

USER GUIDE: PL-60780

Revision 2.1

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consultants@win-ent.com

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1 PL-60780 Overview

This document provides an overview of the PL-60780 (CAP) platform. PL-60780 is a Market Enablement Vehicle, based on Intel's ECG Luna Pier (2nd Generation Atom processor). PL-60780 is a PoC, "Reference Platform," intended to decrease the time to market for Original Equipment Manufacturers (OEMs), Telecom Equipment Manufacturers (TEMS), and System Integrators. The end user target is the small business market segment, with emphasis on hosted, CPE resident and hybrid (host and CPE resident) VoIP and security services. PL-60780 is a single board, box level reference design that will support multiple market segment targets such as:

- o IP PBX
- o Multi Service Business Gateway
- o Hosted VoIP Access
- o Hosted/managed PBX (CPE)
- o Security Appliances
- o Premises Services Gateway (PSG) for the Connected Digital Home, where the PSG becomes the residential broadband home hub.

The contents of the PL-60780 carton are:

1. PL-60780 assembled
2. An external power supply.
3. A VGA video cable.
4. A documentation CD.

Height 1 – 3/4 inches
Width 11 – 1/2 inches
Depth 9 – 1/4 inches
Weight 6 – 1/4 lbs.

2 Quick Start Guide

When powered up fresh “Out of the box,” PL-60780 is a functional small business PBX. This PBX functionality is provided by the open source Asterisk software. PL-60780 with Asterisk has been configured to provide the following:

1. DHCP enabled WAN port.
2. Configured with IP address of 192.168.3.1 as server over the 10 LAN ports.
3. 10 VoIP phone instances (extensions).
4. 2 FXS POTs analog phone instances.
5. WAN trunk demo. This demo places a trunk call to a server at Digium to exercise the WAN interface using an internet connection.
6. Voicemail for all 12 extensions.
7. CallerID on all 12 extensions.
8. Paging via the audio out jack on the back of the chassis.
9. Music on Hold analog audio input capable.
10. Asterisk console available via serial or SSH login.

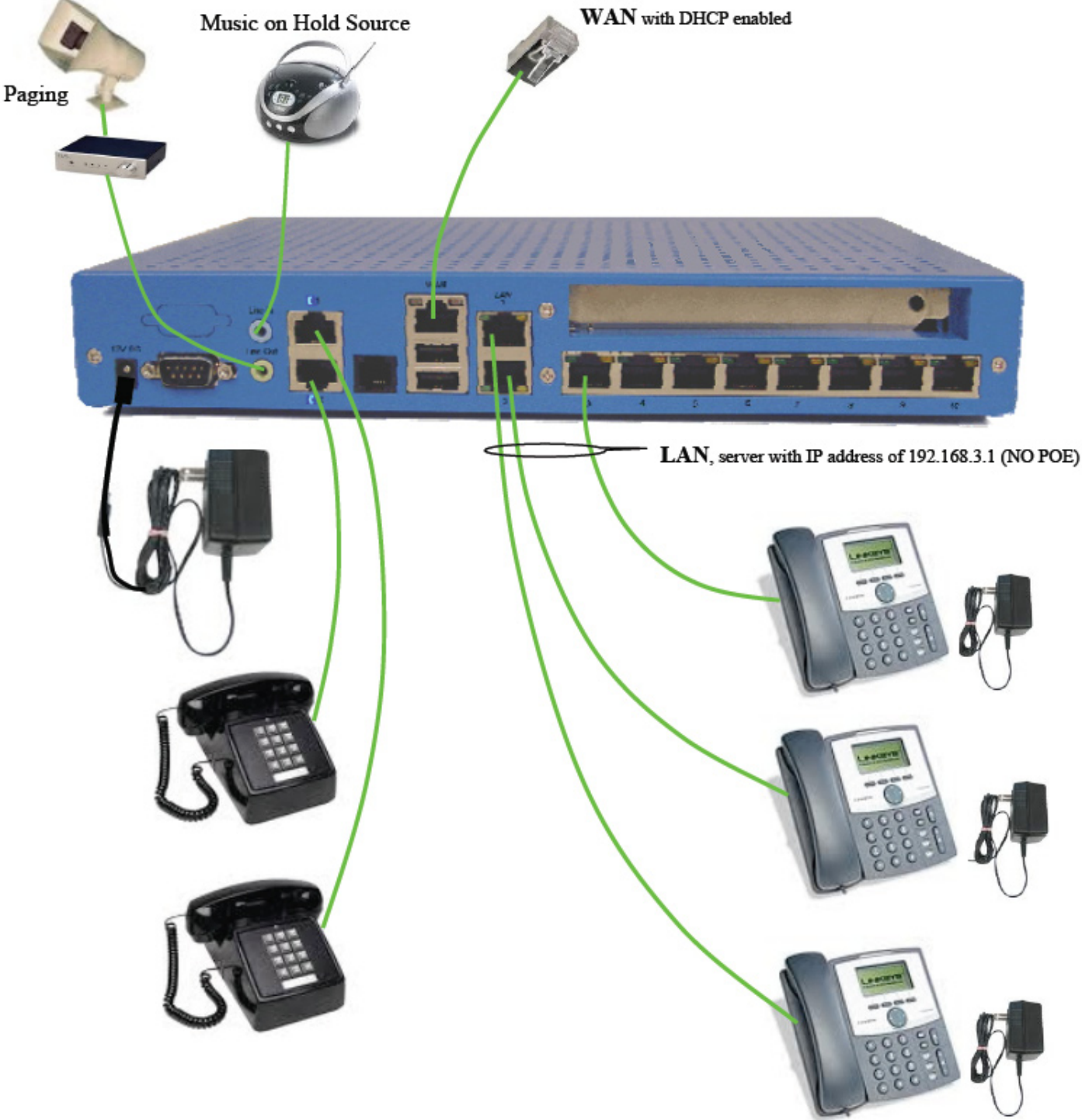
The dialplan for PL-60780 is as follows:

Extension #	Type	Voicemail Box #	Voicemail Password	
100	VoIP	100	100	
101	VoIP	101	101	
102	VoIP	102	102	
103	VoIP	103	103	
104	VoIP	104	104	
105	VoIP	105	105	
106	VoIP	106	106	
107	VoIP	107	107	
108	VoIP	108	108	
109	VoIP	109	109	
121	FXS	121	121	
122	FXS	122	122	
411	When dialed replies back with the currently assigned WAN IP address of the box.			
500	When dialed contacts the Digium company PBX (as a demo) out over the WAN connection.			
600	When dialed echoes back what ever is said.			
900	When dialed activates paging over the audio jack on rear of unit.			
999	Contacts voicemail service running in PL-60780			

To operate the unit, do the following:

1. Attach all desired phones to the appropriate jacks on the back of the unit.
2. Attach a WAN connection to the WAN jack on the back of the unit.
3. Attach the external power supply, this will power up the unit.
4. Wait a good 2 minutes for the unit to boot Linux and Asterisk.
5. DO NOT place PL-60780 where any of the ventilation holes are impeded.
6. Place calls and enjoy.

Sample wiring for PL-60780: Music on Hold



3 PL-60780 Software

PL-60780 is composed of three software/firmware elements:

1. BIOS
2. Fedora 11 Linux
3. Asterisk

The BIOS is installed as firmware in Flash memory on the PL-60780 circuit board. Fedora and Asterisk are installed on the hard disk drive.

3.1 BIOS/Boot

The AMI 08.00.15 BIOS provides basic hardware services and the foundation for booting the unit. It comes preconfigured to boot from the hard disk drive. Alternate boot devices supported are:

1. On board Compact Flash.
2. USB Flash stick or drive.

The BIOS user interface is accessed via either the serial port on the back of the unit or via an attached USB keyboard/mouse and VGA screen. BIOS is not accessible via a LAN connected SSH "terminal" since that level of network functionality is not available at boot time.

BIOS is accessed via the ' Del ' key during the boot sequence. If you are using a serial connected terminal (like PuTTY) the function keys (F1-F12) will not be available. However the operator screen can be navigated quite well using the arrow keys and the ' Enter ' key.

3.2 Fedora 11

The loaded operating system is Fedora 11 Linux. It will take at least 2 minutes to boot into this operating system. Once booted, Fedora will operate Delray Beach with no required operator input. If operator interaction is desired, this is provided via a command line mode from a "terminal" attached to either the serial port on the back, a SSH telnet connection over the WAN port (like the PuTTY client), or an attached USB keyboard/mouse and VGA screen.

Fedora will boot with no user logged in. To access the user mode use the following login:

Login: root

Password: delray

CAUTION: Fedora is an open source operating system. However PL-60780 hardware has required the operating system to be patched. Therefore if the PL-60780 system load is upgraded or reloaded this patch may become lost. The patch only affects the FXS analog phone functionality.

3.2.1 Available Data Devices

There are three mountable data device types on PL-60780 These are:

1. One SATA disk drive.
2. One onboard Compact Flash module.
3. One or more USB drives.

"Out of the box" one SATA 160GB disk drive is mounted. The assignment of /dev/xxx device names given to the available PL-60780 media may vary, therefore it is suggested that before mounting any new devices the 'fdisk -l' command be used to identify the currently assigned device names.

3.2.2 Sound Devices

The ALSA sound drivers have been used in this system build. The utility 'alsamixer' can be used to control the volume settings of the HD audio ports.

3.2.3 Ethernet Devices

There are three Ethernet ports on PL-60780. These are:

1. /dev/eth0 - The WAN port.
2. /dev/eth1 - An AUX port on the daughter card AUX connector.
3. /dev/eth2 - 10 LAN ports via an onboard Ethernet switch.

Only eth0 and eth2 are enabled "out of the box". The 'ifconfig' command will list the currently running Ethernet configurations.

3.3 Asterisk version 1.6.11

As stated in the dailplan in the Quick Start section above, Asterisk is configured for 10 Voip phones, 2 FXS phones, and a WAN connection to the World Wide Web. This is a standard "vanilla" open source Asterisk configuration. The following configuration files were tailored for this PL-60780 software image:

1. /etc/asterisk/extensions.conf
2. /etc/asterisk/sip.conf
3. /etc/asterisk/voicemail.conf
4. /etc/asterisk/xway.conf

The /etc/asterisk/xway.conf file and its associated /usr/lib/asterisk/modules/chan_xway.so file are required to have the two FXS analog phone ports active.

4 PL-60780 Hardware

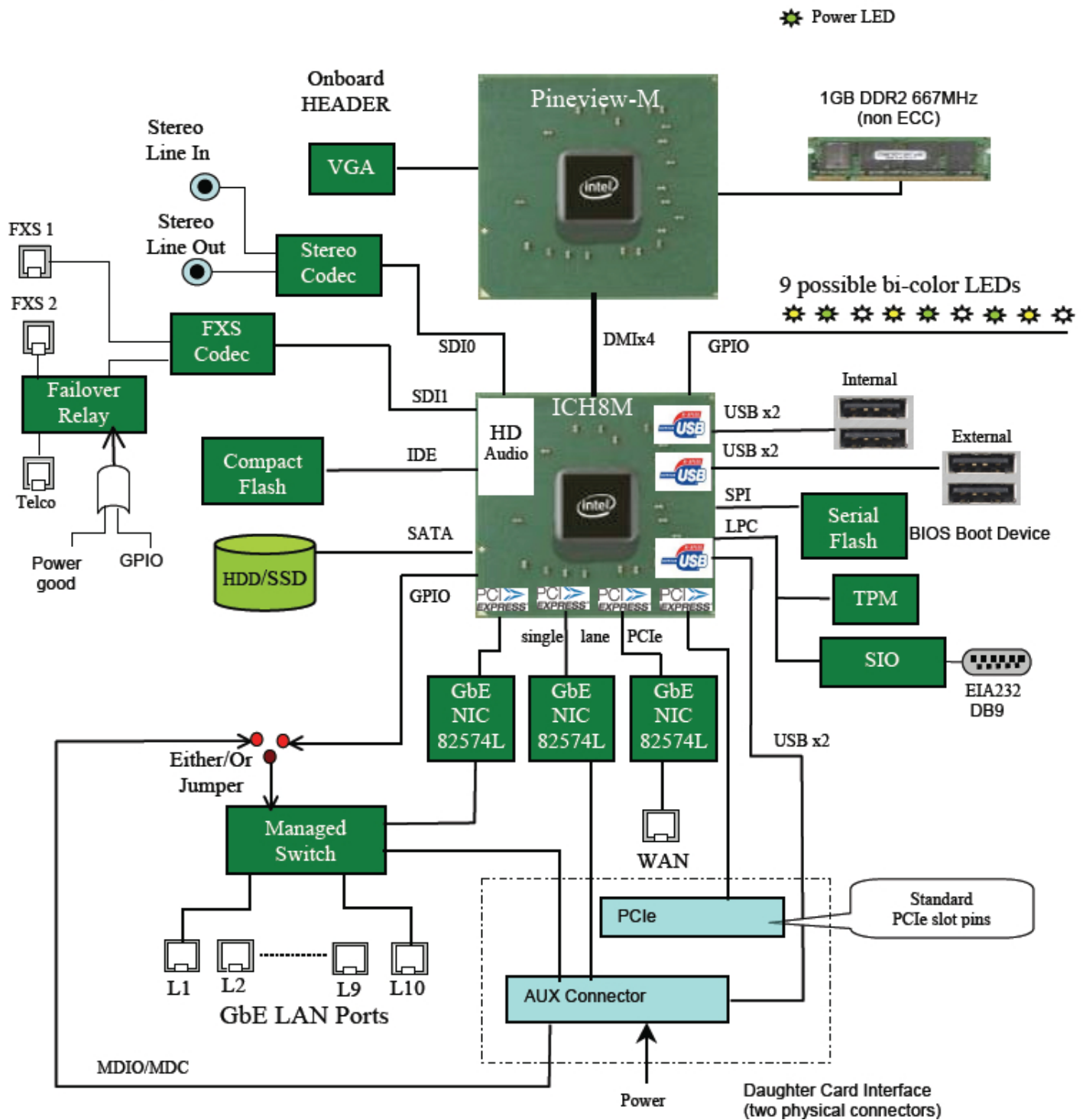
4.1 Hardware Features

Feature	Detailed Description	Notes
Processor	Pineview-M Atom™ 1.6GHz single core + ICH8M	Fan-less design.
IA Memory	1024 MB DDR 2-667 Mhz	standard DDR2 DIMMS (1 channel)
IA Thermal solution	Fan-less design. Main board provides 15W of heat dissipation and the daughter board can require up to 10W of heat dissipation, for at max total of 25W chassis heat dissipation capability.	With the chassis top off the Atom processor runs at the room ambient temperature. With the top cover on the running temp will increase.
Boot Flash	SPI serial boot flash	Contains BIOS
Program Flash	Compact Flash socket	IDE connected Compact Flash socket provided, accessed with covers off.
SATA	Supports laptop style SATA drive or Solid State Disk.	
Ethernet Switch	12 port Gbit managed switch, controlled via GPIO lines that are jumper configurable to be driven from either the ICH8 or from the daughter board.	
10 GbE ports	These are RJ-45 connectors and associated magnetics needed to provide the external WAN and LAN connections.	
PCIe Port (1 x4)	Used for connecting Atom processor to the Ethernet switch.	This port is internal to chassis.
PCIe Port (1 x4)	Used for connecting Atom processor to the daughter board via Ethernet.	This port is internal to chassis.
PCIe Port (1 x4)	Used for the WAN connection to the world.	This port is on the rear bulkhead.
PCIe Port (1 x4)	Accommodates a single 2/3 length full height PCIe daughter card.	
2 External USB	2 USB connectors on rear bulkhead.	
2 Internal USB	Used for "factory" shipped security keys, etc.	
2 Aux USB	Used to connect to daughter board.	
HD Audio	Two HD Audio codecs are to be on the main board. One stereo- out/stereo-in audio codec, and 1 dual FXS codec.	3.0mm external stereo audio jack 600ohm, 1Vpp
FXS Ports	2 HD Audio SLIC driven FXS codec ports. Note: Current version of PL-60780 does not support FX0.	A single Infineon PEB 3200 HDA-2 codec for connecting analog POTS

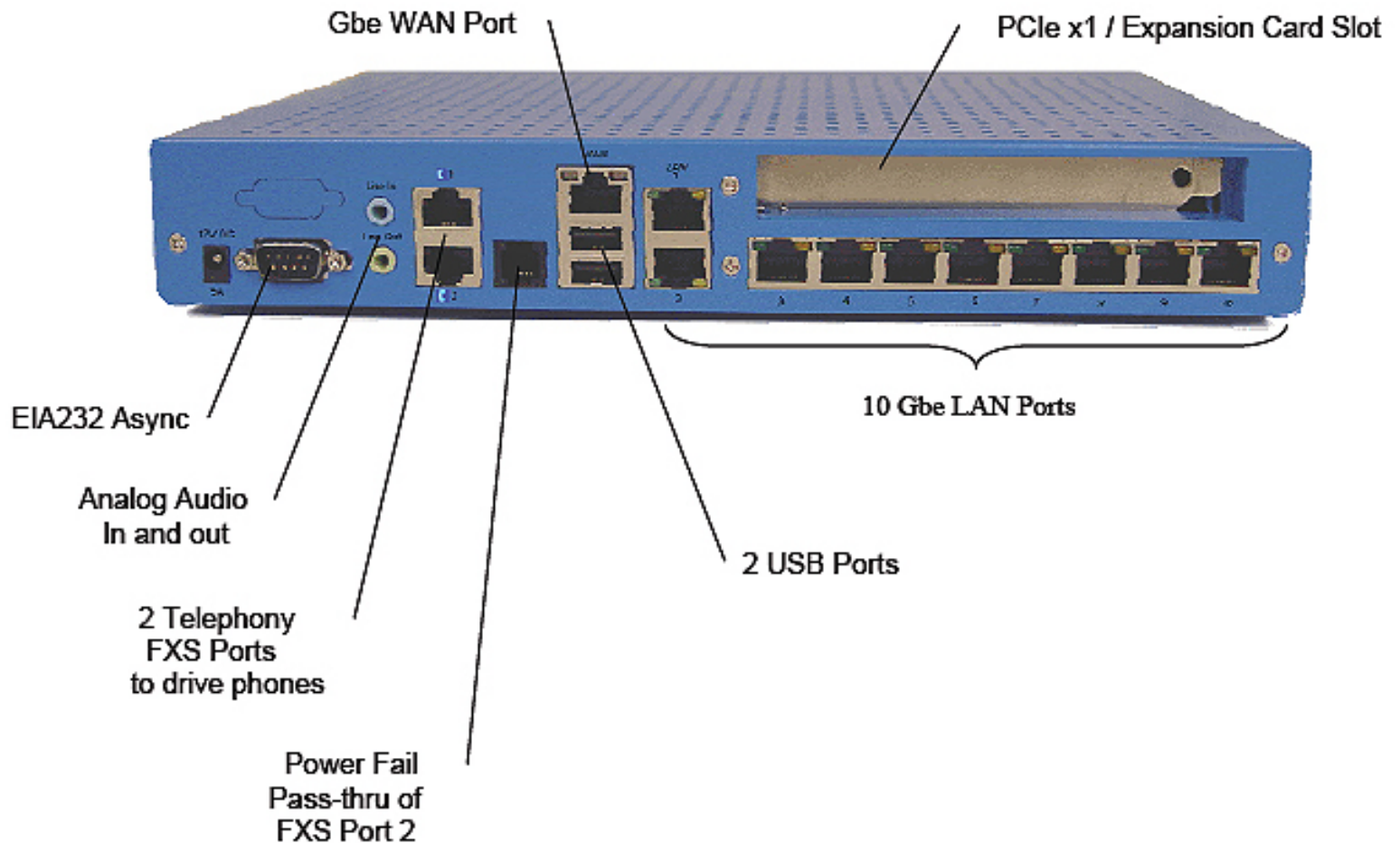
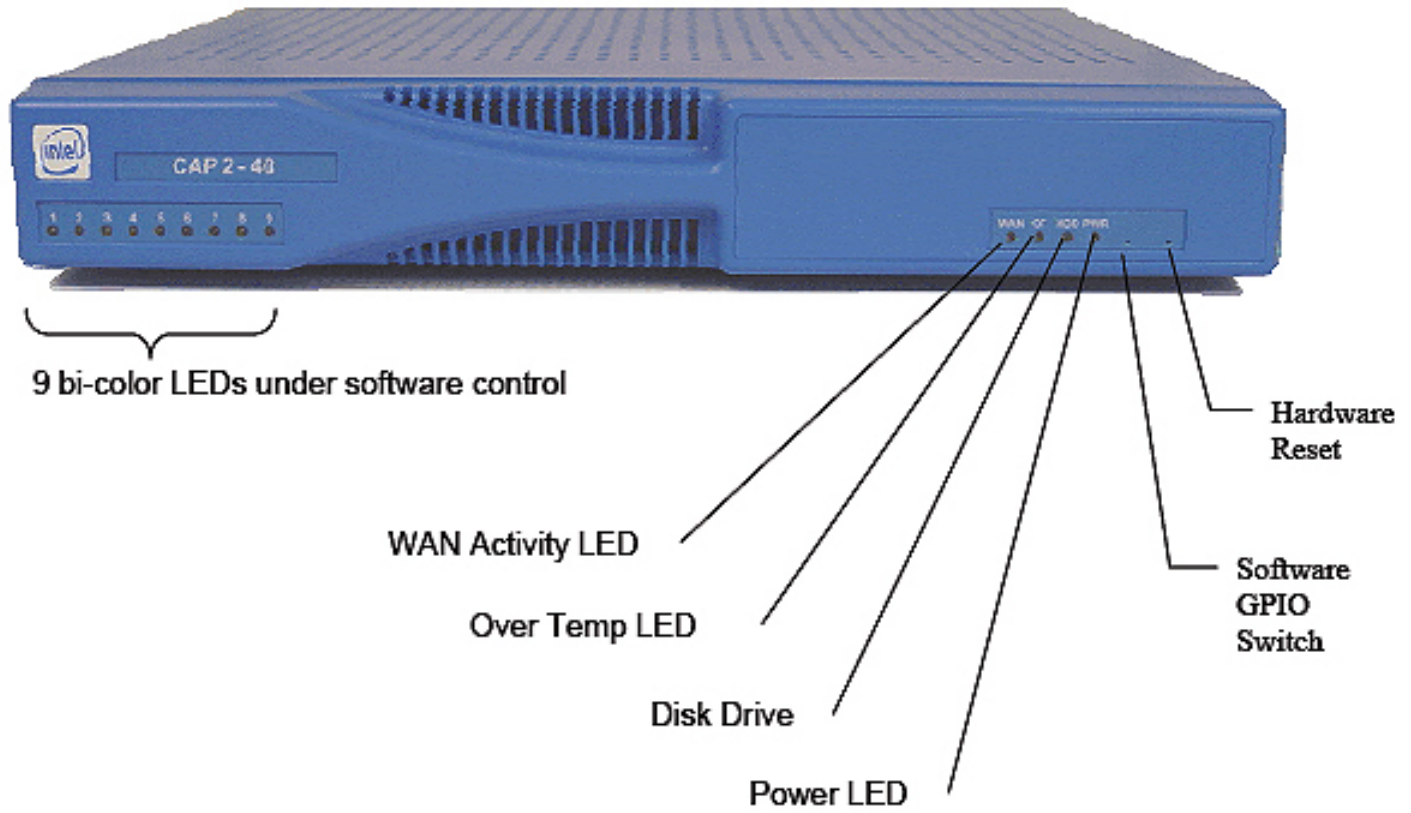
4.1 Hardware Features Continued

Feature	Detailed Description	Notes
		phones and analog G3 Fax terminals
Failover Relay	Relay that when there is no power in the box OR via a GPIO pin; the Tip and Ring of the Telco jack and 2nd FXS port are metalically connected.	FCC Part 68 restrictions concerning Telco Tip and Ring signal trace spacing must be followed.
System Power Supply	12V, 65W external brick power supply.	Off the Shelf supply
Thermal sensor	Sensor in Atom processor.	BIOS
Power good	Power Good senses all power planes on system board.	Lights internal LED on system board.
LED's	Power (Green), on the front panel. System Status (Green), on the front panel. 9 bi-color LEDs, GPIO driven, on the front panel. Ethernet Activity/status LEDs at the RJ45 connectors for each WAN and LAN port, green for link, yellow for activity.	
LPC Header	LPC Header for addition of TPM.	
Reset Button	Push button on system board.	Paperclip access.
Factory Defaults Button	Push button on system board.	Paperclip access.
RTC Battery	3V lithium coin cell.	
Certifications	Design is certifiable for FCC Part 15 (Class B), FCC Part 68, VCCI Class B, UL, CE Mark, C-Tick.	ODM shall test but not certify.

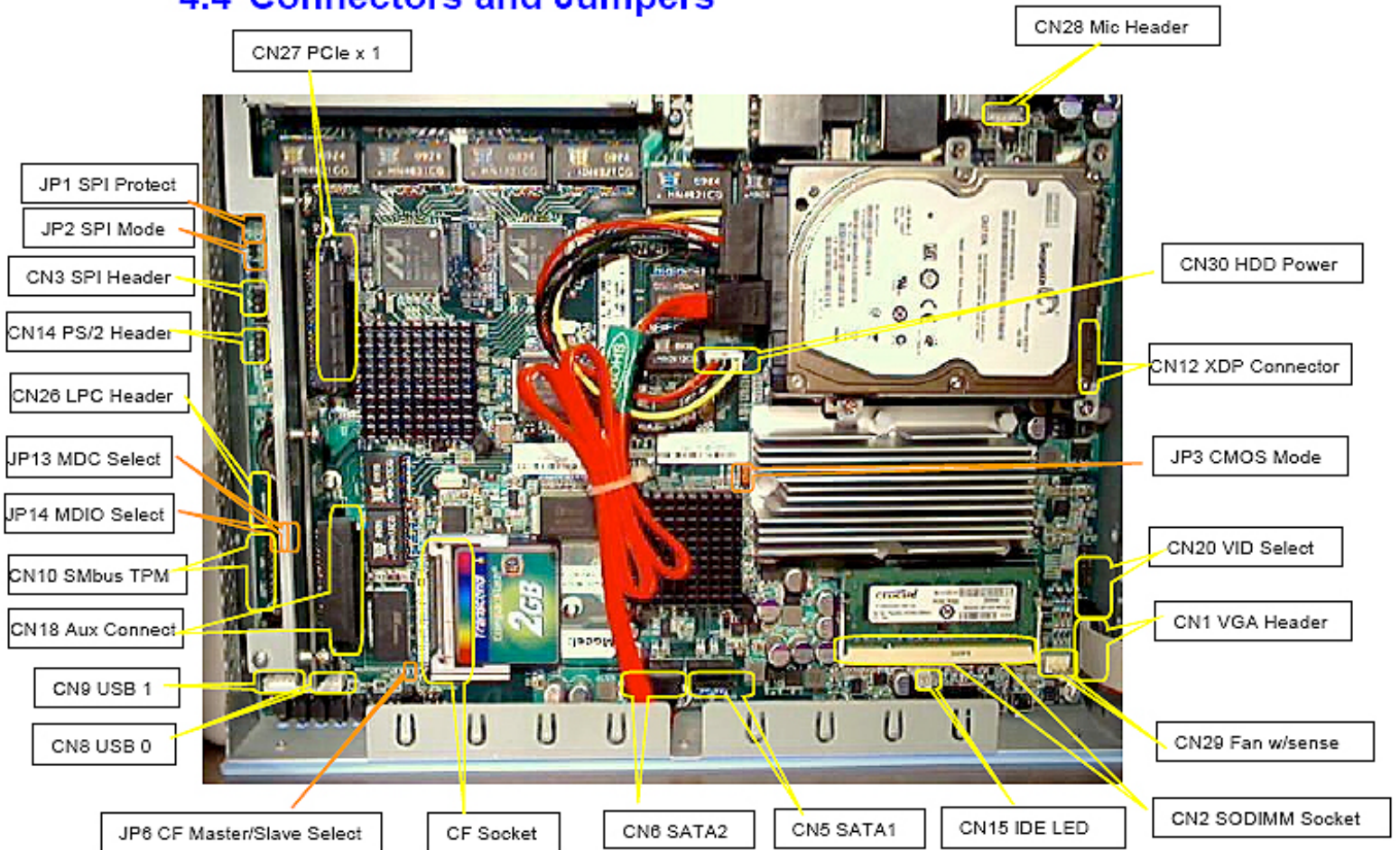
4.2 Block Diagram PL-60780



4.3 Front and Back Panels



4.4 Connectors and Jumpers



4.4.1 CN1 VGA Header

Pin	Signal
1	Red
2	Green
3	Blue
4	+5V
5	GND
6	GND
7	GND
8	GND
9	+5V
10	GND
11	+5V
12	DCC SMB DAT
13	HSY
14	VSYS
15	DCC SMB CLK
16	no connect

4.4.2 CN3 SPI Programmer Header

Pin	Signal
1	+3.3V
2	GND
3	SPI CS0
4	SPI CLK
5	SPI MISO
6	SPI MOSI
7	no connect
8	Flash IO

4.4.3 CN5 SATA 1 Connector

Pin	Signal
1	GND
2	A+
3	A-
4	GND
5	B-
6	B+
7	GND

4.4.4 CN6 SATA 2 Connector

Pin	Signal
1	GND
2	A+
3	A-
4	GND
5	B-
6	B+
7	GND

4.4.5 CN8 USB 0 Connector

Pin	Signal
1	Power
2	USB PN 0
3	USB PP 0
4	GND
5	GND

4.4.6 CN9 USB 1 Connector

Pin	Signal
1	Power
2	USB PN 0
3	USB PP 0
4	GND
5	GND

4.4.7 CN10 SMBus and TPM Header

Pin	Signal
1	33M TPM CLK
2	GND
3	LFRAME
4	no connect
5	PLTRST BUF2
6	+5V
7	LAD3
8	LAD2
9	+3.3V
10	LAD1
11	LAD0
12	GND
13	SMB CLK
14	SMB DAT
15	+3.3V
16	SER IRQ
17	GND
18	TPM CLKRUN
19	TPM LPCPD
20	LDRQ0

4.4.8 CN12 Intel XDP Connector

This is the 60 pin Intel eXtended Debug Port connector.

4.4.9 CN14 PS2 Header

Pin	Signal
1	KCLK
2	MCLK
3	KDAT
4	MDAT
5	no connect
6	no connect
7	PS2 GND
8	GND
9	+5V
10	+5V

4.4.10 CN20 Voltage Identification (VID) Select

Pin	Signal
1	VID8
2	GND
3	VID5
4	GND
5	VID4
6	GND
7	VID3
8	GND
9	VID2
10	GND
11	VID1
12	GND
13	VID0
14	GND

4.4.11 CN26 LPC Port 80 Header

Pin	Signal
1	+3.3V
2	LAD0
3	LAD1
4	LAD2
5	LAD3
6	LFRAME
7	PLTRST BUF2
8	+5V
9	LPC Port 80 Clk
10	no connect
11	GND
12	GND

4.4.12 CN27 PCIe x4 Connector (PCIe x1 support only)

Pin	Signal	Pin	Signal
A1	PRSNT 1#	B1	+12
A2	+12	B2	+12
A3	+12	B3	+12
A4	GND	B4	GND
A5	no connect	B5	SMCLK
A6	no connect	B6	SMDAT
A7	no connect	B7	GND
A8	no connect	B8	+3.3V
A9	+3.3V	B9	no connect
A10	+3.3V	B10	3.3V aux
A11	RST#	B11	WAKE#
A12	GND	B12	no connect
A13	CLK+	B13	GND
A14	CLK-	B14	TP0
A15	GND	B15	TND
A16	RP0	B16	GND
A17	RN0	B17	no connect
A18	GND	B18	GND
A19	no connect	B19	no connect
A20	GND	B20	no connect
A21	no connect	B21	GND
A22	no connect	B22	GND
A23	GND	B23	no connect
A24	GND	B24	no connect
A25	no connect	B25	GND
A26	no connect	B26	GND
A27	GND	B27	no connect
A28	GND	B28	no connect
A29	no connect	B29	GND
A30	no connect	B30	no connect
A31	GND	B31	no connect
A32	no connect	B32	GND

4.4.13 CN28 Mic Header

Pin	Signal
1	Audio GND
2	Audio GND
3	MIC1 R
4	MIC1 L
5	Audio GND

4.4.14 CN29 Fan Header

Pin	Signal
1	+3.3V
2	HDD LED

4.4.15 CN30 HDD Power Connector

Pin	Signal
1	+12
2	GND
3	GND
4	+5V

4.4.16 JP1 SPI Flash Write Protect Jumper

Pins	Signal
1-2	Open to allow write (factory default)
1-2	Jumpered for write protect

4.4.17 JP2 SPI Flash Program Jumper

Pins	Signal
1-2	ICH8 to SPI (factory default)
2-3	PROG to SPI

4.4.18 JP3 CMOS Mode Jumper

Pins	Signal
1-2	Normal (factory default)
2-3	Clear CMOS

4.4.19 JP6 Compact Flash Master/Slave Select Jumper

Pins	Signal
1-2	Jumpered for Master
1-2	Open for Slave (factory default)

4.4.20 JP13 and JP14 Select for Ethernet Switch Control

Pins	Signal
1-2	ICH8 to Control Switch (default)
2-3	Aux Daughter Board to Control Switch

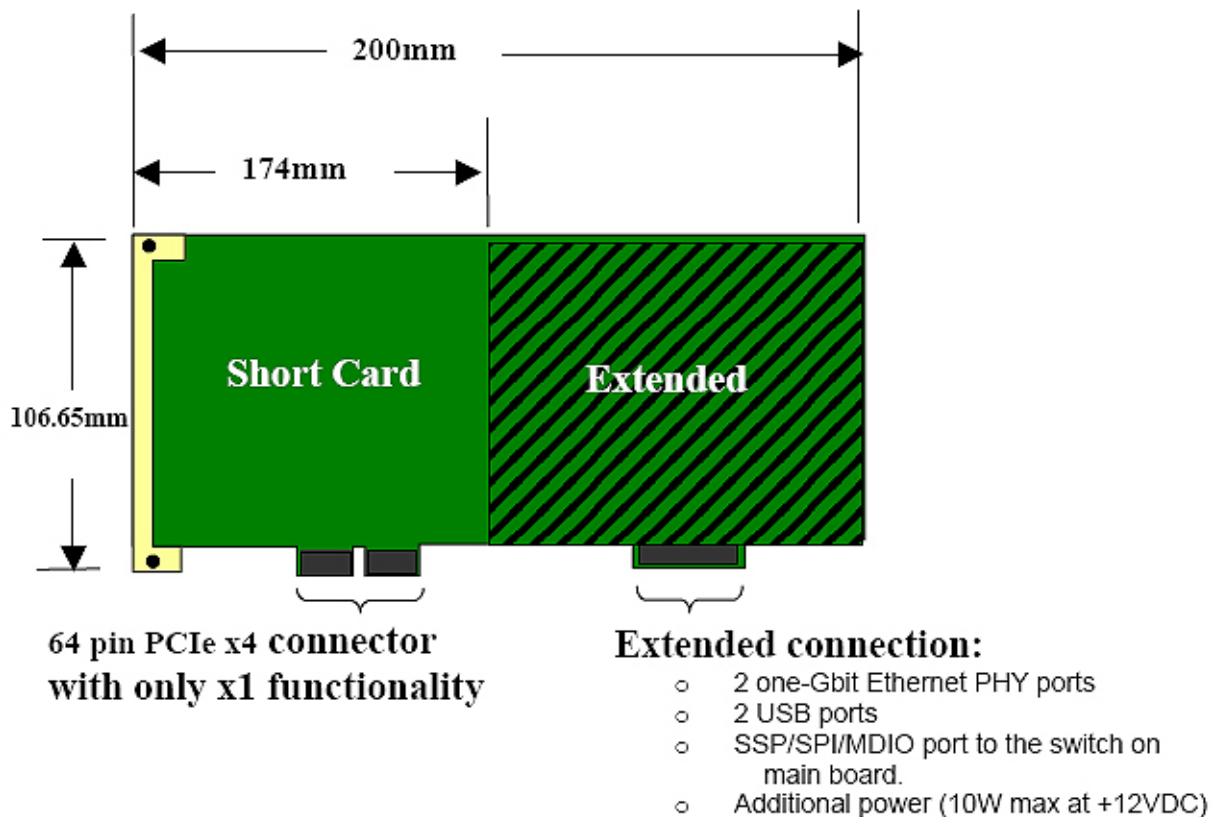
5 Aux Daughter Card

PL-60780 is designed to support one standard PCIe x1 daughter card, or a custom daughter card of similar physical characteristics. There are two connectors a daughter card can plug into. One is physically a x4 PCIe connector (with only x1 functionality) and the second is a PL-60780 specific AUX connector. A daughter card can use either or both of these connectors.

Both connectors are physically the same (different pin assignments) but the AUX connector is flipped 180 degrees to discourage any mismatch errors when installing the card.

A power and cooling budget of 10 Watts is available for the daughter card.

The following figure is the high-level definition for the daughter board:



5.1 AUX Connector

The AUX connector has an assortment of I/O ports available for a wide variety of embedded communication applications. The ports available are:

1. Two USB ports that are available for connecting various radio modules like DECT, Zigbee, etc.
2. A GbE port connected directly to the ICH8 and IA processor which can be used for a vendor preferred WAN connection.
3. A GbE port off of the LAN managed switch which can be used for vendor preferred IP traffic not needing to traverse the IA processor.
4. An SPI/MDIO control port which can be jumpered to the LAN managed switch on the main board. This allows for controlling the LAN switch from an auxiliary processor located on the daughter card itself.
5. Power pins so a custom daughter card will not have to depend on the PCIe connector for power.

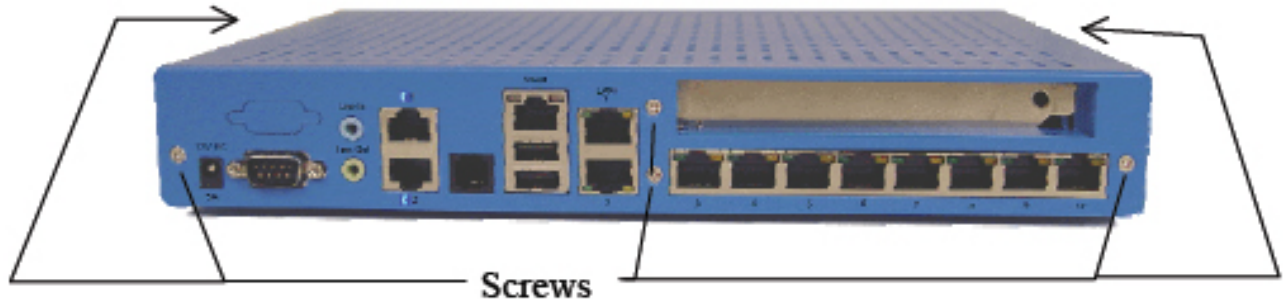
Following are the pin assignments on the AUX connector.

Pin	Signal	Pin	Signal
A1	GND	B1	+12
A2	+12	B2	+12
A3	+12	B3	+12
A4	GND	B4	GND
A5	USB PP5	B5	USB PP4
A6	USB PN5	B6	USB PN4
A7	+5V	B7	GND
A8	+3.3V	B8	+3.3V
A9	+3.3V	B9	+5V
A10	+3.3V	B10	V3P3 STBY
A11	MDC CPU	B11	MDIO CPU
A12	GND	B12	LAN2 MDI P0
A13	LAN2 MDI P3	B13	LAN2 MDI N0
A14	LAN2 MDI N3	B14	GND
A15	GND	B15	LAN2 MDI P1
A16	LAN2 MDI P2	B16	LAN2 MDI N1
A17	LAN2 MDI N2	B17	GND
A18	GND	B18	GND
A19	LAN2 Activity	B19	PHY3 P0 LED0
A20	GND	B20	PHY3 P0 LED2
A21	LAN2 Link100	B21	GND
A22	LAN2 Link1000	B22	GND
A23	GND	B23	PHY MDI N3
A24	GND	B24	PHY MDI P3
A25	PHY MDI N1	B25	GND
A26	PHY MDI P1	B26	PHY MDI N2
A27	GND	B27	PHY MDI P2
A28	PHY MDI N0	B28	GND
A29	PHY MDI P0	B29	GND
A30	GND	B30	GND
A31	GND	B31	GND
A32	Activity	B32	GND

5.2 AUX Card Installation

Following is the procedure to install a daughter card

1. Take off the top cover. All necessary fasteners are on the back and side of the unit. There are four screws on the back on one on each side to remove.



After removal of the fasteners the top cover slides back.

2. Remove the daughter card retainer. There is one screw to do this.

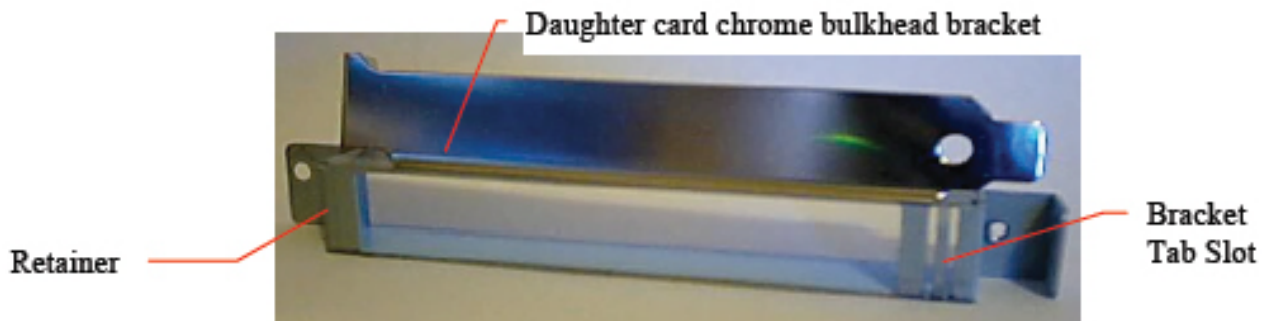
Hidden Bulkhead Assembly Screw



Screw

This retainer supports the chrome bulkhead bracket of standard PCIe cards. With the retainer removed from the chassis the hidden bulkhead assembly screw becomes visible. Remove the blank bulkhead bracket.

3. Outside the chassis, install the bulkhead bracket attached to the daughter card to the retainer with the hidden screw.



4. Seat the daughter card into the PCIe and/or the AUX connectors and reinstall the screw that holds the retainer to the chassis. Replace the top cover.

6 System Restore/Upgrade

If for any reason the PL-60780 system image on the hard disk needs to be upgraded or restored an alternate boot load has been provided on the Compact Flash module. This boot load will allow for the downloading over the WAN port of a complete disk partition image from an Intel server. The Compact Flash boot load image and the PL-60780 runtime demo image files can be found on an Intel server at:

<http://edc.intel.com/Go/3601>
<http://edc.intel.com/Go/3600>

This is the demo image.
This is the CF image.

This process will require a connected USB keyboard/mouse and VGA display. It will not work with a serial port connected terminal. The keyboard/mouse and VGA display need to be connected before the unit is powered on for BIOS to detect them.

CAUTION: This process will completely overwrite the entire hard disk.

1. Reboot the unit.
2. Hit the ' Del ' key during the early boot sequence.
3. With the ' → ' key scroll over from the "Main" toolbar selection to the "Boot" selection.
4. With the ' ↓ ' key scroll down to the "Hard Disk Drives" selection.
5. Hit the ' Enter ' key. This displays the "Hard Disk Drives" screen.
6. Use the ' + ' key until " [HDD:3S-PIO] " is at the top of the drives list. This makes the Compact Flash the primary boot device.
7. Hit the ' Esc ' key.
8. With the ' → ' key scroll over to the "Exit" toolbar selection.
9. Hit the ' Enter " key.
10. Hit the ' Enter " key again which will reboot the unit.
11. Wait for the Gentoo Linux boot to complete.
12. You will be automatically logged on as "root".
13. Enter the following sequence to mount remote access to the Delray Beach software image:
 - i. `mkdir /mnt/foo`
 - ii. `mount -t cifs //edc.intel.com/Go/3601 /mnt/foo`

where edc.intel.com is the Web address of an Intel server.

OR

FTP the <http://edc.intel.com/Go/3601> file to a USB "stick" and then mount the USB device as /mnt/foo.

14. Enter ' fdisk -l ' to list the available data devices. Note the /dev/xxx1 name of the 160.0 GB drive.
15. Enter ' partimage ' followed by the ' Enter ' key. This will display the partimage utility which will be used to reload the PL-60780 software image to the hard drive.
16. Scroll down using the ' ↓ ' key until the hard drive row is highlighted. (i.e. sda1)
17. Hit the ' Tab ' key to activate the "Image file to create/use" box.
18. Enter ' /mnt/foo/backup-of-delray.pimg.gz.000 '
19. Hit ' Tab ' key twice to highlight the "Restore partition from an image file" selection.

20. Hit the ' **Space** ' key to select the restore choice.
21. Hit the ' F5 ' key to display the next partimage screen and start the transfer.
22. Wait for the transfer of the image to the hard disk to complete.
23. Enter the following sequence to mount /dev and /proc to /mnt/foo:
 - i. `mount -o bind /dev /mnt/foo/dev`
 - ii. `mount -t proc none /mnt/foo/proc`
24. Enter the following sequence to chroot into the foo environment:
`chroot /mnt/foo /bin/bash`
25. Enter the following sequence to install grub into foo:
 - i. `grub`
 - ii. `grub> root (hd2,0)` *[there is a space between root and (hd2.]*
 - iii. `grub> setup (hd2)`
 - iv. `grub> quit`
26. Enter ' **exit** ' to exit chroot back to the original root environment.
27. Enter the following sequence to un-mount used directories:
 - i. `umount /mnt/foo/dev`
 - ii. `umount /mnt/foo/proc`
 - iii. `umount /mnt/foo`
28. Reboot the unit and use the ' **Del** ' key to enter the BIOS setup and change the boot device back to the hard disk.

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consultants@win-ent.com