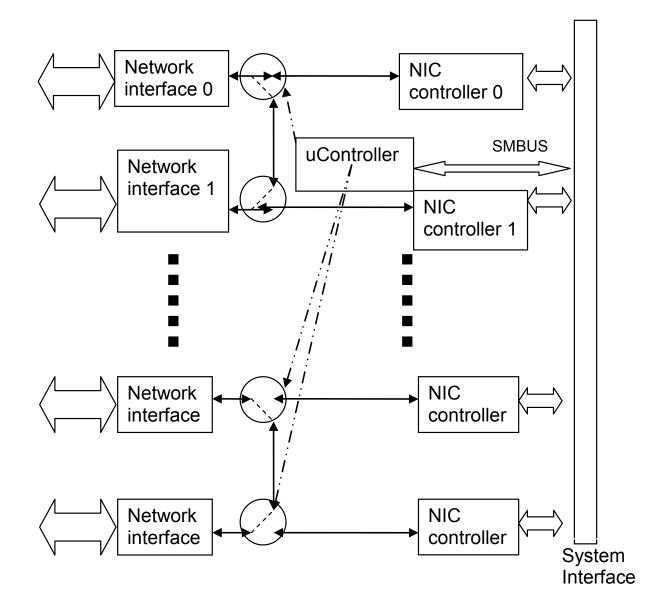
Normal Status:
NIC controller is functioning normally.

Bypass Status:
Ethernet network ports are disconnected from the system interfaces. A crossed connection loop-back between the Ethernet ports is established. Data will be transmitted to another NIC controller and network interface.
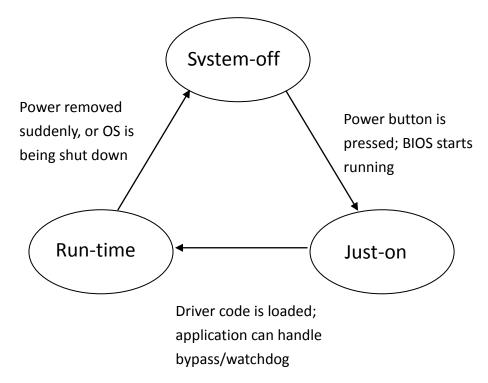
The Integration of uController

The uController plays a crucial role in the bypass setting. The interface between the system and uController is SMBUS (I2C). The following diagram depicts the utilization of uController in Generation 3 Bypass. By using Lanner Bypass driver and software, system designers can program the uController and bypass circuitry to manage the bypass status.

3 Stances to Manage Bypass Status:
The following diagram shows the 3 states in which the bypass status can be controlled:

```
                        ┌──────────────┐
                        │  System-off  │
                        └──────────────┘
      Power removed                        Power button is
      suddenly, or OS is                   pressed; BIOS starts
      being shut down                      running

   ┌──────────────┐                     ┌──────────────┐
   │   Run-time   │ ◄─────────────────  │   Just-on    │
   └──────────────┘                     └──────────────┘

              Driver code is loaded;
              application can handle
              bypass/watchdog
```

Note:
1. System-off is when the power is turned off, or when the OS is being shut down.
2. Run-time is when the driver code is loaded, and the program can take over the bypass/watchdog functions.
3. Just-on is the brief moment when the internal power supply turns on and booting process starts.

Operating System Supported
• Linux
• FreeBSD
• OpenBSD
• Windows

Reference of Lanner's Previous Bypass Generations
Generation 1 Bypass
In Generation 1, bypass is controlled by jumpers on the motherboard. However, the jumper settings vary depending on product models.

Generation 2 Bypass
In Generation 2, bypass settings can be configured by BIOS or programming the GPIO with the use of watchdog timer (WDT).

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