Overview

The 531AP unit was designed for the function of IEEE 802.11B wireless access point. It provides the wireless connection between the wireless clients and Ethernet WAN port.   It features highly secured wireless communication in IP Sec and triple DEC. It can be powered by either AC power or an IEEE 802.3af PoE (Power over Ethernet) DC power injector. It used a X86 class embedded processor with 2 Ethernet ports and a wireless card.   It contains 5 major modules below, please refer to the block diagram in the detail.
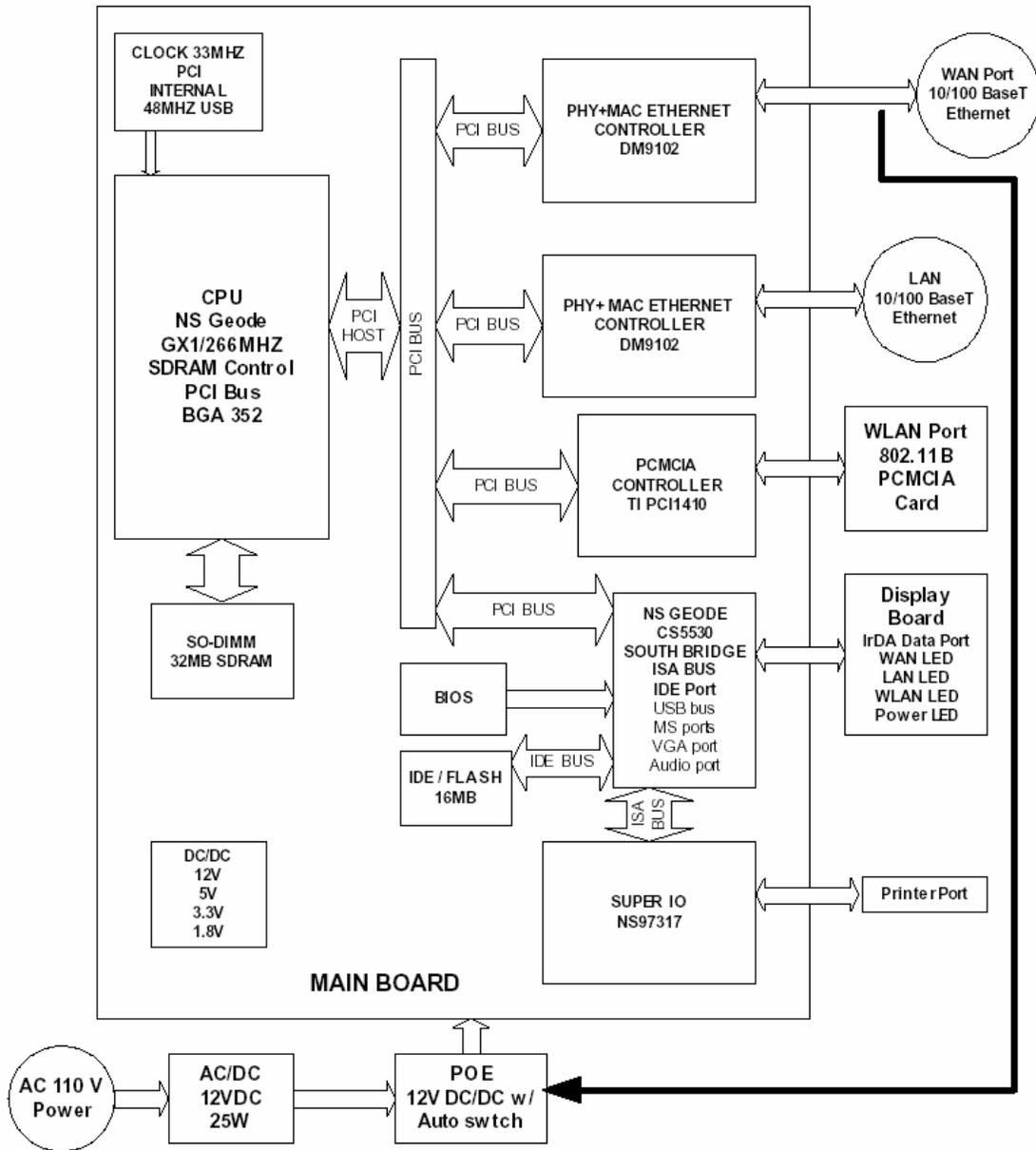
1. Power supply.
2. PoE controller (Power over Ethernet).
3. Main board.
4. LED board.
5. Wireless LAN card

Power supply

The power supply module converted universal AC input to 12V DC output. The 12V output provides power for the system. It is a 25W AC/DC power supply with 100KHZ fixed switching frequency.

PoE controller (Power over Ethernet)

The PoE module has a PoE sensor and a PoE signature per the IEEE 802.3af standard.   It takes the –48V isolated PoE DC power supply with maximum power 14.4W. It used a 20W 48V to 12V DC/DC converter to convert the isolated –48V DC to 12V DC with 300KHZ switching frequency.

Main board

The Main board contains the major components below.
1. A X86 class CPU that operated in 266MHZ internal clock. The CPU also has an internal PCI bus controller or a north bridge that operates in 33MHZ. The main board system clock is synchronized the 33MHZ PCI clock. It also has build in SDRAM controller that operates up to 66MHZ.
2. A peripheral controller or south bridge that provide the ISO bus and IDE controller. It provides the bridge between the PCI bus and ISO bus.
3. A Super I/O controller that provides the serial ports, parallel port and audio ports. It communicates between the input / output devices to the ISO bus.
4. Two PCI bus based Fast Ethernet Controllers to provide LAN and WAN connection to the CPU.
5. A HPNA Controller, it was disabled by software in this application.
6. A Card bus controller bridges the communication between a card-bus based WLAN (Wireless LAN) card to PCI bus.
7. Internal DC/DC converts to provide the adequate voltages for all chips.
8. An IDE flash memory that provides the application software in Linux.
9. A SDRAM SIMM that operates up to 66 MHZ with maximum configuration of 256MB.
10. A BIOS PROM that provides the system level BIOS for the OS.
11. An IDE based flash memory module provides the storage of application software.
12. A real time clock operates the clock without external power for 3 years.

The main board boots from a BIOS PROM and read the application software from an IDE flash. It operates under a Linux based application software. After system boots, it setups configuration for all peripheral device, communication devices and PCI bus device. It controls the data communication between different ports, manage traffics, and

implement the security features in line speed. It communicate with the WAN port vie an Ethernet. It communicate with the LAN port vie another Ethernet port.   It drives the wireless LAN card for wireless network and drives the LED card to display the status.

LED board

The LED board displays the Ethernet traffic condition, WLAN, WAN, and security status, as well as the power condition.

Wireless LAN card

The WLAN card is 3rd party card bus based IEEE802.11b standard WLAN card. Currently, we used the Senao 200mW 802.11b WLAN card (SL-2511CD PLUS EXT2) with FCC ID:NI3-2511CD-PLUS2.   Here is the FCC test report link:
https://gullfoss2.fcc.gov/cgi-bin/ws.exe/prod/oet/forms/reports/Search_Form.hts?mode=Edit&form=Exhibits&application_id=251127&fcc_id=NI3-2511CD-PLUS2

frequency Information for the WLAN
It provides the physical layer and MAC layer connection of the wireless communication. It works at a 1.7GHZ oscillate frequency and operate in 2.412 - 2.462 GHz
band in the frequency below: 2412, 2417, 2422, 2427, 2432, 2437, 2442, 2447, 2452, 2457, 2462MHz in 11 channels are available. It has frequency tolerance from center frequency within +-25ppm. It used modulation techniques and coding for 1Mbps: BPSK, 2Mbps: QPSK and 5.5M/11Mbps : CCK. It operates in the DSSS modulation.

DSSS Information for the WLAN

802.11b is Direct Sequence Spread Spectrum (DSSS), the data is mixed by pseudorandom code which is an orthogonal code. The mixed data is digital modulated by BPSK and QPSK technique depends on the data rates. The CCK coding is applied for increasing the data rate, and also the processing gain will be increased. The bit rates are 1,2,5.5,11Mbps, the symbol rates are 1,1,1.375,1.375Mbps, and the chip rates are always 11Mbps.   The Chip/symbol is 11, 11, 8 and 8 respectively. Although is higher bit rate, the processing gain is lower than 10, but the CCK coding used in higher bit rate will provide 2.2dB coding gain.