Intel PRO/Wireless 2011B LAN & AC'97 Modem 3A Mini PCI Adapter

Product Specification
"Trilogy 3" MPCI

Version 1.2
March 25th, 2002

Content:

Introduction

The primary purpose of this document is to communicate the Intel PRO/Wireless LAN & AC'97 Modem MPCI Adapter features and specifications to a technical audience. Trilogy 3 is an Intel codename that references a third generation of wireless LAN products that are OEMed-in from Symbol Corporation, or based on Intersil Prism 2.5 reference designs. The WLAN and Modem sections of the adapter are completely separate – including power and interface pins, allowing a WLAN-only version via de-population of modem components.

Trilogy 3 Product Overview

Trilogy 3 products transfer data at ethernet speeds (11Mbps instantaneous data rate) over the air between two or more users or between a user and the wired network. The WLAN is not a single product; it is a digital radio system with product components that can be configured to meet a multitude of customer requirements. The Trilogy 3 Access Point (AP) links to a wired LAN via a wired ethernet connection. Wireless NICs communicate to the wired LAN through the AP. Multiple Access Points are deployed in a cellular layout plan similar in concept to the cellular telephone base station layout.

Document Purpose

This document defines the functional characteristics of the Trilogy 3 MPCI Adapter. All of the basic functionality is provided by Intersil as part of their 802.11 DS implementation for the Intersil PRISM 2.5 radio using the Intersil ISL3874A microcontroller. In particular, the host interface access mechanisms, packet send, receive, queuing, timer services, and buffer management are already implemented and do not require further development. Therefore, this document primarily addresses the radio configuration and firmware enhancements required for the Trilogy 3 product.

Key Features

- Direct Sequence 802.11b physical layer
- 802.11b High data rate capability – 11 MBPS, 5.5 MBPS, 2 and 1 MBPS
- 3.3 volt Mini PCI Type 3A card (3.3V Aux – Modem)
- 16 bit host interface using PCI IO mode for 802.11b section
- In-line WEP algorithm
- Enhanced power save algorithm for 802.11b section
- Robust roaming and dynamic rate switching for 802.11b section
- Wi-Fi certified 802.11b section
- Microsoft WHQL certified
- Modem Auto-configuration
- Modem v.90 Compliant (software-upgradeable to v.92)
- Hayes Compatible AT modem command set
- Modem Wake On Ring

What's Not Supported

- The 802.11b firmware does not currently support a low power mode of operation (< 20 ma). For Idle mode, it removes power to as many circuits as possible, but the current level of firmware implementation prevents the ISL3874A controller from using a 32 KHz low power oscillator for sleep mode. Since the controller and clock will always be active the driver does not require wake-up/resume operations (although the adapter will consume as little power as possible when there are no receive, transmit, internal (roam) or host activities in progress.)
- Wake-On-LAN operation is not supported for the 802.11b section of this product. This is due to the fact that the Intersil chipset does not support 3.3VAUX detection.
- A hardware "Radio-Disable" switch is not supported for the 802.11b section; however a software-implemented function is provided to disable radio transmissions.
- There is no output pin to display 802.11b Activity status via an LED. Displaying Activity Status is not supported with the current revision of the Intersil chipset and firmware at this time. Future plans for support of this feature in Intel's 802.11b MPCI product are TBD as of Revision 1.2 of this document.

References

Device Specifications

- ISL 3874A Direct Sequence Spread Spectrum Integrated MAC and Baseband Processor, Intersil Semiconductor, May, 2001
- HFA 3783 I/Q Modem and Synthesizer, Intersil, November, 2000
- ISL 3685 RF/IF Converter and Synthesizer, Intersil, January, 2001
- ISL 3984 RF Power Amplifier and Detector, Intersil, December, 2000
- CY62136V - 128K by 16 Static RAM, Cypress Semiconductor Corporation, September, 2000
- SST 39VF010 128K by 8 bit CMOS FLASH, Silicon Storage Technology, Inc., 2000
- CSP1037 AC-Link Soft Modem Data Sheet, Rev. 1, October 2001, Agere Systems Inc.

External References

- Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications, ISO/IEC 8802-11:1999(E)
- Higher-Speed Physical Layer Extension in the 2.4 GHz Band, IEEE Std 802.11b-1999
- Audio Codec '97, Rev. 2.2, September, 2000, Intel Corporation
- Mini PCI Specification, Rev. 1.0, October 25, 1999, PCI Special Interest Group

WLAN System Architecture

The WLAN section of the adapter consists of a 2.4 GHz radio with direct sequence transmit and receive circuitry using Intersil 3874A Integrated MAC and Base Band Processor and ISL3685/HFA3783 Intersil radio chipset. The controller circuitry consists of the Intersil ISL3874A MAC controller with PCI interface, Flash and SRAM.

Crystal oscillators are used to drive the controller and transmit/receive circuits. Power control circuits are used to selectively enable radio circuitry. Power on reset is accomplished via a Maxim 6326 Reset IC, and with resistors to select default configuration parameters and to put circuits into the off state until the firmware has enabled the outputs from the controller.
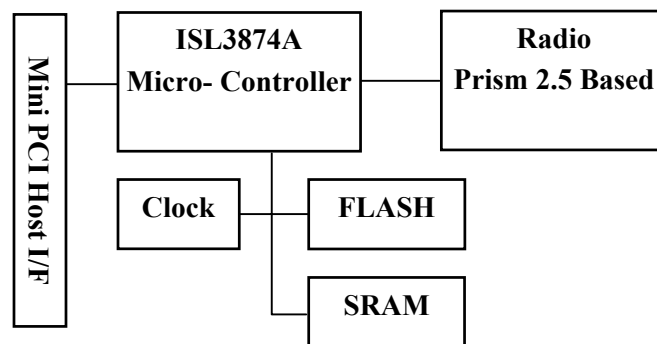
WLAN Block Diagram

The ISL3874A microcontroller section executes under firmware control to process radio, timer and host events/operations. This chip executes RISC-type instructions in one clock using a 3-stage pipeline. The chip supports up to 8 active contexts. Context switching occurs when higher priority events cause an "instant" switch to the appropriate higher priority context. Contexts can be configured as "foreground" or "background", where foreground contexts always have priority, and background contexts operate in a round-robin fashion. When there are no eligible contexts, the device consumes very little power. Up to 64 K words of control store and 8 M bytes of RAM buffers are accessible by the CPU address registers.

All firmware executes from the control store address space in the SRAM in order to provide the required throughput for 11 MBPS data rates. The 256 KB SRAM supports low memory variables and host interface, as well as a linked list of send/receive buffers and host configuration buffers. The upper half of SRAM is used to store the executable control store code.

The Host PCI interface accesses memory/registers via the ISL3874A controller; Command/Status registers and Buffer Access Paths are provided to support a simple, fast interface mechanism. The radio card includes the Direct Sequence send/receive circuitry, RF synthesizers, reference oscillator, and power switching circuits.

WLAN Component Descriptions

The Intel PRO/Wireless 2011B LAN Mini PCI uses the Intersil Corp. Prism 2.5 Chipset to implement the spreading, modulation, demodulation and de-spreading. The RF up- and down-conversion approach is the common superhetrodyne architecture with integrated chip set (ISL3685/HFA3783) manufactured by Intersil. The channel frequency, fc, is created (transmit) or converted (receive) by mixing with a low side LO frequency, flo, to the 374 MHz IF (fc= flo + 374 MHz). The 374 MHz IF is converted to/from baseband using the Intersil I/Q modulator demodulator HFA3783 IC.

WLAN Transmitter Path

The Intersil ISL3874A baseband processor section creates the transmit waveform and outputs the signal on the TX I/Q lines. The Intersil HFA3783 up-converts the transmit baseband signal to 374 MHz. To control the side lobes the transmit signal is passed through a SAW filter (374 MHz center, 22 MHz BW). The signal is then amplified and mixed up to the channel frequency using Intersil ISL3685 IC. The LO frequency is lowside (fc – 374M). The signal is then band-pass filtered, amplified, and low-pass filtered (2.4 to 2.5 GHz passband) to create the required output power while keeping spurious and harmonic emissions in spec. Two switches are incorporated at the output to provide for antenna diversity and receive/transmit switching.

WLAN Receive Path

The receive signal passes through the front-end diversity and transmit/receive switches. The signal is band-pass filtered and then amplified by Intersil ISL3685 and then down-converted to 374 MHz. The LO frequency is lowside (fc – 374M). The receive signal is passed through the SAW to provide adjacent channel selectivity. The Intersil HFA3783 creates the baseband I/Q signals and the signal is de-spread and demodulated in the Intersil ISL3874A.

WLAN Microprocessor Control

The Intersil ISL3874A micro-controller section along with flash and SRAM memory control the transmitter and receiver. The micro-controller section is derived from the Intersil HFA3842 and is clocked at 14.67 MHz by a PLL-divided 44 MHz crystal. The micro-controller along with the embedded firmware runs the 802.11 Media Access Control (MAC) layer control. The MAC control sends and receives packets and transfers data to and from the PCI interface to the host computer. The host computer in which the Mini-PCI is embedded can be a handheld, notebook or fixed computer.

WLAN Frequency Generation

The first and second LO are generated by two external VCOs. The first LO feeds the Intersil ISL3685 to generate the channel frequency minus 374 MHz. The second LO which feeds the Intersil HFA3783 is 2 times 374 MHz (748 MHz). A 44 MHz crystal is the reference for the synthesizers. The synthesizers are controlled by the ISL3874A micro-controller section.

WLAN Hardware Environment

Overview

The Intel PRO/Wireless 2011B LAN Mini PCI Adapter can be used in handheld, notebook or fixed computers to provide wireless network access. The Adapter communicates over the air between two or more users or between a user and the wired network.

Card Dimensions

The Intel PRO/Wireless 2011B LAN Mini PCI Adapter complies with the dimensional specifications of a Mini PCI Type 3A card. The maximum dimensions are: height 50.95 mm (2.006 inches,) width 59.75 mm (2.352 inches,) and thickness 4.9 mm (0.193 inches.)
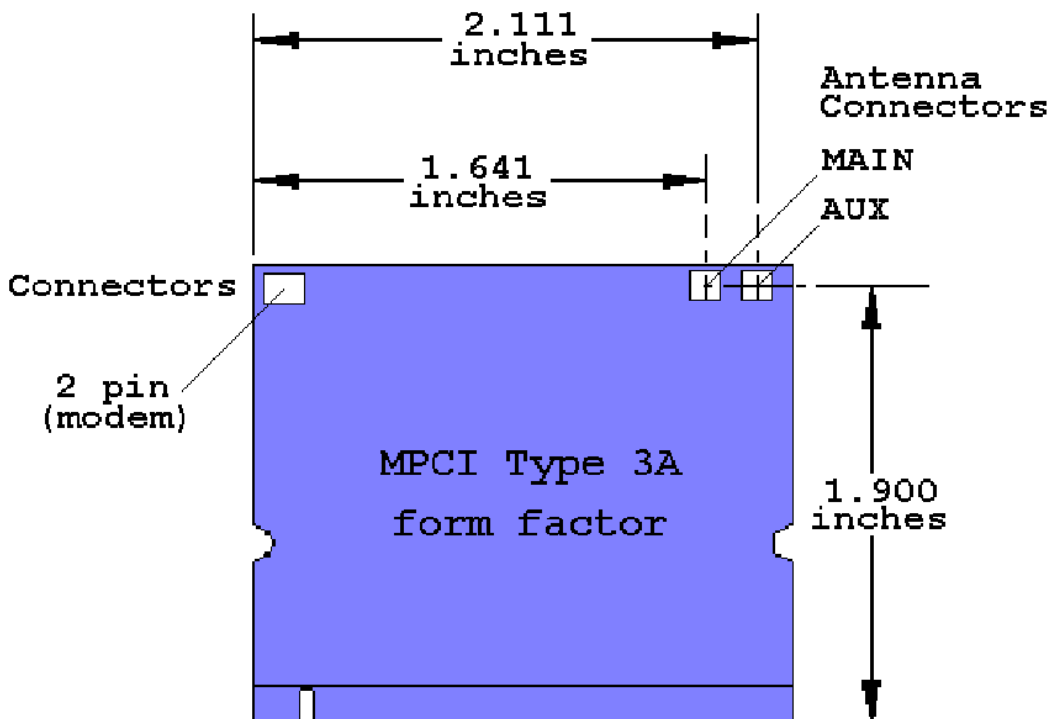
The 2-pin modem connector meets the physical requirements of and is located per the Mini-PCI specification. Antenna connectors are located as shown in the above drawing. They are Hirose type U.FL-R-SMT.

External Indicator Signaling

Signals are provided to drive up to 2 external LAN Status LEDs. These signals are available in one of two different configurations via the bottom System Connector (**SC**) pins. All signals, whether positive or negative drive, can supply 6mA of current.

Signal Name	Functional Description	Drive Polarity	System Connector Pinouts by Configuration	
			Standard	Option B
Power	Power applied to Adapter	Positive	NA	12+/(No -)
Link	Flashing: Scanning On Solid: Associated	Negative	11+/13-	NA

WLAN Operating Channels

The FCC (US), IC (Canada), and ETSI (Europe) specify operation from 2.4 GHz to 2.4835 GHz.

The channels used are:

Channel	Center Frequency (MHz)	Start Frequency (MHz)	End Frequency (MHz)
1	**2412**	**2400**	**2424**
2	2417	2405	2429
3	2422	2410	2434
4	2427	2415	2439
5	2432	2420	2444
6	**2437**	**2425**	**2449**
7	2442	2430	2454
8	2447	2435	2459
9	2452	2440	2464
10	2457	2445	2469
11	**2462**	**2450**	**2474**
12	2467	2455	2479
13	2472	2460	2484
14	2483	2471	2495*

Highlights denote 3 most commonly used (non-overlapping) Ch's in the U.S.

*Japan specifies 2.483 to 2.495 for Channel 14.

WLAN Modulation and Channel Data Rates

Four modulation formats and data rates are specified by the IEEE 802.11b specification. The basic access rate is based on 1 Mbit/s Differential Binary Phase Shift Keying (DBPSK) modulation. The enhanced access rate is based on 2 Mbit/s Differential Quaternary Phase Shift Keying (DQPSK). The extended Direct Sequence specification defines two additional data rates. These rates are based on the Complementary Code Keying (CCK) modulation scheme for 5.5 Mbit/s and 11 Mbit/s.

WLAN Electrical Specifications

Description	MAX	TYP	MIN	Unit	Comments
Functional					
3.3v 802.11 Sleep Current	100	65		mA	Sleep portion only
3.3v Transmit Current	385	300		mA	
3.3v Receive Current	350	200		mA	
3.3V Idle Current	200	150		mA	11b Sleep mode avg.
Frequency Tolerance 0C to 55C	+25		-25	PPM	
Frequency Tolerance -10C to 70C	-25		+25	PPM	
Receiver					
Sensitivity, 11 Mbps, 25C		-85	-82	dBm	8% PER 1024 Octets
Sensitivity, 5.5 Mbps, 25C		-88	-85	dBm	8% PER 1024 Octets
Sensitivity, 2 Mbps, 25C		-91	-88	dBm	8% PER 1024 Octets
Sensitivity, 1 Mbps, 25C		-94	-91	dBm	8% PER 1024 Octets
Sensitivity, 11 Mbps, -10C to 70C		-82	-80	dBm	8% PER 1024 Octets
Sensitivity, 5.5 Mbps, -10C to 70C		-85	-83	dBm	8% PER 1024 Octets
Sensitivity, 2 Mbps, -10C to 70C		-88	-86	dBm	8% PER 1024 Octets
Sensitivity, 1 Mbps, -10C to 70C		-91	-89	dBm	8% PER 1024 Octets
Transmitter					
Power Level, 25C	15.4			dBm	Max. Power - Default
Power Level, -10C to +70C		14		dBm	Max. Power - Default

WLAN Power Requirements

The Adapter is able to work with the standard Mini-PCI 3.3V +/- 5% power source. The Adapter's current consumption depends on the operating state. The operating state is controlled by the Adapter's driver software and the Adapter's CPU. The pulse characteristics, and peak inrush current depend on the capacitance and resistance of the host power supply. The Adapter presents a capacitive load of approximately 20 uF. Noise on the 3.3 V power supply should be below 50 mV RMS.

Modem System Architecture

The 56K soft modem design is based on the Agere CSP1037 Scorpio chip set. This chip set includes an integrated direct access arrangement (DAA) that provides a programmable line interface to meet international telephone line requirements.

Unlike Controller or Controller-less modems, the AC'97 soft modem uses host CPU computing power to process the incoming/outgoing data instead of having a dedicated DSP local to the modem.
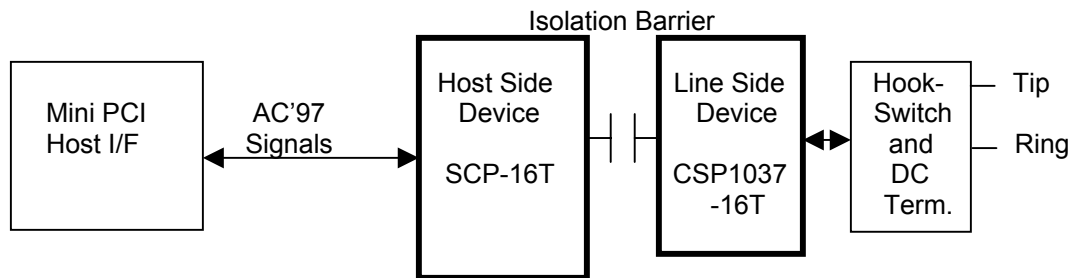
Modem Block Diagram

Host Side (SCP-16T) has the AC'97 link protocol built-in for communication to the Host. It is responsible to process data coming in and going out to the Line Side chip as well as commands to control the Line Side for on-hook, off-hook, dial, ring detect. The host side can be configured via Host Interface strapping pins as an AC'97 Primary (ID 00) or Secondary (ID's 01 or 10) Codec. For the (default) Primary mode, an on-board 24.576MHz oscillator is provided which is converted to the required internal and external clock frequencies by a PLL within the Host Side chip. An analog Call-Progress signal is provided at one of two Host Interface pins. Power for the digital portion of the Host Side is provided by the host system's 3.3VAUX supply. Power for the analog portion is provided by a charge pump, which is driven by the data-stream of the isolation barrier.

The Scorpio chip set achieves an isolation barrier through low-cost, high-voltage capacitors in conjunction with Agere's proprietary signal processing techniques. These techniques eliminate any signal degradation due to capacitor mismatches, common-mode interference, or noise coupling. All transmit, receive, control, and ring detect data are communicated through this barrier.

Line Side (CSP1037-16T) communicates data with the Host Side across the capacitive barrier. The Line Side chip performs D/A and A/D conversion, provides the DAA functions such as AC and DC impedance control, ring detection, and loop current monitoring. This chip also controls the analog input/output to Tip/Ring via discrete components. Power for the Line Side is derived from the telephone line.

The hook-switch and DC termination circuits of the DAA are implemented with discrete transistors and passive components, controlled by the Line Side chip.

Modem Hardware Environment

Data Mode Capabilities
- V.90 Compliant (software-upgradeable to v.92)
- ITU-T V.34 extended rates: 33600 bits/s - 2400 bits/s
- V.32terbo, V.32bis, and fallbacks
- TIA/EIA 602 standard for AT command set
- V.42 error correction (LAPM and MNP)
- V.42bis and MNP Class 5 data compression
- V.25 & V.25ter
- V.8bis signaling
- Bell 103J
- Bell 212A

FAX Mode Capabilities
- ITU-T V.17, V.29, V.27ter, and V.21 Ch 2
- TIA/EIA 578 Class 1 FAX

Modem Configuration

The AC'97 Primary / Secondary Codec addressing configuration is the responsibility of the OEM via motherboard strapping of the System Connector (**SC**) ID pins.

AC'97 Address Mode	**SC** Conn. Pin Strapping	
	ID 1 (Pin 109)	ID0 (Pin 108)
Primary (00)	High or Open	High or Open
Secondary 01	High or Open	Low
Secondary 10	Low	High or Open
Secondary 11	Not Supported	Not Supported

An analog audio Call Progress signal is provided at (only) one pin of the **SC**. Whichever pin is not used for this function will be a NC (Open-circuit).
Standard Audio Output pin: 111 (MOD_AUDIO_MON)
Optional pin (**Option C**):   116 (SYS_AUDIO_IN)

Modem Power Requirements

The Adapter requires the standard Mini-PCI 3.3VAUX +/- 5% power source. The Adapter's current consumption depends on the operating state. The operating state is controlled by the Adapter's driver software and the Adapter's CPU.   The pulse characteristics, and peak inrush current depend on the capacitance and resistance of the host power supply. The Adapter presents a capacitive load of approximately 10 uF. Noise on the 3.3 VAUX power supply should be below 50 mV RMS.

Environmental Performance

Environment	Limits
Storage Temperature	-30 ºC to +80 ºC
Operating Temperature	0 ºC to 65 ºC Nominal Temperature Range -10 ºC to +70 ºC Extended Temperature Range
Humidity	95%, Non-Condensing
Altitude	Altitude: up to 2.4 km
ESD	+/-15 kV, Air / +/-8 kV, Contact / +/-2 kV, Pin
Power Supply Noise & Interference	70 mV rms from 50 Hz to 70 Hz and 50 mV rms 70 Hz to 400 MHz,
Vibration, Shock, Torque, Drop, Dust, Rain & Drip.	TBD

Regulatory

Regulatory agency approval requirements for this product are FCC, CE, and UL. (Other regulatory requirements on a per country/application basis).

Certifications	U.S./Canada: FCC Part 15 Class B US Unintentional Emissions. FCC Part 15.247, 15.205, 15.209 Canada DOC RSS-210 Canadian Spread Spectrum Europe: ETS 300 328, ETS 300 826, CE Marked Japan: RCR STD-33
Safety Compliance	USA/Canada: UL1950/CSA 22.2 Europe: CE Marked

Standard for Operation: Conforms to 802.11b specifications
Standard for Interoperability: Wireless Ethernet Compatibility Alliance (WECA)

Ethernet Software Driver and Feature Set

The software driver set is a major software release designed to support the features of the 80211b Ethernet controller used on the Intel M3AWEB/56GA Mini-PCI Combo Card product. The level of driver support is described in the following sections.

Software Support

- Microsoft NT4.0
- Windows 2000
- Windows 98 and 98SE
- Windows Millennium
- Windows XP

Ethernet Features

- 802.11b 11 Mbps,5.5 Mbps,2 Mbps,1 Mbps.
- Supports ad hoc peer-to-peer networking and communication to wired networks via WiFi compliant access points.
- Supports on board dual diversity switch.
- IEEE 802.11b compliant with 128-bit/40-bit WEP encryption.
- 14 channels in the 2.4 GHz band

Data Link Layers

- IEEE 802.2 LLC

Protocol Support

- TCP/IP
- Novell IPX/SPX and Microsoft compatible
- Microsoft NetBEUI

Support Software

IMWEBSTA.EXE

IMWEBsta.exe is the system tray utility that launches the configuration software utility for this product. The software allows a user to do the following actions:

- Configure the SSID (**Service Set Identifier**)
- Specify operating mode (**Infrastructure, 802.11 Ad-Hoc**)
- Specify Transmit Rate (**Auto, 1-2 Mb, 5.5 Mb, 11 Mb, Fully Automatic**)
- Disable or modify encryption settings (**Disabled, 64bit, 128 bit**)
- View link status (**Link Quality, Signal Strength, Throughput, Tx Rate**)
- View current Channel
- View current associations
- Rescan option. Forces the radio to rescan all available channels
- View current Network driver version
- View current firmware version
- Enable/Disable Radio
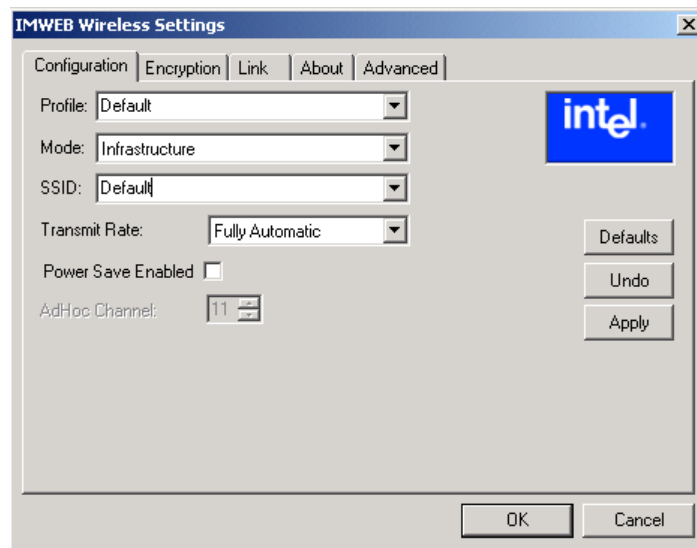
(Screen Shot)

This utility is supported under Microsoft Windows 98, Windows 98SE, Windows ME, Windows NT4, Windows 2000, and Windows XP operating systems. Under Windows XP, the appearance of the system tray utility can change. Certain menu options will not be available in Windows XP if the zero config service (aka .1x) is active.

Ethernet Software Matrix

File Name	Type
IMWEBsta.exe	Tray Application (Common)
IMWEBIOC.dll	Driver API Agent (Common)
IMWEBIOC.vxd	Virtual Device Driver (Win98/98SE)
IMWEBCFG.cpl	Control Panel Ext (NT5)
IMWEBCFG.cpl	Control Panel Ext (NT4)
IMWEBCFG.dll	NDI App Extension (Win16)
IMWEBRes.dll	Resource Dll (Win32)
IMWEBR16.dll	Resource DLL (Win16)
IMWEBN5.sys	NDIS5.0 Driver
IMWEBN4.sys	NDIS4.0 Driver
NetIMWEB.inf	Win Info File (Win2K,98,98SE,Me,XP)
Oemsetup.inf	Win Info File (NT4)
Setup.exe	InstallShield Installer

Modem Software Driver and Feature Set

Operating System Software Support

- Microsoft Windows XP
- Microsoft NT4.0 (SYS drivers)
- Windows 2000 (WDM drivers)
- Windows 98 (WDM and VxD drivers)
- Windows Millennium (WDM drivers)
- PC '99 compliant
- ACPI compliant

AC'97 Modem Driver Package File Description

The following table shows the file description of the most typical Scorpio modem driver package. (Driver package for Windows XP will be the same as Win2K package.)

R:	Required files
O:	Optional files
S:	SETUP related files
D:	Debug purpose only files

Table 1. Scorpio Driver Package Description

File Name	Description	98/SE	NT4	ME	W2K
Ltsetup1.dll	Agere setup dll file	S	S	S	S
Ltsetup2.dll	Agere setup dll file	S	S	S	S
Ltsetup3.exe	Agere setup executable for Win95 only	S	S	S	S
Setup.exe	Agere setup main executable – called by user	S	S	S	S
Ltremove.exe	Agere device remove executable	S	S	S	S
Ltsetup.ini	Agere setup information file	S	S	S	S
Ltsm.sys	WDM type modem driver			R	R
Ltsm.sys	NT4 SYS type modem driver		R		
Ltsm.vxd	VxD type modem driver	R			
Ltsm9md.inf	Windows INF file			R	
Ltsm9md.cat	Catalog (digital signature) file for Ltsm9md.inf			R	
Ltsm9pc.inf	Windows INF file			R	
Ltsm9pc.cat	Catalog (digital signature) file for Ltsm9pc.inf			R	
Ltsmdmi.dll	Implements DOS compatibility tab in modem properties	O		O	
Ltsmmsg.exe	User messaging utility	R/O*	R/O*	R/O*	R/O*
Ltsmnt4.inf	Windows INF file		R		
Ltsmnum.vxd	Helper VxD for DOS box support			R	
Ltsmvcd.vxd	Helper VxD for DOS box support	R		R	
Ltsmvxd.inf	Windows INF file	R			
Ltsmvxd.cat	Catalog (digital signature) file for Ltsmw2k.inf	R			
Ltsmw2k.inf	Windows INF file				R
Ltsmw2k.cat	Catalog (digital signature) file for Ltsmw2k.inf				R

Ltsmmsg.exe   Required if system audio is used for call progress. Otherwise LtsmMsg.exe is used to display user warning messages such as over current condition or invalid country/region selection.

SETUP Usage

Agere supplies a simplified user friendly driver setup program along with the modem driver package, called SETUP. The setup program works on all Windows operating systems (Win98/98SE/ME/NT4/2K/XP) and performs the following functions:

- Install modem driver

- Copy modem related files upon installing modem

- Launch modem related executables upon installing modem

- Uninstall modem driver

- Clean up modem related registry information upon uninstallation of modem

- Delete modem related files from the system upon uninstallation of modem

SETUP Customization

Customization to SETUP can be made by editing ltsetup.ini file. This gives OEMs more flexibility in the way the setup program operates under their systems. Here is the detail description of ltsetup.ini.

Table 2. [ltsetup.ini]

[INSTALL_OPTIONS]	Section defines all the installation options.
;File version 1.37	Setup program version
Debug=N	Debug=Y will enable debug mode operation.
WDMDriver=N	WDMDriver=Y will install WDM driver for Win98SE instead of VxDs.
ReBoot=N	For W9x/ME/2K/XP, ReBoot=Y will prompt user to reboot the system after installing the driver. (NT4 will always ask to reboot the system.)
CleanUpRegistry=Y	Enable clean up the registry keys specified in [CLEANUPPATH] section.
CopyFilesW2K=N	In W2K, copy files only, does not refresh the system. (Should not be documented later.)
;SilentInstall=Y	Enable silent install mode.
;CabsFlag=Y	Enable ltremove to set SourcePath to \Windows\options\cabs for WinME. It is set to \windows\options\install by default.
;CatFlag=Y	Enable to use SetupCopyOemInf to copy W2K INF files.
CabExtract=N	Enable cab file extraction feature upon installing modem driver.
[COPY_FILES_9X] ;FILE0=filename1, $windows\system FILE1=ltremove.exe	Section allows copying specific files (to specific locations) other than default driver/INF/exe in Win9x.
[COPY_FILES_NT] FILE0=ltmsg.exe FILE1=ltremove.exe ;FILE2=filename1, $windows\system32	Section allows copying specific files (to specific locations) other than default driver/INF/exe in NT4.
[COPY_FILES_Win2K] ;FILE0=ltmsg.exe FILE1=ltremove.exe ;FILE2=filename, $windows\system32	Section allows copying specific files (to specific locations) other than default driver/INF/exe in W2K/XP.
[DELETE_FILES_9X] FILE0=ageresoftmodem.htm, $windows	Section allows deleting specific files upon uninstallation of the modem driver in Win9x.
[DELETE_FILES_NT] FILE0=ageresoftmodem.htm, $windows	Section allows deleting specific files upon uninstallation of the modem driver in NT4.
[DELETE_FILES_Win2K] FILE0=ageresoftmodem.htm, $windows	Section allows deleting specific files upon uninstallation of the modem driver in W2K/XP.
[LAUNCH_FILES_9X] FILE0=lthomol.exe	Section allows launching specified executable (at specific directory location) upon installation of the

;FILE1=filename arg1 arg2,
$windows\system

specific directory location) upon installation of the modem driver in Win9x.

[LAUNCH_FILES_NT]
FILE0=lthomol.exe
;FILE1=filename arg1 arg2,
$windows\system32

Section allows launching specified executable (at specific directory location) upon installation of the modem driver in NT4.

[LAUNCH_FILES_Win2K]
FILE0=lthomol.exe
;FILE1=filename arg1 arg2,
$windows\system32

Section allows launching specified executable (at specific directory location) upon installation of the modem driver in W2K/XP.

[IDS_TO_BE_INSTALLED]
id0=10B9&DEV_5450
id1=1039&DEV_7013
id2=8086&DEV_2446
id3=8086&DEV_2486
id4=8086&DEV_7196
id5=1106&DEV_3068

Specify the motherboard chipset IDs (PCI vendor ID and device ID) which the modem is installed to (up to 20 IDs).

[CLEANUPPATH]
Path0="Software\\Lucent\\SoftModem"

Specify the registry path to be clean up upon uninstallation of modem driver.

[REGDELKEYS]
Path0="Software\\Lucent"

Specify the registry keys for modem uninstallation.

[CABNAME]
Cabname=agrsm.cab

Specify the cab file being extracted by setup.

[CABPATH]
;path="C:\ageresoftmodemhelp"
Path="C:\Program Files\agere\scorpio"
;path="C:\cabxtracts"

Specify the directory location where the cab file is being extracted. Setup will create the sub directory by itself assuming parent directory already exists in the system. (i.e. \scorpio should be created under existing directory C:\Program Files\agere)

Multilanguage Support

SETUP also offers multi language support. It automatically picks up the language used in the system and displays the messages in each language. The supported languages include:

English	*Dutch*	*German*	*Norwegian*
Chinese (Simplified)	*Finnish*	*Italian*	*Portuguese (Brazilian)*
Chinese (Traditional)	*French (Canadian)*	*Japanese*	*Spanish*
Danish	*French (French)*	*Korean*	*Swedish*

LTHOMOL.exe (Homologation support utility)

Agere Scorpio modem offers worldwide support over 60 country/region modes. This homologation capability is enabled by the certain modem hardware (DAA - analog front-end design) and the software (Device driver). The device driver configures various parameters and sets the modem to function under certain telecommunication regulation and laws to pass PTT approvals. This capability allows PC OEMs and retail manufactures to market their products in more countries/regions. It will also enables end-users to have more mobility of the modem usage in laptop PC environments. While over 100 homologation parameters have their default values configured in the modem driver, LTHOMOL.exe adds the capability to modify/update the parameters that matches with the certain modem hardware to be installed.

;This section allows to patch existing country settings or add new country.	
;format is Snnn=defaultValue,minValue,maxValue	
;minValue and maxValue are ignored for debug registers (>=500)	
;[B5]	Country/Region code
;S0=4,4,8	Parameter S0
;S516=0x21	Parameter S516
;	
;This section allows to disable support for specific countries.	
:	
;[Disable_Country]	
;0A	
;0F	
;B6	

For the detail of the country/region codes and homologation parameters settings, please refer to *Lucent Technologies Homologation Parameter Values for the LU97 Soft Modem Chip Set manual (Jan/2001)*.

LTSMMSG.exe (User messaging & system audio support utility)

LTSMMSG.exe is a stand-alone program that offers you to show pop-up windows to indicate users for certain critical events occurred, while users are using the modem function. This program supports all Windows operating systems.

Selection of Un-homologated Country Messaging

If the user selects some country which the modem is not homologated, either from *Regional Settings* and/or *Modem, Dialing Properties, My Location* in Control Panel, this warning message will show up.

Modem is not approved in the selected country.

Selecting a country other than the one in which you are currently located may cause your modem to be configured in a way that violates the telecommunication regulations/laws of that country.

In addition, your modem may not function properly if the correct country selection is not made. Only select the country in which you are located.

Country/region setting of the modem will remain the same as it was before if an un-homologated country/region is selected. In addition the modem function itself will not be blocked by this program.

To enable this feature the following line is needed in the INF file(s) for each operating system.

[PortMod.AddReg]

HKLM,SOFTWARE\Microsoft\Windows\CurrentVersion\Run,LTSMMSG,,LTSMMSG.exe

(*Launch LTSMMSG.exe upon Windows boot-up.*)

Over Current Protection (OCP) Messaging

When the user is on the road or even at home and accidentally plugs modem into RJ-11 jack that is a digital PBX line, the modem will not go off hook to protect the modem hardware to be damaged by high voltage/current line condition. Upon off hook event, the following warning message will show up.

"The modem is plugged into a digital PBX line and will not work."

The modem hardware has to equip the over current protection circuit to support this feature.

To enable this feature the following line is needed in the INF file(s) for each operating system.

[PortMod.AddReg]

HKLM,SOFTWARE\Microsoft\Windows\CurrentVersion\Run,LTSMMSG,,LTSMMSG.exe

(*Launch LTSMMSG.exe upon Windows boot-up.*)

System Audio Support

LTSMMSG.exe also serves as a Windows user mode ring-3 application which samples audio data stream generated by the driver and transfers the data onto the system audio device. This will allow the system to support call progress tone monitor function without using PWM (Pulse Width Modulation) speaker function that is previously supported. This new feature eliminates the external components (circuit) required for PWM speaker support and will help reducing the BOM (Bill of Material) and the size of the modem hardware.

To enable this feature the following line is needed in the INF file(s) for each operating system. (Example of system audio support in Intel Solano2 system)

[Lucent_Modems]

%INTEL_AMR.Modem% = INTEL_AMR_SA.Modem,
PCI\VEN_8086&DEV_2446&SUBSYS_12345678

(INTEL_AMR_SA.Modem *entry enables system audio support in Intel system*.)

[ControlFlags]

ExcludeFromSelect = PCI\VEN_8086&DEV_2446&SUBSYS_12345678

(*Match the ID string with above [Lucent_Modems] ID entry*.)

[PortMod.AddReg]

HKLM,SOFTWARE\Microsoft\Windows\CurrentVersion\Run,LTSMMSG,,LTSMMSG.exe

HKLM,SOFTWARE\Lucent\SoftModem,CallProgressPlayThreshold,1,a0,1f,00,00

(*Launch LTSMMSG.exe upon Windows boot-up and specify the audio sample playback latency*.)

If the PC OEM requires just the system audio support, the following line will disable user messaging functions in the INF file(s) for each operating system.

[PortMod.AddReg]

HKLM,SOFTWARE\Lucent\SoftModem,SoftModemMsgDisable,1,FF,FF,FF,FF

This system audio support is officially implemented from version 3.1.90 release and onward.

Quality

Product design requirements

- This product will meet the validation requirements as documented in the Intel qualification methodology specification, 25-GS-3000.

Environmental requirements

- This product will meet the environmental and reliability test profiles for boards and systems per the Intel environmental standards handbook (specification 662394-04)

Statistical tool

- Specification 25-GS-3010 will be used to determine various build quantities to ensure qualification and product health post-launch.

Product manufacturing requirements

- This product will meet the validation requirements as documented in the Intel qualification methodology specification, 25-GS-3000.
- Product cosmetics must meet Intel's workmanship standards. Document number 61957.

Product qualification

- This product will meet and / or exceed the requirements as outlined in the Intel product qualification methodology specification, 25-GS-3000

Post-launch product health through end of life

- The number of defects found will not exceed 1500 DPM as measured by out-going quality monitor (OQM)

Federal Communication Commission Interference Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

FCC Caution: To assure continued compliance, (example - use only shielded interface cables when connecting to computer or peripheral devices) any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Statement Needed to be Shown on End Product

Since this module is installed inside the end product, the end product should be affixed a label on visible area showing that this product contain a RF module, and also its FCC ID.

IMPORTANT NOTE:
FCC Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

This device is intended only for OEM integrators under the following conditions:

1) The antenna must be installed such that 20 cm is maintained between the antenna and users, and
2) The transmitter module may not be co-located with any other transmitter or antenna.

As long as the 2 conditions above are met, further <u>transmitter</u> testing will not be required.   However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed (for example, digital device emissions, PC peripheral requirements, etc.).

IMPORTANT NOTE: In the event that these conditions <u>can not be met</u> (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID <u>can not</u> be used on the final product.   In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and Obtaining a separate FCC authorization.

End Product Labelling

This transmitter module is authorized only for use in devices where the antenna may be installed such that 20 cm may be maintained between the antenna and users (for example access points, routers, wireless ASDL modems, and similar equipment).   The final end product must be labeled in a visible area with the following: " Contains TX FCC ID: HFSM3AWEB ".

Manual Information That Must be Included

The users manual for end users must include the following information in a prominent location "
IMPORTANT NOTE: To comply with FCC RF exposure compliance requirements, the antenna used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter."

Statement for Warning & Configuration

1. This device is only for OEM integrator.

2. The use of this device is limited to notebook.

3. Antenna should be the antenna used in FCC's authorization for ID: HFSM3AWEB and it should be the integral part of the notebook with the installation configuration shown in the following diagram.

Allowed Antenna Locations