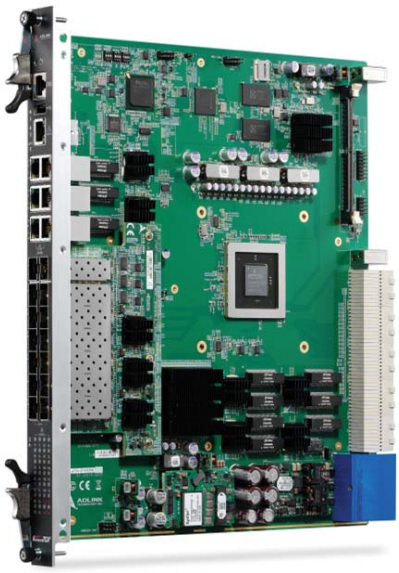
ADLINK TECHNOLOGY INC.

aTCA-3710

40GbE AdvancedTCA Fabric Interface Switch

User's Manual



Manual Revision:	1.01
Revision Date:	March 18, 2015
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Revision History

Rev	Date	Description
1.00	01/04/2014	Initial release
1.01	18/03/2015	Add hardware configuration settings

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Preface

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Table of Contents

Revision History ii
Preface iii
List of Tables vi
List of Figures vi
1 Overview 7
1.1 Introduction 7
1.2 Board Overview 10
1.3 Functional Block Diagram 11
1.4 Package Contents 11
2 Features Summary 12
2.1 Switch Board Specification 12
2.2 Placement 16
2.3 Front panel Layout 16
3 External Interfaces 17
3.1 Front Panel 17
3.2 Zone 2 Backplane Interfaces 19
4 Software Component Overview 20
4.1 IPMI Subsystem 20
4.2 LMP Subsystem 21
4.3 Switch Subsystem 21
5 IPMI Subsystem 23
5.1 Platform Management Overview 23
5.2 Serial Over LAN (SOL) 23
5.3 IPMI Sensors 23
5.4 FRU Information 31
5.5 IPMI Commands 34
6 LMP Subsystem 36
6.1 Booting Image Redundancy 36
6.2 LMP SDK/BSP Porting (U-Boot file system) 38
6.3 Device Drivers 38
6.4 LMP State Machines 40
6.5 Boot Sequence 41
6.6 Non-volatile Memory Mapping 42
7 Switch Subsystem 43
7.1 Broadcom SDK 43
7.2 ADLINK Switch Software Overview 44
8 Getting Started 46
8.1 Safety Requirements 46
8.2 Quick Start 46
9 Configuring and Managing the Fabric Switch 57
Appendix I. Advanced Operation 58
Switching I/O between Front Panel and Base Switch 58
Switch UART Serial Port between Front Panel and IPMC 59
Appendix II. Software Setup/Update/Recovery 60

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U-Boot Installation 60
BSP/Embedded Linux/BCM SDK Installation 61
Redundant LMP Firmware & Boot 63
IPMI Firmware Update Procedure 64
Safety 66
Consignes de Sécurité 67
Getting Service 68

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List of Tables

Table 1. Board Overview 10
Table 2. Serial Console Port Pinout 17
Table 3. Serial Console Port Configuration Value 17
Table 4. RJ-45 Management Port Pin-out 18
Table 5. LMP U-boot boot up failover actions 37
Table 6. Summary of Devices and Access 39
Table 7. LMP State Descriptions 40
Table 8. LMP State Transition Descriptions 41
Table 9. Boot Sequence State Descriptions 41
Table 10. Non-volatile Memory Map 42
Table 11. Ground Header Settings (JP3) 48
Table 12. XAUI_SEL Status Settings (JP5) 49
Table 13. JTAGSEL Pin Definition (JP8) 49
Table 14. SPI Flash or SD Card Selection (SW1) 51
Table 15. Faceplate Serial Port Selection (SW2) 51
Table 16. Multi-function Switch (SW3) 52
Table 17. Programmable Devices 52

List of Figures

Figure 1. aTCA-3710 Block Diagram 11
Figure 2. IPMC UART Interface 13
Figure 3. aTCA-3710 Mechanical Layout 16
Figure 4. aTCA-3710 Front Panel Layout 16
Figure 5. aTCA-3710 Software Overview 20
Figure 6. IPMI Function Blocks 21
Figure 7. Broadcom SDK Function Blocks 22
Figure 8. U-Boot Redundancy Flow 37
Figure 9. LMP SDK/BSP Porting 38
Figure 10. LMP State Machine 40
Figure 11. aTCA-3710 Boot Sequence 41
Figure 12. Broadcom SDK Porting 43
Figure 13. Switch Software Blocks 44
Figure 14. Hardware Configuration Switches and Jumpers 47
Figure 15. Ground Header Schematic (JP3) 48
Figure 16. XAUI_SEL Status Header Schematic (JP5) 48
Figure 17. JTAGSEL Mode Header Schematic (JP8) 49
Figure 18. IPMC JTAG Header Schematic (JP9) 50
Figure 19. CPLD JTAG Header Schematic (JP12) 50
Figure 20. Switching I/O between Front Panel and Base Switch 58

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1 Overview

1.1 Introduction

The aTCA-3710 is a high performance, high bandwidth, 40G Fabric switch blade for AdvancedTCA® platforms. This product is ideal for bandwidth intensive telecom applications such as wireless access controller, DPI/security network, IPTV, IP multimedia subsystem, RNC/BSC, broadband access/bearer network, data center, and LTE/4G network applications. The aTCA-3710 provides 40GbE hub-to-node connectivity and integrated switch silicon that supports load balancing, priority queues, packet classification, and flow control to enable strict bandwidth management for implemented applications.

To maximize switch blade cost effectiveness, two models of the aTCA-3710 40G Fabric switch blade are available to meet different ATCA platform bandwidth requirements (aTCA-3710/320G and aTCA-3710/640G). The aTCA-3710 40G Fabric switch incorporates the latest generation of switching technology to provide 40GbE connectivity to node slots in 6 and 14-slot chassis as well as 40GbE I/O. Additionally, the aTCA-3710 also provides front I/O to handle high throughput requirements of telecom applications.

In addition to a Fabric switch, the aTCA-3710 also incorporates a Base switch to provide PICMG 3.0 Gigabit Ethernet backplane connectivity. The Base switch provides up to 13 ports of node slot connectivity to support both 6 and 14-slot chassis in addition to 8 ports of front I/O, with 6 ports supporting 1GbE and 2 ports supporting 10GbE. Other ports are used to provide connectivity to other components on the board such as the Local Management Processor and IPMC, and a redundant switch slot supports connectivity with the redundant base switch and shelf management. A powerful quad-core Local Management Processor (LMP) executes all switch functions, blade setup and hardware platform management functions. Dual Boot Flash Memory and dual OS Flash Memory is provided for redundancy.

The ADLINK aTCA-3710 is equipped with ADLINK networking software, which combines all the essential features required for a fully functional switch infrastructure on ATCA platforms. This complete package allows customers to focus on revenue-generating software development projects and provides the flexibility to develop specific functions according to customer requirements.

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The selected set of abbreviations frequently used in this document are listed below.

Term	Description
ASIC	Application Specific Integrated Circuit
ATCA	Advanced Telecom Computing Architecture
Base Interface	ATCA Base Interface on the Zone-2 connectors to connect to the dual hubs, 4 differential pairs per Base Channel.
Blade	A printed circuit board assembly that plugs into a chassis
BSP	Board Support Package
Boot-flash	Flash memory where the bootloader program is stored
Bootloader	Code used to boot the System before loading OS
DDR	Double Data Rate DRAM memory
DFT/DFM	Design For Test/Manufacturing
DIMM	Dual Inline Memory Module
ECC	Error Correction Control
E-keying	Standard defined by PICMG useful to verify whether the ATCA blade plugged in is compliant to the fabric link capabilities
Fabric Interface	ATCA Fabric Interface on the Zone-2 connectors to connect to the dual Switch Fabric Blades
Fabric Slot	A slot supporting a link connection to/from each node slot
FRU	Field Replaceable Unit
GPIO	General Purpose Input/Output
Hot-swap	Functions of replacing system components without shutting down the system
IPMB	Intelligent Platform Management Bus
IPMB-L	IPMB Local interface
IPMC	Intelligent Platform Management Controller
IPMI	Intelligent Platform Management Interface
JTAG	Joint Test Action Group
MAC	Media Access Controller
MMC	Module Management Controller
NPU	Network Processor Unit
OOS	Out Of Service
PCI	Peripheral Component Interconnect
PCIe	Peripheral Component Interconnect-Express
PHY	Physical Layer or Physical Layer Device
PICMG	PCI Industrial Computer Manufacturers Group
RGMII	Reduced Gigabit Medium Independent Interface
RTM	Rear Transition Module
RXAUI	Reduced XAUI, having 2 lanes@6.25Gbps
SDR	Sensor Data Record

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Term	Description
SDRAM	Synchronous Dynamic Random Access Memory
SFP	Small Form Pluggable (1G interface)
SFP+	Small Form Pluggable Plus (10G interface)
SGMII	Serial Gigabit Medium Independent Interface
SOL	Serial Over LAN
QSFP+	Quad Small Form Pluggable Plus (40G interface)
UART	Universal Asynchronous Receiver-Transmitter
VLP	Very Low Profile, DRAM Module Form Factor Spec
XAUI	10 Gigabit (X) Attachment Unit Interface, having 4 lanes@3.125Gbps
XLAUI	40 Gigabit (XL) Attachment Unit Interface

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1.2 Board Overview

Table 1. Board Overview

Feature	Function	Description
LMP Subsystem	Processor	Freescale QorIQ P2041(Quad Core) @ 1.2GHz
	DRAM Memory	4GB DDR3 1333 Mini-RDIMM 1Rx8 VLP (512Mx8)
	Boot Flash Memory	PCT25VF080B 2x 8 Mbit SPI Serial Flash
	OS Flash Memory	Industrial Grade SATA NANDrive 2x 8 GB (chip SSD)
Data Interconnection Subsystem	Ethernet Switching	BCM56842 320Gbps Bandwidth 40GbE switch fabric with QoS Support
	Ethernet Switching	BCM56846 640Gbps Bandwidth 40GbE switch fabric with QoS Support
I/O Interface	Dual RJ-45 Conn.	LAN from 2x BCM5466, supports 6 ports
	Single RJ-45 Conn.	LAN from 1x BCM54612, supports 1 port
	Serial (UART), console	UART#1 connects to either RJ-45 console port or to the SOL port
	USB	One USB 2.0 port
	Reset button	Recessed push button for blade reset
	10G Interface from I/O card (aDB-3710)	11x 10G Ethernet (SFP+) Fabric switch BCM56842/56846, 3x 10G Ethernet (SFP+) from (aDB-3710) BCM8706, total 14 ports
	High Speed Re-timer (aDB-3710)	Re-timer for SFP+ 10Gbs TI DS100DF410
SOL Interface	PHY Transceiver	BCM5221A4K architecture 10/100 control SOL port link (Smart Fusion A2F500 UART #0)
Microcontroller Subsystem	Smart Fusion FPGA	Shelf management and power management control sequence, redundant IPMB, IPMI v2.0-SOL support
CPLD Subsystem	Lattice LCMXFT256	Provides device multi-function GPIO control and sequencing
Backplane Connection	Base Interface	Zone 2, provided by 4x BCM5466 supporting 13 ports 1000BASE-T Ethernet & 2 ports 1000BASE-T Ethernet to ShMC; PICMG 3.0 Base Interface switching – Gigabit Ethernet (1.0Gbps)
	Fabric Interface	Zone 2, provided by BCM56842/BCM56846 PICMG 3.0 Rev 3.0 and PICMG 3.1 Rev 2.0 Fabric Interface switching – Option 3, 9, 9-KR (40GBASE-KR4), 3-KR (4x 10GBASE-KR)
	Power Interface	Zone 1, provides -48VDC (SynQor power module spec)
Software	Bootloader	U-boot (LMP Freescale QorIQ P2041)
	Operating System	Open Linux OS
	Development Environment	Broadcom SDK running under Open Linux
	Firmware	IPMC/IPMI over LAN (RMCP/IP) and Serial-over-LAN per PICMG 3.0; software license for 10G and 40G applications

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1.3 Functional Block Diagram

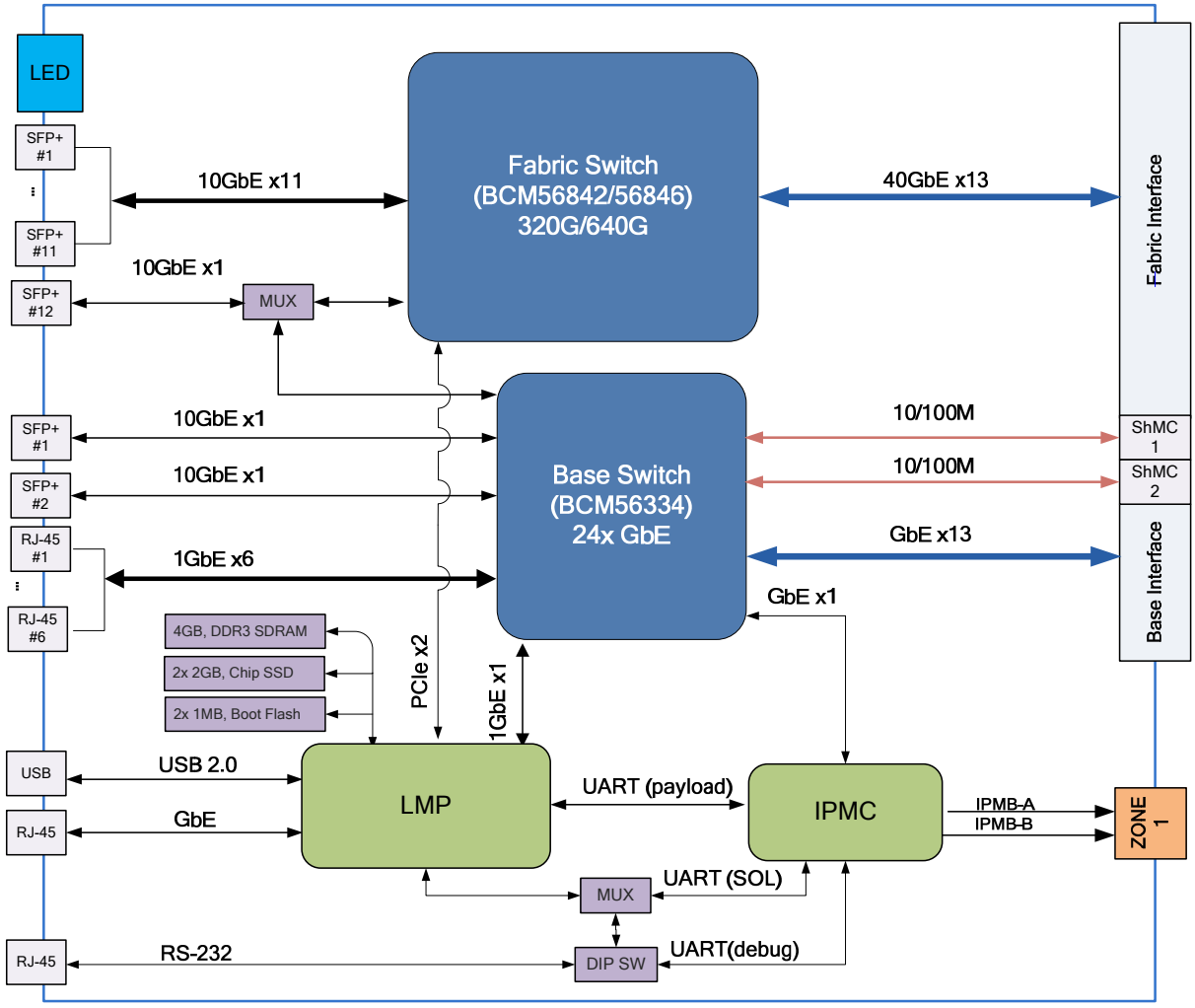


Figure 1. aTCA-3710 Block Diagram

1.4 Package Contents

The aTCA-3710 is shipped with the components listed below. If any of the items in the contents list are missing or damaged, retain the shipping carton and packing material and contact the dealer for inspection. Please obtain authorization before returning any product to ADLINK.

The packing contents of non-standard configurations may vary depending on customer requests.

- aTCA-3710 (320G) AdvancedTCA Switch Blade

  or

- aTCA-3710 (640G) AdvancedTCA Switch Blade

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2 Features Summary

2.1 Switch Board Specification



2.1.1 Base Interface

- Broadcom BCM56334 24-port GbE switch with 4-port 10GbE HiGig2 (iPss)
- 13x 1000BASE-T ports to Base Interface (Zone2) and two dedicated 10/100BASE-T ports to shelf manager
- 2x 10GbE SFP+ egress ports to front panel
- 6x 1GbE RJ45 egress ports to front panel
- 1x GbE port to LMP (Freescale P2041)
- 1x GbE port to IPMC (Smart Fusion A2F500)
- 1x 10G port to Fabric switch (BCM56842/56846)

2.1.2 Fabric Interface

- Standard: BCM56842 320Gbps bandwidth 40GbE switch
- Optional: Pin-to-pin compatible BCM56846 640Gbps bandwidth 40GbE switch
- Up to 13 Fabric Interface Channels: 1-13 (FCH)
- IEEE 802.3 40GBASE-KR4 (FCH1-FCH13=XLAUI)
- L2, L3 protocol, QoS, ACLs etc., up to 7-tuple matching layer 2 -4 fields, IPv4/IPv6 support
- Twelve 10GbE SFP+ egress ports to front panel (default)
- Optional: One 10GbE port can be switched to Base Switch (BCM56334) by IC switch
- Two PCIe ports to LMP (Freescale P2041)

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2.1.3 Local Management/Control Plane Processor

- Freescale QorIQ P2041 (quad core) @ 1.2GHz
- Max. 4GB, DDR3 SDRAM on VLP mini-DIMM sockets
- 2x 2GB (Micro SSD card, redundant)
- 2x 1MB (SROM), optional: 1 x 2GB (Micro-SD card , SROM redundant)
- 1x GbE RJ-45 on front panel console port to LMP or IPMC (switched by IC), to LMP is default
- 1x USB 2.0 ports to front panel
- 1x GbE RJ-45 port to front panel
- 2x PCIe ports to Fabric switch (BCM56842/56846)
- 1x GbE port to Base switch (BCM56334)
- UART#1 connects to either the front panel RJ-45 console port or to the SOL port (Smart Fusion A2F500 UART #0), but not at the same time
- UART#2 to IPMC for payload interface (Smart Fusion A2F500)
- For details on UART design, see Figure 2. IPMC UART Interface

2.1.4 IPMC

- Smart Fusion A2F500 MCU with Pigeon Point Systems Firmware
- Dual redundant IPMB, IPMI v2.0, SOL support
- Supports power sensor to make power management
- One GbE port to Base switch
- UART#2 to LMP (for payload transmission from P2041 to the IPMC)
- UART#0 and UART#1 are used for Serial Over LAN port via the IPMC and the front panel IPMC console port
- For details on UART design, see Figure 2. IPMC UART Interface

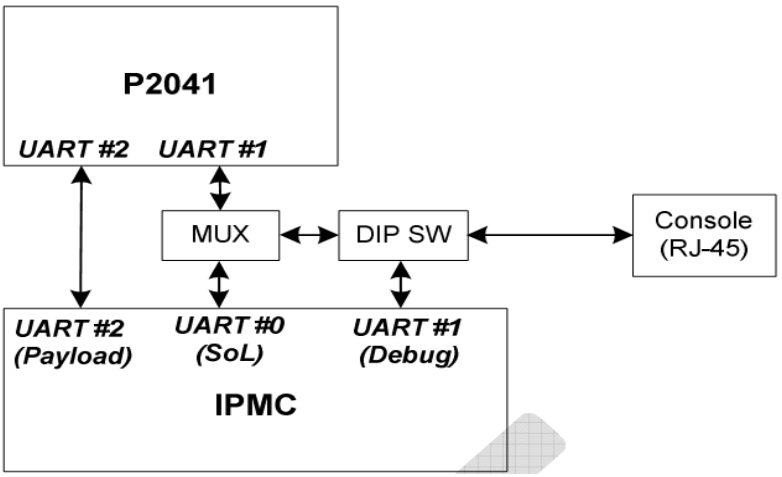


Figure 2. IPMC UART Interface

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2.1.5 Miscellaneous

- Out-of-Service (OOS) LED, 1x, Red
- Power Good LED, 1x, Green
- Health LED, 1x, Amber
- Hot Swap LED, 1x, Blue
- RJ-45 GbE port Link/Activity status, 9x, Left LED Green for Active, Right LED Yellow for 100/1000M Link
- Fabric Ethernet SFP+ port enable status LEDs, 12x, Green for port enabled
- Fabric Ethernet SFP+ Link/activity status LEDs, 12x, Green for link On & Activity
- Base Ethernet SFP+ port status LEDs, 2x, Green for port enabled
- Base Ethernet SFP+ Link/activity status LEDs, 2x, Green for link On & Activity

2.1.6 Front I/O

- USB 2.0 port x1 to LMP
- RS-232 (RJ-45) x1 to LMP or IPMI
- RJ-45 GbE port x1 to LMP
- 10G Ethernet x2 (SFP+) to Base Interface Switch
- 1GbE x 6 (RJ-45) to Base Interface Switch
- 10G Ethernet x 12 (SFP+) to Fabric Interface Switch
- Recessed push button for blade reset

2.1.7 Software features

- The LMP software suite, a dedicated board management and control plane module, includes LMP U-boot, Open Linux OS, Broadcom Switch software and IPMI software. All functional modules other than U-boot come as part of the LMP OS image.
- The IPMI software suite, a chassis management module, includes the vendor's bootloader, OS and IPMI package.
- Broadcom SDK running under Open Linux on LMP
- ADLINK patches applied to many of the standard modules, including the following functions:
  - Boot image redundancy
  - Device drivers
  - H/W diagnostics
  - S/W image upgrade
- ADLINK Networking Software based on Broadcom SDK supporting following functions:
  - Full featured CLI/Telnet for controlling all switch features
  - L2/L3 packet processing
  - Load balancing based on L2, L3, L4 switching protocol, routing etc.
  - ACLs up to 7-tuple matching Layer 2-4 fields
  - IP packet forwarding of IPv4, IPv6 and IP multicast

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- VLAN, STP, link aggregation etc.
- Additional protocols are available upon request

- ADLINK Shelf Management in IPMI package can support the following functions:
  - HW management per ATCA PICMG 3.0; includes IPMI management, FRU HW management, shelf environment management (power, cooling, watchdog timer, E-keying), and shelf sensor management
  - IPMI over LAN (RMCP/IP) and Serial-Over-LAN per PICMG 3.0

2.1.8 Dimensions

322.25mm x 280mm x 6HP (L x W x H), AdvancedTCA single slot

2.1.9 Environment

Temperature	Operating: 0°C ~ +55°C Non-operating :-40°C ~ 70°C
Humidity	Operating: 0~95% @ 40°C, non-condensing, Non-operating : 5~95%, non-condensing
Shock	Operating: 20G Non-operating: 50G Peak-to-peak, 11ms duration (standard)
Vibration (5-500HZ)	Operating : 0.5Grms Non-Operating : 1.88Grms
Altitude	0 ~ 4000 meters, relative to sea level

2.1.10 Power Consumption

120 W max.

2.1.11 PICMG Standard Compliance

PICMG 3.0 Base Interface switching – Gigabit Ethernet (1.0Gbps)
PICMG 3.0 Rev 3.0 and PICMG 3.1 Rev 2.0 Fabric Interface switching – Options 3, 9, 9-KR (40GBASE-KR4), 3-KR (4x 10GBASE-KR)

2.1.12 Certifications

FCC, CE, CUL, NEBS Level 3 (design)

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2.2 Placement

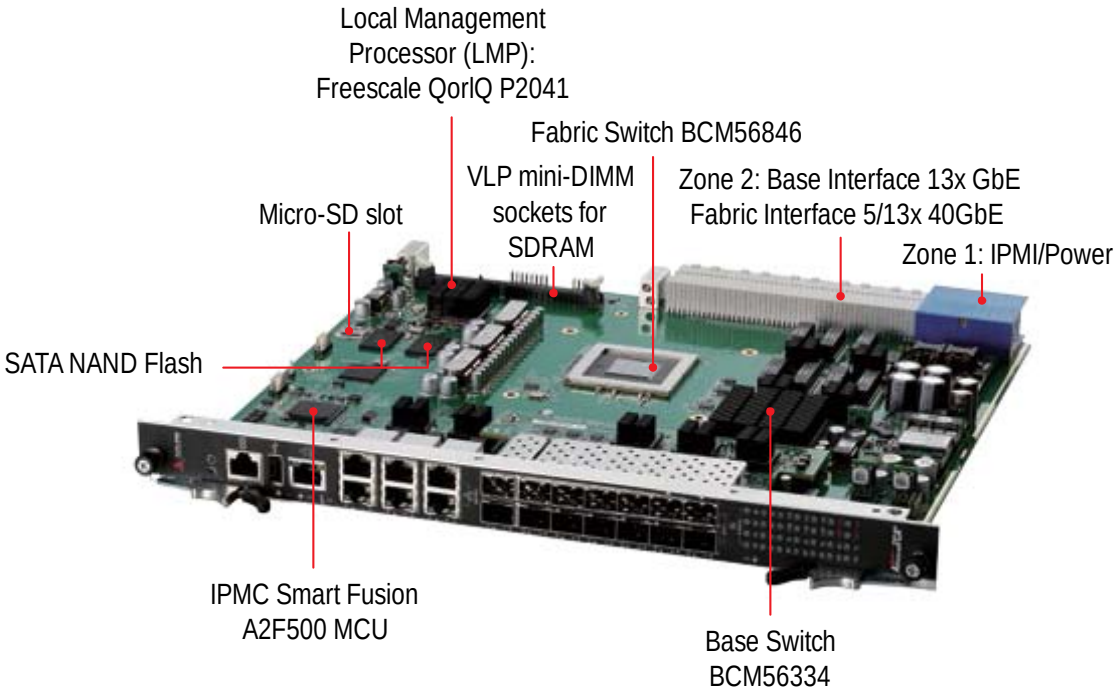


Figure 3. aTCA-3710 Mechanical Layout

2.3 Front panel Layout

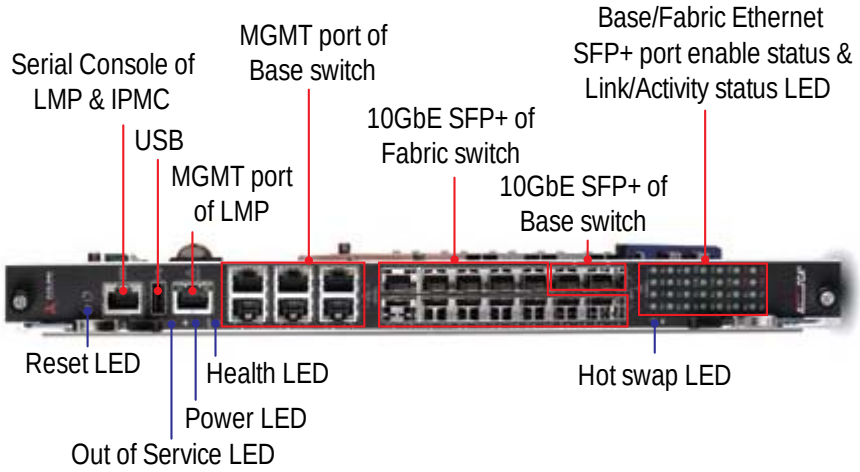


Figure 4. aTCA-3710 Front Panel Layout

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3 External Interfaces

3.1 Front Panel

3.1.1 Console Port

One console serial port is provided in an RJ-45 shielded connector outlet, and is connected to the LMP, which enables access to all major devices using command line interface commands for configuration and monitoring. This port is also configured to be shared with the IPMC.

The serial port configuration is RS-232 compatible including XON/XOFF, baud rate, stop, and start bit setting. The label for the console port is visibly different from the management Ethernet port to avoid ambiguity that may be caused by RJ-45 connectors of the same type. The pin-out of the serial interface RJ-45 connector is compatible to the Cisco serial port pinout as shown in Table 2, and the configuration values are shown in

Table 3.

Table 2. Serial Console Port Pinout

Pin	Description
1	RTS
2	NC
3	TXD
4	GND
5	GND
6	RXD
7	NC
8	CTS

Table 3. Serial Console Port Configuration Value

Item	Value
Baud rate	115200
Data	8-bit
Parity	None
Stop bit	1-bit
Flow control	None

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3.1.2 USB Port

A single USB port is available on the face plate, which is connected to the LMP. The P2041 supports 2x USB compliant to USB specification Rev 2.0. On the board, USB2 is routed to the faceplate USB connector. USB1 is not used.

3.1.3 Management Ethernet Port

Seven RJ-45 Ethernet ports are provided on the front panel. One 10/100/1000BASE-T port is connected to the LMP directly, for easier debugging/testing (such as simple connection to a different subnet console by configuring a necessary IP address for the port without involvement of the blade switch). The label for the management Ethernet port is visibly different from the console port to avoid ambiguity that may be caused by RJ-45 connectors of the same type.

Table 4. RJ-45 Management Port Pin-out

Pin	Signal Name	Comments
1	BI_DA+	Bi-directional lane 1, positive polarity
2	BI_DA-	Bi-directional lane 1, negative polarity
3	BI_DB+	Bi-directional lane 2, positive polarity
4	BI_DB-	Bi-directional lane 2, negative polarity
5	BI_DC+	Bi-directional lane 3, positive polarity
6	BI_DC-	Bi-directional lane 3, negative polarity
7	BI_DD+	Bi-directional lane 4, positive polarity
8	BI_DD-	Bi-directional lane 4, negative polarity

3.1.4 Service Ports

The traffic service ports are provided with RJ-45 and SFP+ outlets. Either a fiber optic cable or a copper cable with a mating SFP+ connector can be used to connect the blade with remote blades or appliances. The SFP+ ports will support IEEE 802.3ae (Clause 52), IEEE 802.3aq (Clause 68).

3.1.5 Reset Switch

The front panel reset switch is a global reset switch for the blade. When pushed, a payload reset event is sent to the IPMC to begin corresponding initialization procedures.

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3.2 Zone 2 Backplane Interfaces

ATCA specifications define Zone 2 for Fabric, Base and update channel interface interconnections. The Base Interface port is compliant to 1000BASE-T Ethernet. Thirteen Base Interface ports from the backplane are connected to the Ethernet switch in the blade. Through the switch, the Base Interface traffic goes to the LMP for necessary processing. The Fabric Interface in aTCA-3710 blade can connect to up to thirteen boards in the chassis. The thirteen Fabric Interface ports are connected to the high capacity onboard Ethernet switch, where the port speed is configurable to 1Gbps/10Gbps/40Gbps in the form of one SerDes lane at 1Gbps or 4 SerDes lanes at 2.5Gbps each or 4 SerDes lanes at 10Gbps, each to be compliant with Option 3/9, 10GBase-KR, 4x10GBase-KR or 40GBase-KR4 (40G Ethernet) respectively.

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4 Software Component Overview

This chapter describes the top level of software design of the aTCA-3710.

The aTCA-3710 software can be logically divided into four subsystems as shown in Figure 5. This chapter will cover the IPMI subsystem, LMP subsystem, and switch subsystem. The remaining subsystem is the customer software, which can be a user add-on L2/L3 stack, or the upper level user interface/application.

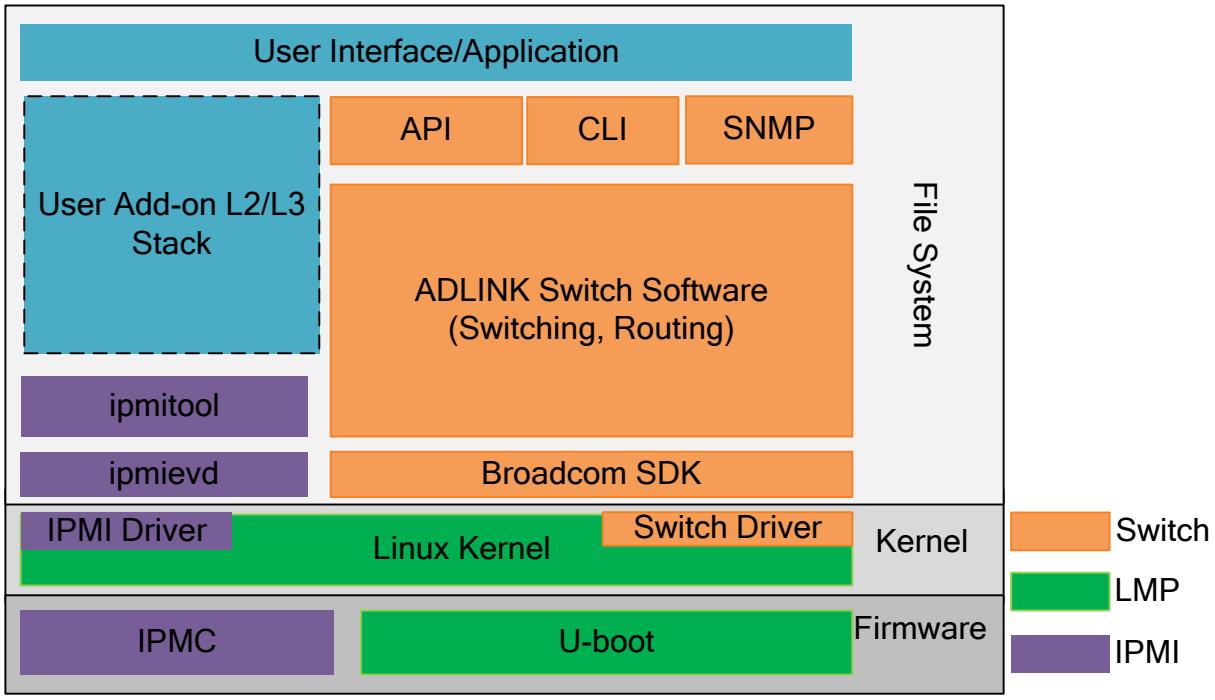


Figure 5. aTCA-3710 Software Overview

4.1 IPMI Subsystem

The Intelligent Platform Management Interface (IPMI) is a part of the ATCA standard for controlling intelligent devices that monitor a system. It enables dynamic discovery of sensors in the system and the ability to monitor the sensors and to be informed when the sensor's values change or go beyond the predefined boundaries. It also has a standardized database for field-replaceable units (FRUs) and a watchdog timer.

The IPMI subsystem includes IPMC, kernel driver and userland applications. The IPMC side is a Pigeon Point SmartFusion implementation. The system interface between the LMP and the IPMC is implemented by a UART interface. The native Linux IPMI driver needs to be patched to support the UART-based serial interface. On the LMP side, ipmitool is used to send IPMI requests and receive IPMI responses from the IPMC, and ipmievd is used to listen to sensor events generated and reported by the IPMC firmware.

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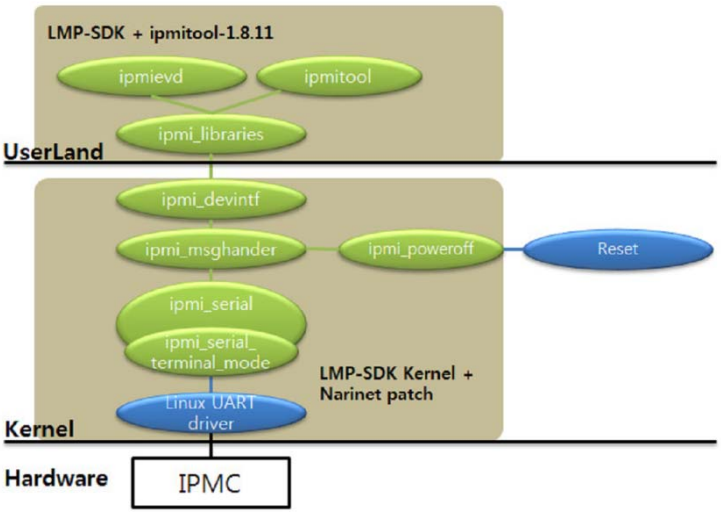


Figure 6. IPMI Function Blocks

4.2 LMP Subsystem

The LMP subsystem includes the U-boot based boot loader, Linux kernel and file system porting. The LMP subsystem development is based on an LMP-SDK provided by Freescale (LMP processor provider). After installation, the LMP-SDK will create the necessary build tool chains for BSP development, and it will also generate the initial U-boot, kernel and file system. ADLINK will make BSP development and create patches to make Linux work smoothly on the aTCA-3710.

4.3 Switch Subsystem

The switch subsystem includes Broadcom SDK configuration/porting and user-space switch software. The Broadcom SDK is a part of the LMP software suite. Shown in Figure 7 are the Broadcom switch S/W package components which are associated with the two onboard switches, the BCM56842/BCM56846 Fabric switch and the BCM56334 Base switch. The configuration interfaces are PCIe for BCM56842/BCM56846 and BCM56334. Both interfaces are connected to the LMP.

bcm.user is a user interface shell program which can be accessed to configure the switches. The kernel modules linux_user_bde.ko, and linux_kernel_bde.ko simply provide switch hardware access points and most of the functionalities are provided by bcm.user. The aTCA-3710 S/W package provides the user mode BCM-SDK only. The kernel mode BCM-SDK, where most of the functionalities are included in the kernel with bcm.user for a simple user interface, is not supported on the aTCA-3710.

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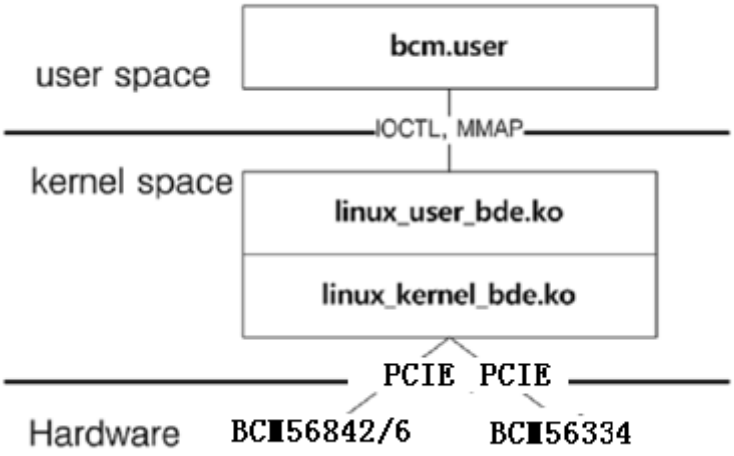


Figure 7. Broadcom SDK Function Blocks

The ADLINK Software for Network (ADSN) is based on the Broadcom SDK and includes all Layer 2 and Layer 3 switching functions.

The Fabric & Base Switches (BCM56842/56846/56334) can also be paired with ADSN. ADSN includes functions of port configuration, customized port mirror, VLAN setting, trunk group, ACL, static route, and management API with a more user-friendly CLI to enable more straightforward API development.

The details of the ADSN release software can be found in the **ADSN Configuration Guide** and **ADSN API Programming Guide**. They will not be covered in this document.

Under default settings, the system will boot to the Broadcom BCM SDK shell. Please contact your ADLINK representative to order ADLINK Software for Network.

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5 IPMI Subsystem

5.1 Platform Management Overview

The purpose of the hardware platform management system is to monitor, control, and assure proper operation of AdvancedTCA® boards and other shelf components. The hardware platform management system watches over the basic health of the system, reports anomalies, and takes corrective action when needed. The hardware platform management system can retrieve inventory information and sensor readings as well as receive event reports and failure notifications from boards and other intelligent FRUs. The hardware platform management system can also perform basic recovery operations such as reset of managed entities.

The IPMC controller on the aTCA-3710 supports an “intelligent” hardware management system, based on the Intelligent Platform Management Interface Specification. The hardware management system provides the ability to manage the power, cooling, and interconnect needs of intelligent devices; to monitor events; and to log events to a central repository.

5.2 Serial Over LAN (SOL)

Serial Over LAN (SOL) is a remote management feature that allows the IPMC (Smart Fusion A2F500) to redirect the serial console from the blade via an IPMI session over the network with RMCP+ protocol.

The aTCA-3710 supports SOL on the Base Interface which is powered by the BCM56334 Gigabit Ethernet Switch. The BCM56334 Gigabit Ethernet Switch is connected to the IPMC (Smart Fusion A2F500) via the NC-SI interface, which provides remote management capability before the payload power is authorized. Users can use the SOL feature to transmit/receive serial console message from a remote site with full console management functionality.

5.3 IPMI Sensors

The following table lists all the sensors supported by the aTCA-3710.

Item	Sensor Name	Sensor Address	Description
(1)	Hot Swap	(0x0)	FRU Hot Swap Sensor
(2)	Version Change	(0x1)	Version Change Sensor
(3)	IPMB Physical	(0x2)	Physical IPMB Sensor
(4)	BMC Watchdog	(0x3)	Watchdog Timer Sensor
(5)	+2.5V	(0x4)	Voltage Sensor Upper Non-Recoverable Threshold = 2.75 Volts

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Item	Sensor Name	Sensor Address	Description
			Upper Critical Threshold = 2.7 Volts Upper Non-Critical Threshold = 2.65 Volts Lower Non-Critical Threshold = 2.35 Volts Lower Critical Threshold = 2.3 Volts Lower Non-Recoverable Threshold = 2.25 Volts
(6)	+3.3V	(0x5)	Voltage Sensor Upper Non-Recoverable Threshold = 3.63 Volts Upper Critical Threshold = 3.56 Volts Upper Non-Critical Threshold = 3.5 Volts Lower Non-Critical Threshold = 3.1 Volts Lower Critical Threshold = 3.04 Volts Lower Non-Recoverable Threshold = 2.97 Volts
(7)	+12V	(0x6)	Voltage Sensor Upper Non-Recoverable Threshold = 13.2 Volts Upper Critical Threshold = 12.96 Volts Upper Non-Critical Threshold = 12.72 Volts Lower Non-Critical Threshold = 11.28 Volts Lower Critical Threshold = 11.04 Volts Lower Non-Recoverable Threshold = 10.8 Volts
(8)	MAC AVS +1V	(0x7)	Voltage Sensor Upper Non-Recoverable Threshold = 1.1 Volts Upper Critical Threshold = 1.08 Volts Upper Non-Critical Threshold = 1.06 Volts Lower Non-Critical Threshold = 0.94 Volts Lower Critical Threshold = 0.92 Volts Lower Non-Recoverable Threshold = 0.9 Volts
(9)	+1.5V	(0x8)	Voltage Sensor Upper Non-Recoverable Threshold = 1.65 Volts Upper Critical Threshold = 1.62 Volts Upper Non-Critical Threshold = 1.59 Volts Lower Non-Critical Threshold = 1.41 Volts Lower Critical Threshold = 1.38 Volts Lower Non-Recoverable Threshold = 1.35 Volts
(10)	56842 +1V	(0x9)	Voltage Sensor Upper Non-Recoverable Threshold = 1.1 Volts Upper Critical Threshold = 1.08 Volts Upper Non-Critical Threshold = 1.06 Volts Lower Non-Critical Threshold = 0.94 Volts Lower Critical Threshold = 0.92 Volts Lower Non-Recoverable Threshold = 0.9 Volts
(11)	+5V	(0xA)	Voltage Sensor Upper Non-Recoverable Threshold = 5.5 Volts Upper Critical Threshold = 5.4 Volts

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Item	Sensor Name	Sensor Address	Description
			Upper Non-Critical Threshold = 5.3 Volts Lower Non-Critical Threshold = 4.7 Volts Lower Critical Threshold = 4.6 Volts Lower Non-Recoverable Threshold = 4.5 Volts
(13)	DDR3 VTT +0.75V	(0xC)	Voltage Sensor Upper Non-Recoverable Threshold = 0.83 Volts Upper Critical Threshold = 0.81 Volts Upper Non-Critical Threshold = 0.79 Volts Lower Non-Critical Threshold = 0.71 Volts Lower Critical Threshold = 0.69 Volts Lower Non-Recoverable Threshold = 0.67 Volts
(14)	LMP P2041 +1V	(0xD)	Voltage Sensor Upper Non-Recoverable Threshold = 1.1 Volts Upper Non-Critical Threshold = 1.08 Volts Upper Critical Threshold = 1.06 Volts Lower Critical Threshold = 0.94 Volts Lower Non-Critical Threshold = 0.92 Volts Lower Non-Recoverable Threshold = 0.9 Volts
(15)	VDD +1.2V	(0xE)	Voltage Sensor Upper Non-Recoverable Threshold = 1.32 Volts Upper Critical Threshold = 1.3 Volts Upper Non-Critical Threshold = 1.28 Volts Lower Non-Critical Threshold = 1.13 Volts Lower Critical Threshold = 1.1 Volts Lower Non-Recoverable Threshold = 1.08 Volts
(16)	IPMC +1.6V	(0xF)	Voltage Sensor Upper Non-Recoverable Threshold = 1.76 Volts Upper Critical Threshold = 1.73 Volts Upper Non-Critical Threshold = 1.69 Volts Lower Non-Critical Threshold = 1.5 Volts Lower Critical Threshold = 1.47 Volts Lower Non-Recoverable Threshold = 1.44 Volts
(17)	48V Current(A)	(0x10)	Current Sensor Upper Non-Recoverable Threshold = 9 Amps
(18)	48V_A Power(V)	(0x11)	Voltage Sensor Upper Non-Recoverable Threshold = 72 Volts Upper Critical Threshold = 64 Volts Upper Non-Critical Threshold = 55 Volts Lower Non-Critical Threshold = 43 Volts Lower Critical Threshold = 41 Volts Lower Non-Recoverable Threshold = 39 Volts
(19)	48V_B Power(V)	(0x12)	Voltage Sensor Upper Non-Recoverable Threshold = 72 Volts

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Item	Sensor Name	Sensor Address	Description
			Upper Critical Threshold = 64 Volts Upper Non-Critical Threshold = 55 Volts Lower Non-Critical Threshold = 43 Volts Lower Critical Threshold = 41 Volts Lower Non-Recoverable Threshold = 39 Volts
(20)	48V Temp	(0x13)	Temperature Sensor Upper Non-Recoverable Threshold = 95 degrees C Upper Critical Threshold = 85 degrees C Upper Non-Critical Threshold = 75 degrees C Lower Non-Critical Threshold = 0 degrees C Lower Critical Threshold = -5 degrees C Lower Non-Recoverable Threshold = -10 degrees C
(21)	LMP 1st Boot	(0x14)	First LMP flash boot status Sensor
(22)	LMP 2st Boot	(0x15)	Second LMP flash status Sensor
(23)	Payload Reset	(0x16)	Payload reset status Sensor

5.3.1 Sensor Reading (FRU Hot Swap Sensor)

	Byte	Data Field
Request data	1	Sensor Number (FFh = reserved)
Response data	1	Completion Code
	2	Sensor Reading. [7:0] - Not used. Write as 00h.
	3	Standard IPMI byte (See “Get Sensor Reading” in IPMI specification): [7] - 0b = All Event Messages disabled from this sensor [6] - 0b = sensor scanning disabled [5] - 1b = initial update in progress. This bit is set to indicate that a “Re-arm Sensor Events” or “Set Event Receiver” command has been used to request an update of the sensor status, and that update has not occurred yet. Software should use this bit to avoid getting an incorrect status while the first sensor update is in progress. This bit is only required if it is possible for the IPM Controller to receive and process a “Get Sensor Reading or Get Sensor Event Status” command for the sensor before the update has completed. This is most likely to be the case for sensors, such as fan RPM sensors, that may require seconds to accumulate the first reading after a re-arm. [4:0] – reserved. Ignore on read.
	4	Current State Mask [7] – 1b = FRU Operational State M7 - Communication Lost [6] – 1b = FRU Operational State M6 - FRU Deactivation In Progress [5] – 1b = FRU Operational State M5 - FRU Deactivation Request [4] – 1b = FRU Operational State M4 - FRU Active [3] – 1b = FRU Operational State M3 - FRU Activation in Progress [2] – 1b = FRU Operational State M2 - FRU Activation Request [1] – 1b = FRU Operational State M1 - FRU Inactive

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	Byte	Data Field
		[0] – 1b = FRU Operational State M0 - FRU Not Installed
	(5)	[7:0] – Optional/Reserved. If provided, write as 80h (IPMI restriction). Ignore on read.

5.3.2 Get Sensor Reading (Physical IPMB-0 Sensor)

	Byte	Data Field
Request data	1	Sensor Number (FFh = reserved)
Response data	1	Completion Code
	2	[7] – IPMB B Override State 0b = Override state, bus isolated 1b = Local Control state - IPM Controller determines state of bus. [6:4] = IPMB B Local Status 0h = No Failure. Bus enabled if no override in effect. 1h = Unable to drive clock HI 2h = Unable to drive data HI 3h = Unable to drive clock LO 4h = Unable to drive data LO 5h = Clock low timeout 6h = Under test (the IPM Controller is attempting to determine if it is causing a bus hang). 7h = Undiagnosed Communications Failure [3] – IPMB A Override State 0b = Override state, bus isolated 1b = Local Control state - IPM Controller determines state of bus. [2:0] = IPMB A Local Status 0h = No failure. Bus enabled if no override in effect. 1h = Unable to drive clock HI 2h = Unable to drive data HI 3h = Unable to drive clock LO 4h = Unable to drive data LO 5h = Clock low timeout 6h = Under test (the IPM Controller is attempting to determine if it is causing a bus hang). 7h = Undiagnosed Communications Failure
	3	Standard IPMI byte (see “Get Sensor Reading” in IPMI specification) [7] – 0b = All Event Messages disabled from this sensor [6] – 0b = Sensor scanning disabled [5] – 1b = Initial update in progress. This bit is set to indicate that a “Re-arm Sensor Events” or “Set Event Receiver” command has been used to request an update of the sensor status, and that update has not occurred yet. Software should use this bit to avoid getting an incorrect status while the first sensor update is in progress. This bit is only required if it is possible for the controller to receive and process a “Get Sensor Reading” or “Get Sensor

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	Byte	Data Field
		Event Status" command for the sensor before the update has completed. This is most likely to be the case for sensors, such as fan RPM sensors, that may require seconds to accumulate the first reading after a re-arm. [4:0] – Reserved. Ignore on read.
	4	[7:4] – Reserved. Write as 0h, ignore on read [3] 1b = IPMB A enabled, IPMB-B enabled [2] 1b = IPMB A disabled, IPMB-B enabled [1] 1b = IPMB-A enabled, IPMB-B disabled [0] 1b = IPMB A disabled, IPMB-B disabled
	(5)	[7:0] – Optional/Reserved. If provided, write as 80h (IPMI restriction). Ignore on read.

5.3.3 Watchdog Timer Sensor

Sensor Type	Sensor Type Code	Sensor Specific Offset	Event
Watchdog 2	23h		This sensor is recommended for new IPMI v1.0 and later implementations. Timer expired, status only (no action, no interrupt)
		00h	Hard Reset
		01h	Power Down
		02h	Power Cycle
		03h	reserved
		04h-07h	Timer interrupt
		08h	The Event Data 2 field for this command can be used to provide an event extension code, with the following definition: 7:4 interrupt type 0h = none 1h = SMI 2h = NMI 3h = Messaging Interrupt Fh = unspecified all other = reserved 3:0 timer use at expiration: 0h = reserved 1h = BIOS FRB2 2h = BIOS/POST 3h = OS Load 4h = SMS/OS 5h = OEM Fh = unspecified all other = reserved

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5.3.4 Version Change Sensor

Sensor Type	Sensor Type Code	Sensor Specific Offset	Event
Version Change	2Bh	00h	00h Intelligent change detected with associated Entity. Informational. This offset does not imply whether the intelligent change was successful or not. Only that a change occurred.
		01h	01h Firmware or software change detected with associated Entity.Informational. Success or failure not implied.
		02h	02h Intelligent incompatibility detected with associated Entity.
		03h	03h Firmware or software incompatibility detected with associated Entity.
		04h	04h Entity is of an invalid or unsupported intelligent version.
		05h	05h Entity contains an invalid or unsupported firmware or software version.
		06h	06h Intelligent Change detected with associated Entity was successful. (deassertion event means unsuccessful').
		07h	07h Software or F/W Change detected with associated Entity was successful. (deassertion event means 'unsuccessful') *Event data 2 can be used for additional event information on the type of version change, with the following definition:* Event Data 2 7:0 Version change type 00h unspecified 01h management controller device ID (change in one or more fields from 'Get Device ID') 02h management controller firmware revision 03h management controller device revision 04h management controller manufacturer ID 05h management controller IPMI version 06h management controller auxiliary firmware ID 07h management controller firmware boot block 08h other management controller firmware 09h system firmware (EFI / BIOS) change 0Ah SMBIOS change 0Bh operating system change 0Ch operating system loader change 0Dh service or diagnostic partition change 0Eh management software agent change 0Fh management software application change 10h management software middleware change 11h programmable intelligent change (e.g. FPGA) 12h board/FRU module change (change of a module plugged into associated entity) 13h board/FRU component change (addition or removal of a replaceable

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Sensor Type	Sensor Type Code	Sensor Specific Offset	Event
			component on the board/FRU that is not tracked as a FRU) 14h board/FRU replaced with equivalent version 15h board/FRU replaced with newer version 16h board/FRU replaced with older version 17h board/FRU intelligent configuration change (e.g. strap, jumper, cable change, etc.)

5.3.5 Get Sensor Reading Command

	Byte	Data field
Request data	1	Sensor Number (FFh = reserved)
Response data	1	Completion Code
	2	Sensor reading Byte 1: byte of reading. Ignore on read if sensor does not return an numeric (analog) reading.
	3	[7] - 0b = All Event Messages disabled from this sensor [6] - 0b = sensor scanning disabled [5] - 1b = reading/state unavailable (formerly “initial update in progress”). This bit is set to indicate that a ‘re-arm’ or ‘Set Event Receiver’ command has been used to request an update of the sensor status, and that update has not occurred yet. Software should use this bit to avoid getting an incorrect status while the first sensor update is in progress. This bit is only required if it is possible for the controller to receive and process a ‘Get Sensor Reading’ or ‘Get Sensor Event Status’ command for the sensor before the update has completed. This is most likely to be the case for sensors, such as fan RPM sensors, that may require seconds to accumulate the first reading after a re-arm. The bit is also used to indicate when a reading/state is unavailable because the management controller cannot obtain a valid reading or state for the monitored entity, typically because the entity is not present. For more in formation, please see *Section 16.4, Event Status, Even Conditions, and Present State* and *Section 16.6, Re-arming* on the PICMG specification 3.0. [4:0] - reserved. Ignore on read.
	4	For threshold-based sensors Present threshold comparison status [7:6] - reserved. Returned as 1b. Ignore on read. [5] - 1b = at or above (≥) upper non-recoverable threshold [4] - 1b = at or above (≥) upper critical threshold [3] - 1b = at or above (≥) upper non-critical threshold [2] - 1b = at or below (≤) lower non-recoverable threshold [1] - 1b = at or below (≤) lower critical threshold [0] - 1b = at or below (≤) lower non-critical threshold For discrete reading sensors [7] - 1b = state 7 asserted [6] - 1b = state 6 asserted

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	Byte	Data field
		[5] - 1b = state 5 asserted [4] - 1b = state 4 asserted [3] - 1b = state 3 asserted [2] - 1b = state 2 asserted [1] - 1b = state 1 asserted [0] - 1b = state 0 asserted
	(5)	For discrete reading sensors only. (Optional) (00h Otherwise) [7] - reserved. Returned as 1b. Ignore on read. [6] - 1b = state 14 asserted [5] - 1b = state 13 asserted [4] - 1b = state 12 asserted [3] - 1b = state 11 asserted [2] - 1b = state 10 asserted [1] - 1b = state 9 asserted [0] - 1b = state 8 asserted

5.4 FRU Information

The FRU (Field Replaceable Unit) information includes Board information, product information, and board E-key information.

5.4.1 Board information area

Board Info Area	Field Data
Mfg. Date / Time	Programmed with manufacturing date
Board Manufacturer	ADLINK Technology
Board Product Name	aTCA-3710
Board Serial Number	Programmed with serial number
Board Part Number	aTCA-3710

5.4.2 Product information area

Product Info Area	Field Data
Manufacturer Name	ADLINK Technology
Product Name	aTCA-3710
Product Part/Model Number	aTCA-3710
Product Version	Programmed with Product Version

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Product Serial Number	Programmed with serial number
FRU File ID	FRU version

5.4.3 Board E-key information

The board E-keying information is compatible with PICMG 3.0 R3.0 and PICMG 3.1 R2.0.

Base Channel of Board Point-to-Point Connectivity:

Field	Field Data
Link Descriptor	00001101h ~ 0000110Eh
Link Grouping ID (Bits 31-24)	00h: Single-channel link
Link Type Extension (Bits 23-20)	0h: None
Link Type (Bits 19-12)	01h: PICMG 3.0 Base Interface 10/100/1000 BASE-T
Link Designator (Bits 11-0)	101h~10Eh: Base Interface, Channel 1 ~ Channel 14, Port 0

Fabric Channel of Board Point-to-Point Connectivity:

Field	Field Data
Link Descriptor	00132F41h ~ 00132F4Dh
Link Grouping ID (Bits 31-24)	00h: Single-channel link
Link Type Extension (Bits 23-20)	1h: Fixed 40GBASE-KR4
Link Class (bits 19-16)	3h: 10.3125Gbd Signaling Link Class
Link Type (Bits 15-12)	2h: PICMG 3.1 Ethernet Fabric Interface
Link Designator (Bits 11-0)	F41h ~ F4Dh: Fabric Interface, Channel 1 ~ Channel 13, Port 0, 1, 2, 3
Link Descriptor	00032F41h ~ 00032F4Dh
Link Grouping ID (Bits 31-24)	00h: Single-channel link
Link Type Extension (Bits 23-20)	0h: Fixed 10GBASE-KR
Link Class (bits 19-16)	3h: 10.3125Gbd Signaling Link Class
Link Type (Bits 15-12)	2h: PICMG 3.1 Ethernet Fabric Interface
Link Designator (Bits 11-0)	F41h ~ F4Dh: Fabric Interface, Channel 1 ~ Channel 13, Port 0, 1, 2, 3
Link Descriptor	00032141h ~ 0003214Dh
Link Grouping ID (Bits 31-24)	00h: Single-channel link
Link Type Extension (Bits 23-20)	0h: Fixed 10GBASE-KR
Link Class (bits 19-16)	3h: 10.3125Gbd Signaling Link Class
Link Type (Bits 15-12)	2h: PICMG 3.1 Ethernet Fabric Interface
Link Designator (Bits 11-0)	141h ~ 14Dh: Fabric Interface, Channel 1~ Channel 13, Port 0

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Field	Field Data
Link Descriptor	00102F41h ~ 00102F4Dh
Link Grouping ID (Bits 31-24)	00h: Single-channel link
Link Type Extension (Bits 23-20)	1h: Fixed 10GBASE-BX4 (XAUI)
Link Class (bits 19-16)	0h: Basic signaling Link Class
Link Type (Bits 15-12)	2h: PICMG 3.1 Ethernet Fabric Interface
Link Designator (Bits 11-0)	F41h ~ F4Dh: Fabric Interface, Channel 1 ~ Channel 13, Port 0, 1, 2, 3
Link Descriptor	00002F41h ~ 00002F4Dh
Link Grouping ID (Bits 31-24)	00h: Single-channel link
Link Type Extension (Bits 23-20)	0h: Fixed 1000BASE-BX
Link Class (bits 19-16)	0h: Basic signaling Link Class
Link Type (Bits 15-12)	2h: PICMG 3.1 Ethernet Fabric Interface
Link Designator (Bits 11-0)	F41h ~ F4Dh: Fabric Interface, Channel 1 ~ Channel 13, Port 0, 1, 2, 3
Link Descriptor	00002141h ~ 0000214Dh
Link Grouping ID (Bits 31-24)	00h: Single-channel link
Link Type Extension (Bits 23-20)	0h: Fixed 1000BASE-BX
Link Class (bits 19-16)	0h: Basic signaling Link Class
Link Type (Bits 15-12)	2h: PICMG 3.1 Ethernet Fabric Interface
Link Designator (Bits 11-0)	141h ~ 14Dh: Fabric Interface, Channel 1 ~ Channel 13, Port 0

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5.5 IPMI Commands

The following table presents all the commands which are supported by the aTCA-3710 through different interfaces and compatible with IPMI v1.5 and PICMG 3.0 R2.0 ECN001.

There are two interfaces implemented with IPMI command support.
(1) PI: Payload serial interface; (2) IPMB0: IPMBA & IPMBB

	PI	IPMB0
IPMI command **IPM Device "Global" Commands**		
Get Device ID	●	●
Cold Reset	●	●
Warm Reset	●	●
Get Self Test Results	●	●
Get Device GUID	●	●
IPMI Messaging Support Commands		
Set BMC Global Enables	●	●
Get BMC Global Enables	●	●
Clear Message Flags	●	●
Get Message Flags	●	●
Get Message	●	●
Send Message	●	●
Master Write-Read	●	●
BMC Watchdog Timer		
Reset Watchdog Timer	●	●
Set Watchdog Timer	●	●
Get Watchdog Timer	●	●
Event Commands		
Set Event Receiver	●	●
Get Event Receiver	●	●
Platform Event	●	●
Sensor Device Commands		
Get Device SDR Info	●	●
Get Device SDR	●	●
Reserve Device SDR Repository	●	●
Get Sensor Reading Factors	●	●
Set Sensor Hysteresis	●	●
Get Sensor Hysteresis	●	●
Set Sensor Threshold	●	●
Get Sensor Threshold	●	●
Set Sensor Event Enable	●	●

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Sensor Device Commands (cont'd)		
Get Sensor Event Enable	●	●
Rearm Sensor Events	●	●
Get Sensor Event Status	●	●
Get Sensor Reading	●	●
FRU Device Commands		
Get FRU Inventory Area Info	●	●
Read FRU Data	●	●
Write FRU Data	●	●
PICMG Command **HPM.1 Upgrade Commands (HPM.1)**		
Get target upgrade capabilities	●	●
Get component properties	●	●
Abort Firmware Upgrade	●	●
Initiate upgrade action	●	●
Upload firmware block	●	●
Finish firmware upload	●	●
Get upgrade status	●	●
Activate firmware	●	●
Query Self-test Results	●	●
Query Rollback status	●	●
Initiate Manual Rollback	●	●
AdvancedTCA		
Get PICMG Properties	●	●
Get Address Info	●	●
FRU Control	●	●
FRU Control Capabilities	●	●
Get FRU LED Properties	●	●
Get LED Color Capabilities	●	●
Set FRU LED State	●	●
Get FRU LED State	●	●
Set IPMB State		●
Set FRU Activation Policy	●	●
Get FRU Activation Policy	●	●
Set FRU Activation	●	●
Get Device Locator Record ID	●	●
Get Port State	●	●
Set Port State		●
Compute Power Properties		●
Set Power Level	●	●
Get Power Level	●	●
Bused Resource Control		●
Get IPMB Link Info	●	●

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6 LMP Subsystem

The aTCA-3710 has two CPUs on the board: the Local Management Processor (LMP) P2041 and the SmartFusion IPMC. Therefore, on the blade, we have two software suites; the LMP software suite, and the IPMC software suite. Each software suite comes in the form of a bootloader image and an OS image in one or more of the flash memories on the board, respectively. The LMP software suite, a dedicated board management and control plane module, includes the U-boot Bootloader, the Open Linux OS, the Broadcom Switch software, the IPMI software and the LMP ADLBOMA (ADLINK Board Management). All the functional modules other than U-boot Bootloader are part of the LMP OS image. The IPMC software suite, a chassis management module, includes the vendor's bootloader, OS and IPMI package.

ADLINK patches are applied to the many of the standard modules include the following functions.

- Booting Image Redundancy
- Device drivers
- H/W diagnostics
- S/W image upgrade

6.1 Booting Image Redundancy

The aTCA-3710 software package provides booting image redundancy to survive a single point of failure during the boot process. When a device with a CPU core boots up from an image stored in a storage device, the system is guaranteed to successfully boot by having redundant bootable images stored separately in primary and redundant storage devices. The bootloader U-boot image and the Linux operating system image are stored in different storage devices.

Boot image redundancy applies to the LMP as summarized below.

- LMP U-boot image redundancy
- LMP OS image redundancy

6.1.1 U-Boot Redundancy

The U-boot image is stored in an SPI flash memory. On the aTCA-3710, the LMP has two such U-boot flash memories in a primary and a redundant fashion. To support redundancy, the IPMC is involved in the flow as shown in .Figure 8 below

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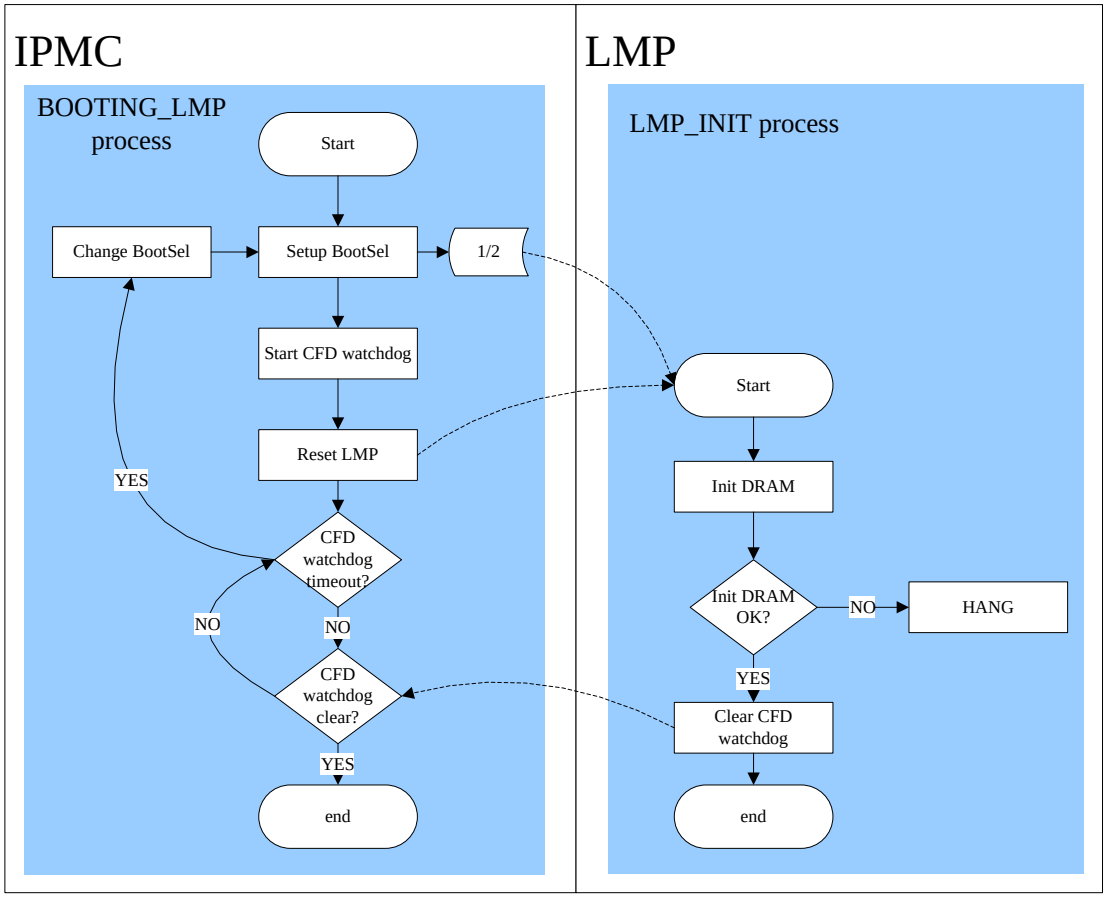


Figure 8. U-Boot Redundancy Flow

The actions for each step are described in Table 5.

Table 5. LMP U-boot boot up failover actions

Domain	Name	Description
IPMC (BOOTING_LMP)	Setup BootSel	Sets LMP SPI CS0. (SPI_FLASH1 or SPI_FLASH2) In IPMC Standalone mode, irrespective of IPMC configuration, user can select BootSel using H/W switch.
	Start CFD watchdog	timeout : 2 sec
	Change BootSel	Changes the Bootsel setting.
LMP (LMP_INIT)	Start	IPMC selects a booting device from either SPI_FLASH1 or SPI_FLASH2 and triggers the LMP to boot up.
	HANG	This is a state at which U-boot booting code is stuck without doing anything (which may happen at problematic situations such as DRAM initialization faults). Once 2 seconds pass at this state, the IPMC CFD watchdog resets the LMP.
	ClearCFD watchdog	The LMP requests the IPMC to clear CFD watchdog. The request signal is forwarded to the IPMC through IPMI interface.

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6.1.2 Kernel/File System Redundancy

The aTCA-3710 provides dual Chip SSD devices for primary storage and redundant storage of the OS image.

6.2 LMP SDK/BSP Porting (U-Boot file system)

The LMP-SDK used is the Local Management Processor P2041 SDK provided by Freescale. As of December 2012, most up-to-date version is SDK 1.3, distributed in an ISO file. After installation, the default directory generated is **QorIQ-SDK-V1.3-20121114-yocto**.

The directory structure follows that of Linux Target Image Builder (LTIB, http://ltib.org), which enables bitbaketool to generate target images.

※ The details for the Freescale SDK installation and operation are found in ~/documents after ISO installation.

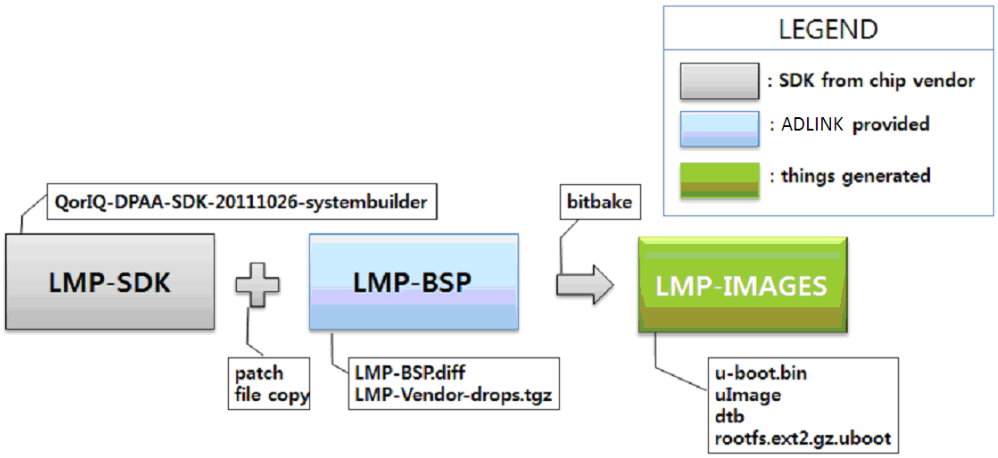


Figure 9. LMP SDK/BSP Porting

6.3 Device Drivers

The device drivers provide accessibility to the devices on the aTCA-3710 blade. The vendor's drivers are ported to the blade environment with necessary changes.

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Table 6. Summary of Devices and Access

Device	ID	Description	Host	Program	Remark
P2041	LMP	Local Management Processor	LMP	(All LMP Linux programs)	LMP-SDK + ADLINK patch
Mini VLP DIMM	LMP_MEM	DRAM for LMP	LMP	LMP linux kernel	LMP-SDK + ADLINK patch
BCM56842/6	FABRIC_SWITCH	multilayer switch	LMP	bcm.user	BCM-SDK + ADLINK patch
BCM56334	BASE_SWITCH	base switch	LMP	bcm.user	BCM-SDK +ADLINK patch
CPLD	CPLD	CPLD for system control	LMP	adlik-cpld	ADLINK
BCM54612E	MGMT_PHY	PHY for mgmt Ethernet port of LMP	LMP	adlk-mdio	ADLINK
M24256	LMP_EEPROM	mac addresses for LMP	LMP	adlk-eeprom	ADLINK
DS1388	RTC	Real Time Clock	LMP	date, hwclock	LMP-SDK (Linux standard utilities)
MAX5820	PWR_CTRL	power control for FABRIC_SWITCH	LMP	i2cget, i2cset...	LMP-SDK (Linux standard utilities)
Front SFP(+)	FP1,FP2,FP3,FP4	Front SFP(+) module	LMP	i2cget, i2cset...	LMP-SDK (Linux standard utilities)
I2CIO	F_I2CIO	I2C to IO buffer	LMP	i2cget, i2cset...	LMP-SDK (Linux standard utilities)
PCA9546	F_I2CHUB	I2C HUB device	LMP	(kernel)	virtual I2C bus
SPI_FLASH	SPI_FLASH1 SPI_FLASH2	boot flash for U-boot	LMP	mtd-utilities	LMP-SDK + ADLINK patch Linux MTD system based
CHIP_SSD	CHIP_SSD1 CHIP_SSD2	OS, data flash for linux	LMP	mount, ...	LMP-SDK (Linux standard utilities)
A2F500	IPMC	IPMC	LMP	ipmitool	open source + ADLINK patch
A2F500	IPMC	IPMC	SHMC	-	PICMG standard

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6.4 LMP State Machines

The LMP State machine is illustrated in Figure 10.

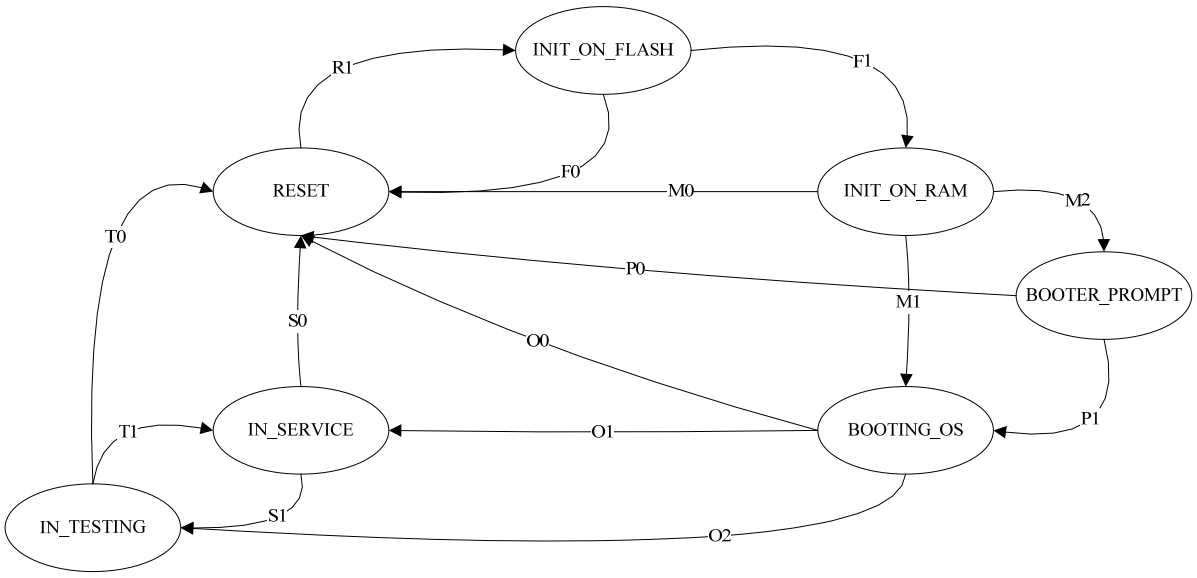


Figure 10. LMP State Machine

Table 7. LMP State Descriptions

State	Description
RESET	Resets the LMP and LMP peripheral devices.
INIT_ON_FLASH	The Bootloader at the flash address space runs and initializes devices such as DRAM device. Copies the bootloader code to the DRAM. Enables the BMC watchdog. (timeout : 30 sec) Disables the CFD watchdog.
INIT_ON_RAM	The Bootloader at RAM address space runs and initializes the peripheral devices.
BOOTER_PROMPT	Disables the BMC watchdog. Waits for a User command input.
BOOTING_OS	Disables the BMC watchdog. Triggers the OS booting.
IN_SERVICE	Performs the LMP services. aTCA-3710 board management services include the following: - ipmievd: IPMI message processing daemon Other services defines by a user can be included.
IN_TESTING	Performs testing

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Table 8. LMP State Transition Descriptions

Transition	Name	Conditions
RESET->INIT_ON_FLASH	R1	The bootloader is present at the boot flash.
INIT_ON_FLASH->RESET	F0	The CFD watchdog disable processing fails in 2 sec after Reset.
INIT_ON_FLASH->INIT_ON_RAM	F1	The program jumps to the bootloader code region in the DRAM.
INIT_ON_RAM->RESET	M0	The BMC watchdog disable processing fails in 30 sec after entering INIT_ON_RAM state.
INIT_ON_RAM->BOOTING_OS	M1	An OS loading command is saved into the Bootcmd environment variables.
INIT_ON_RAM->BOOTER_PROMPT	M2	The bootcmd environment variable are not present or the OS loading command is not correct..
BOOTER_PROMPT->RESET	P0	Reset command is performed.
BOOTER_PROMPT->BOOTING_OS	P1	The OS loading command is performed.
BOOTING_OS->RESET	O0	The BMC watchdog timeout triggered by the bootloader occurs.
BOOTING_OS->IN_SERVICE	O1	The OS application defined as LMP services run normally.
BOOTING_OS->IN_TESTING	O2	Enters into the OS test mode.
IN_SERVICE->RESET	S0	The reboot commandis performed.
IN_SERVICE->IN_TESTING	S1	The OS application defined as an LMP service halts some functions.
IN_TESTING->RESET	T0	The reboot commandis performed.
IN_TESTING->IN_TESTING	T1	The OS application defined as LMP services runs normally.

6.5 Boot Sequence

The boot sequence of devices with a CPU core is illustrated in Figure 11. The IPMC is responsible for initiation of the booting sequence. The states in the boot sequence are summarized in Table 9.

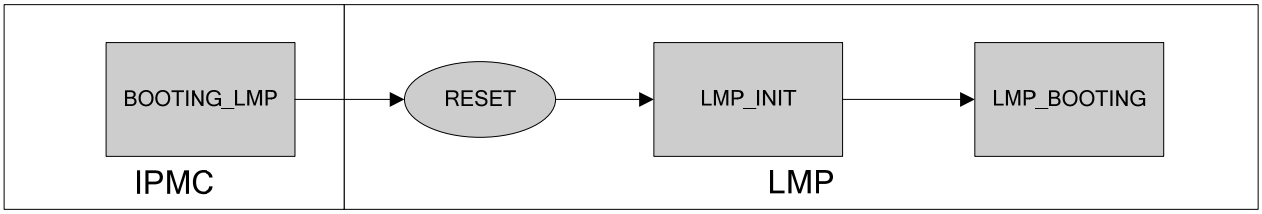


Figure 11. aTCA-3710 Boot Sequence

Table 9. Boot Sequence State Descriptions

Host	Process	Conditions
IPMC	BOOTING_LMP	Configures the LMP boot flash and resets the LMP. Refer to Figure 4-1 LMP U-boot booting flow.
LMP	LMP_INIT	Initializes associated devices. Refer to Figure 4-1 LMP U-boot booting flow.
	LMP_BOOTING	Triggers the LMP OS booting. Refer to Figure 4-2 LMP OS booting flow

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6.6 Non-volatile Memory Mapping

The aTCA-3710 provides various non-volatile memory (NVM) to store software images and log system events for different purposes.

The memory map for the devices is shown in Table 10.

Table 10. Non-volatile Memory Map

Host	Device	Size	Contents	format	U-boot	linux	Remark
LMP	SPI_FLASH1	0xB0000	U-boot image	binary	read/write	/dev/mtd0	Same S/W access point to SPI_FLASH1, SPI_FLASH2. Selected by a CPLD register
		0x20000	U-boot Env.	binary	read/write	/dev/mtd1	
		0x20000	Fman-Ucode	binary	read/write	/dev/mtd2	
		0x20000	Reserved	binary	Read/write	/dev/mtd3	
	SPI_FLASH2	0xB0000	U-boot image	binary	read/write	/dev/mtd0	
		0x20000	U-boot Env.	binary	read/write	/dev/mtd1	
		0x20000	Fman-Ucode	binary	read/write	/dev/mtd2	
		0x20000	Reserved	binary	read/write	/dev/mtd3	
	CHIP_SSD1	1024 MiB	OS images	VFAT	read only	/dev/sda1 (/bootA)	
		7168MiB	System config	EXT3	no access	/dev/sda2 (/var/NVMA)	
	CHIP_SSD2	1024 MiB	OS images	VFAT	read only	/dev/sdb1 (/bootB)	
		7168MiB	System config	EXT3	no access	/dev/sdb2 (/var/NVMB)	

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7 Switch Subsystem

The switch subsystem includes Broadcom driver/SDK porting, and ADLINK switch software running over the Broadcom SDK. ADLINK Software for Network (ADSN) includes all Layer 2 and Layer 3 switching functions.

The Fabric & Base Switch (BCM56842/56846/56334) can also be paired with ADSN. ADSN includes functions of port configuration, customized port mirror, VLAN setting, trunk group, ACL, static route, and management API with a more user-friendly CLI to enable more straightforward API development.

Details on the ADLINK Software for Network release software can be found in the ***ADSN Configuration Guide*** and ***ADSN API Programming Guide***. It will not be covered in this document.

Under default settings, the system will boot into the Broadcom BCM SDK shell. Please contact your ADLINK representative to order ADLINK Software for Network.

7.1 Broadcom SDK

After the Broadcom SDK is running successfully, the diagnostic shell can be used, providing a set of APIs.

The diagnostic shell provides rich set of commands to control Broadcom switching chips. The shell includes some common diagnostic commands and low level commands. It can be used to configure switching tables (L2, L3, FP), and to get and set the registers. So it is also an invaluable tool for diagnosing problems.

The APIs are defined in terms of high-level concepts such as ports, abstract L2 entries, routing table entries, and VLAN. There is no need to program registers directly. The APIs support all chip features, including physical port control, switching port control, VLAN control, L2/L3 table management, mirroring and filtering.

The SDK also provides a diagnostic test suite.

The engineer compiles the Broadcom SDK as shown below in Figure 12, resulting in an application and two kernel modules. The libraries are used for the APIs.

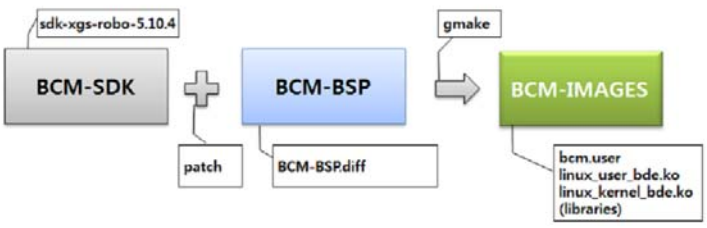


Figure 12. Broadcom SDK Porting

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7.2 ADLINK Switch Software Overview

The aTCA-3710 switch ports support Layer 2 forwarding of frames according to IEEE 802.1D and 802.1 Q specifications. Layer 2 forwarding uses the media access control address (MAC address) from the host's network interface cards (NICs) to decide where to forward frames. Layer 2 switching is hardware based, which means the Broadcom switches use application-specific integrated circuits (ASICs) to build and maintain filter tables (also known as MAC address tables or CAM tables).

The aTCA-3710 also supports Layer 3 forwarding of packets. Traditional routers use microprocessors to make L3 forwarding decisions. The Broadcom switches used by the aTCA-3710 support hardware-based Layer 3 packet forwarding, and most packet forwarding is handled by the Broadcom hardware ASICs.

Both the MAC and L3 forwarding tables support static configuration of the table entries. Alternatively, the switch ASICs can also update the MAC tables automatically, while the L3 forwarding tables need be updated by an external helper. We use the ADLINK updater to update the L3 forwarding table.

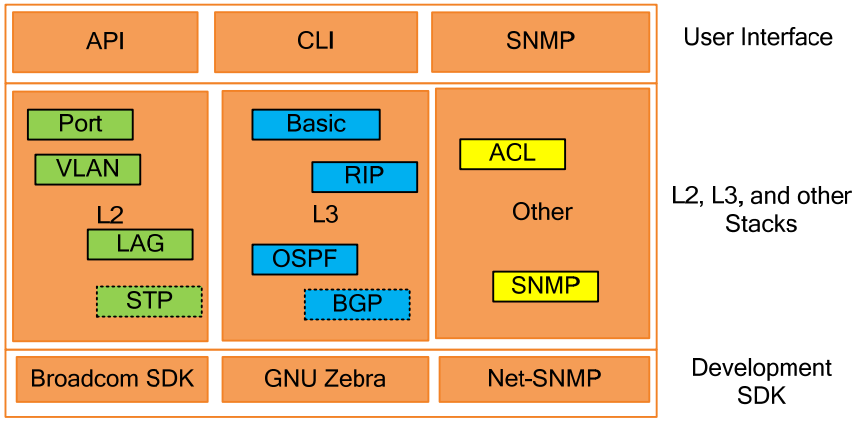


Figure 13. Switch Software Blocks

The main user-space switch software components are shown in Figure 13. They are generally grouped into three layers.

(1) The development SDK includes the Broadcom SDK, GNU Zebra and Net-SNMP. The Broadcom SDK is used to provide all necessary interfaces (both API and CLI) to configure the switch, or retrieve configurations and status from the switch. GNU Zebra is used to provide L3 routing protocols such as RIP, OSPF and BGP. Net-SNMP is used to provide the SNMP protocol development framework.

(2) The switch functions are mainly implemented in various software stacks as described in the middle layer of Figure 13. Based on their functions, the software stacks can be further divided into three groups. The first group is Layer 2 switching stacks, including Port configuration, VLAN, LAG, and STP. The second group is Layer 3 switching stacks, including basic route configuration, RIP, OSPF and BGP. The third group includes the other stacks to support SNMP and ACL.

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(3) Above the software stacks, the aTCA-3710 provides three kinds of user interface. The basic CLI interface can be used by the customer for quick access to the switch functions. The API and SNMP interfaces can be used by the customer for further customized development. Both API and SNMP interfaces support remote access, and the customer can link a local library on a remote client to invoke the switch APIs or send SNMP requests.

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8 Getting Started

The aTCA-3710 has been designed for easy installation. However, the following standard precautions, installation procedures, and general information must be observed to ensure proper installation and to preclude damage to the board, other system components, or injury to personnel.

8.1 Safety Requirements

The following safety precautions must be observed when installing or operating the aTCA-3710. ADLINK assumes no responsibility for any damage resulting from failure to comply with these requirements.

Do not touch the heatsink when installing or removing the board. The board should not be placed on any surface or in any form of storage container until the board and heat sink have cooled down to room temperature.

This ATCA blade contains electrostatic sensitive devices. Please observe the necessary precautions to avoid damage to your board:

- Discharge your clothing before touching the assembly. Tools must be discharged before use.
- Do not touch components, connector-pins or traces.
- If working at an anti-static workbench with professional discharging equipment, please do not omit to use it.

8.2 Quick Start

8.2.1 Hardware Configuration Settings

For normal operation, it is not recommended to change any onboard hardware configuration settings, but there are some options on the board for those want to investigate more flexibility for testing. Figure 14 below shows the locations of the hardware configuration switches and jumpers.

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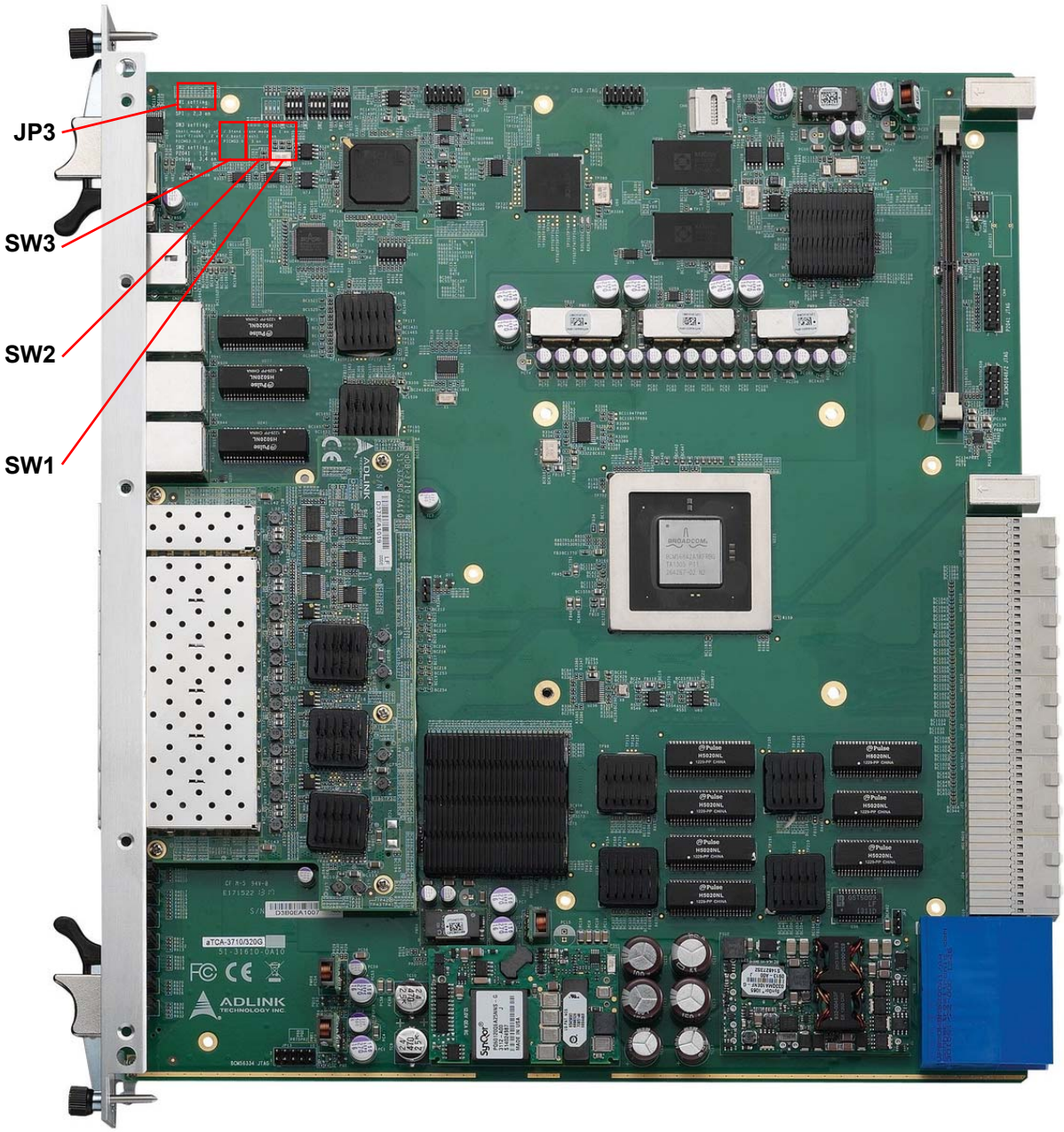


Figure 14. Hardware Configuration Switches and Jumpers

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Headers and Jumpers

- **Ground Connection (JP3):** This header is used to short GND and GND_SHELF on the board. The default setting is Pin 1 and Pin 2 shorted.

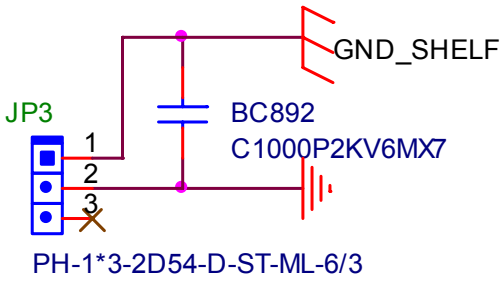


Figure 15. Ground Header Schematic (JP3)

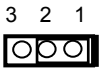
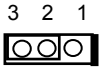
GND Connection	JP3
Short GND and Chassis GND by capacitor	
GND not shorted	

Table 11. Ground Header Settings (JP3)

- **XAUI_SEL Status (JP5):** This header is a reserved hardware switch. The default configuration of XAUI_SEL status is set by IPMC through keying in instructions.

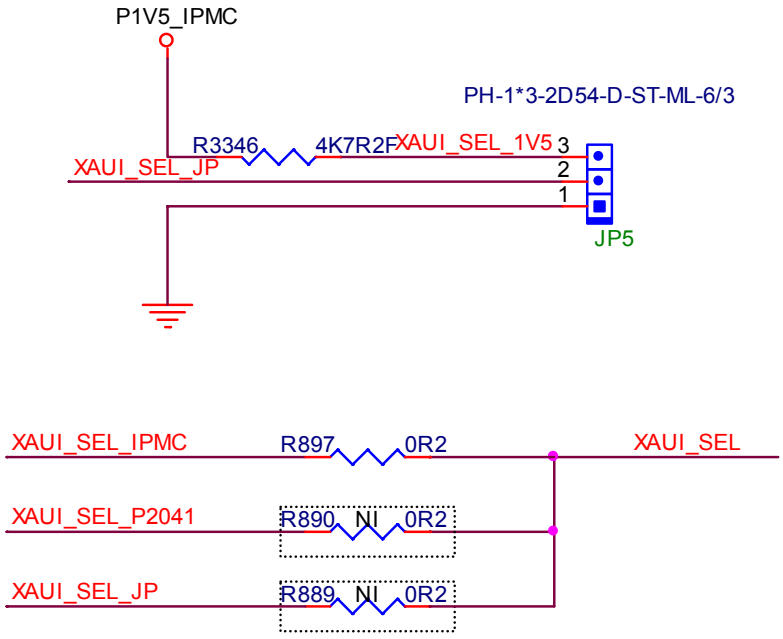


Figure 16. XAUI_SEL Status Header Schematic (JP5)

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Pin	Description
1	BCM56842 connects to BCM56334 (HiGig)
0	BCM56842 connects to aDB3710 (BCM8706)

Table 12. XAUI_SEL Status Settings (JP5)

- **IPMC JTAGSEL Mode (JP8):** This header is used to select either FPGA Fabric TAP or Cortex-M3 JTAG debug. The default setting is FPGA Fabric TAP.

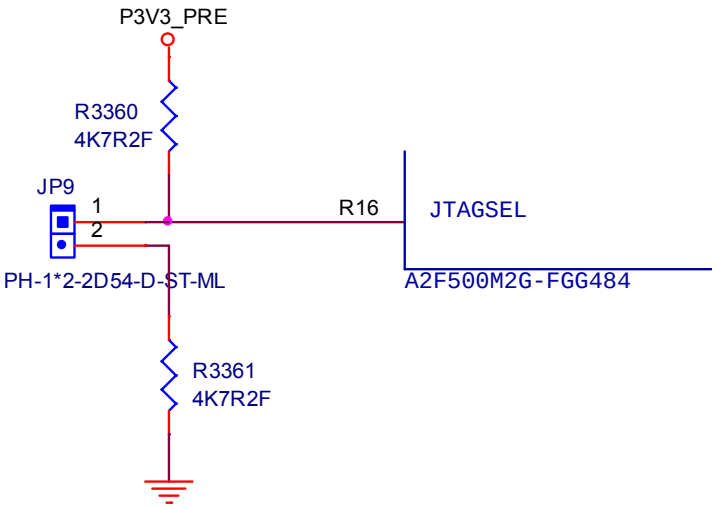


Figure 17. JTAGSEL Mode Header Schematic (JP8)

Name	Type	Polarity/Bus Size	Description
JTAGSEL	In	1	JTAG controller selection Depending on the state of the JTAGSEL pin, an external JTAG controller will either see the FPGA fabric TAP/auxiliary TAP (High) or the Cortex-M3 JTAG debug interface (Low). The JTAGSEL pin should be connected to an external pull-up resistor such that the default configuration selects the FPGA fabric TAP.

Table 13. JTAGSEL Pin Definition (JP8)

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- **IPMC JTAG (JP9):** This header is used to program the IPMC bit file using a JTAG cable.

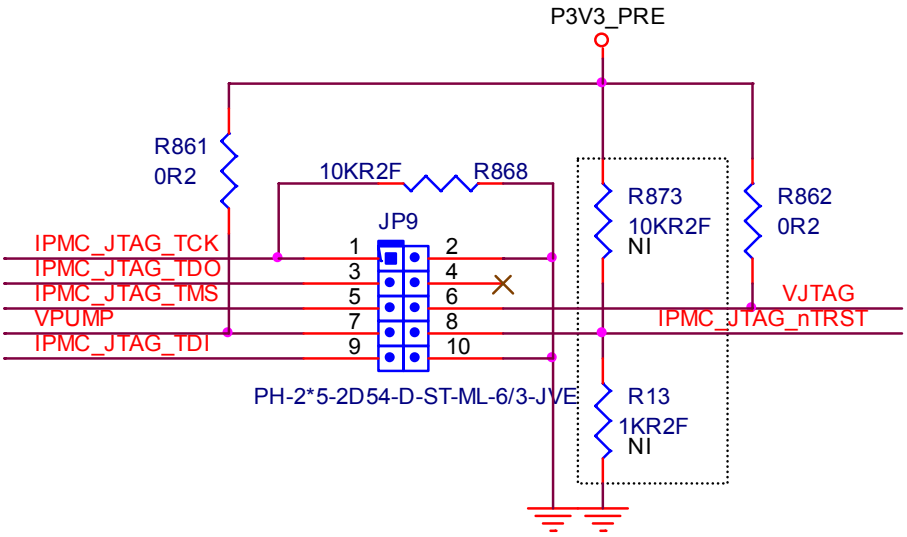


Figure 18. IPMC JTAG Header Schematic (JP9)

- **JTAG Header (JP12):** This header is used to reprogram the CPLD bit file using a JTAG cable.

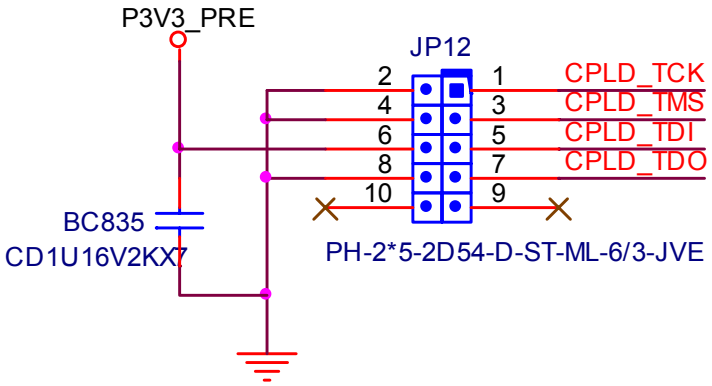


Figure 19. CPLD JTAG Header Schematic (JP12)

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DIP Switches

- **SW1:** SW1 is used to switch between **SPI flash boot** and **SD card boot**. The default setting is SPI flash boot.

SW No.	Mode	Setting		
SW1	SPI Flash	1	OFF	
		2	ON	
		3	ON	
		4	OFF	
	SD Card	1	ON	
		2	OFF	
		3	OFF	
		4	ON	

Table 14. SPI Flash or SD Card Selection (SW1)

- **SW2:** The front panel **serial port** is set to **connect to the LMP console** by default. For testing purposes, the serial port can be configured to connect to the **IPMC console** as shown in the following table. The baud rate is115200 for the LMP console and 9600 for the IPMC debug console.

SW No.	Mode	Setting		
SW2	LMP Console	1	ON	
		2	ON	
		3	OFF	
		4	OFF	
	IPMC Debug Console	1	OFF	
		2	OFF	
		3	ON	
		4	ON	

Table 15. Faceplate Serial Port Selection (SW2)

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- **SW3:** This is a multi-function switch. Pin 1 is used to select **Shelf Mode** or **Stand Alone Mode**. Pin 2 is used to select between **boot from SPI Flash 0** or **boot from SPI Flash 1**. Pin 3 is used to select **compliance to PICMG 3.0** or **PICMG 3.1**. Pin 4 is used to manually close the **Hot Swap switch**. If Pin 4 is "ON" (connected to GND), this has the same effect as closing the Hot Swap switch SW5 (blade inserted).

SW No.	Mode	Setting		Mode	Setting	
SW3	Shelf Mode	1	OFF	Stand Alone Mode	1	ON
	Boot from SPI Flash 0	2	OFF	Boot from SPI Flash 1	2	ON
	PICMG 3.0	3	OFF	PICMG 3.1	3	ON
	Handle	4	OFF	DIP Handle	4	ON

Table 16. Multi-function Switch (SW3)

Programmable Devices

There are programmable devices with their own images on the board. The board is provided with default images programmed for all devices as described in Table 17.

Component	Description	Content
SPI flash memory	SST25VF080B	U-Boot image
IPMC	A2F500M3G-FGG484I	IPMC image
EEPROM	M24256 (256Kb)	IPMI variables
microSD card	DS2M-08GI81AC1ST	Linux and user application
CPLD	LCMX0640C3FTN256C	CPLD Image

Table 17. Programmable Devices

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8.2.2 Connecting to the Blade

Connecting to the aTCA-3710 by COM port

Step 1

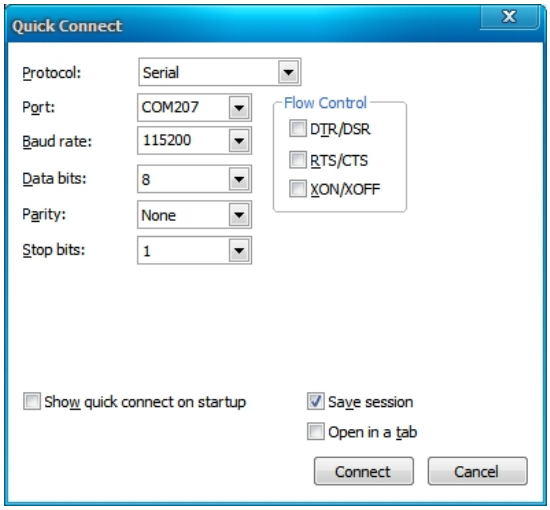
Turn on the aTCA‐3710. Connect the USB port of a laptop/PC to the LMP via the front panel COM port (RJ-45) on the aTCA‐3710 using an RJ-45‐to‐USB adapter.

COM port



Step 2

Start a terminal‐emulator application (e.g. SecureCRT) on the laptop/PC with the settings listed below: corresponding laptop/PC COM port, 115,200 baud, 8 data bits, no parity, one stop bit and no flow.

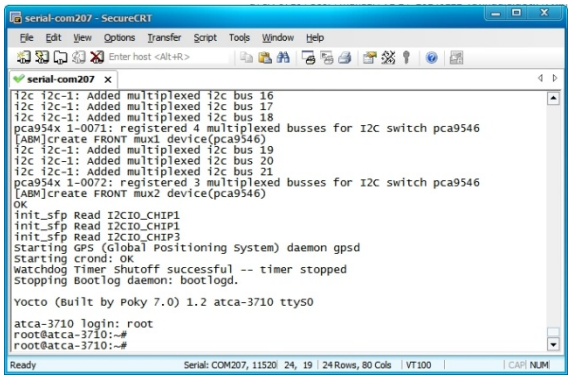


Step 3

Login to the aTCA‐3710.

User: root
Password: (no password)

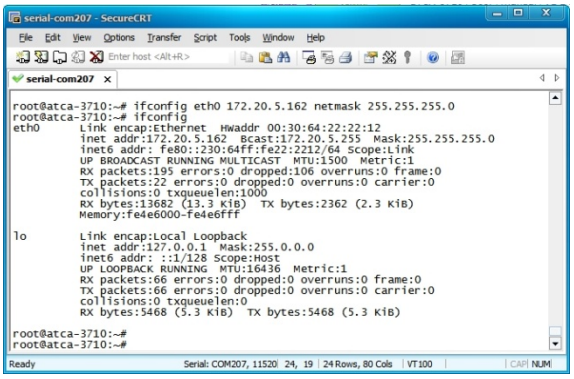
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Step 4

Set IP address of eth0, for example:

```
root@atca-3710:~# ifconfig eth0 172.20.5.162 netmask 255.255.255.0
```



Connecting to the aTCA-3710 remotely

Before connecting to the aTCA-3710 remotely, you must configure the IP address of the LMP management port. If there is no IP address, please configure it first by following the instructions above in “Connecting to the aTCA-3710 by COM port”.

Step 1

Turn on the aTCA‐3710.

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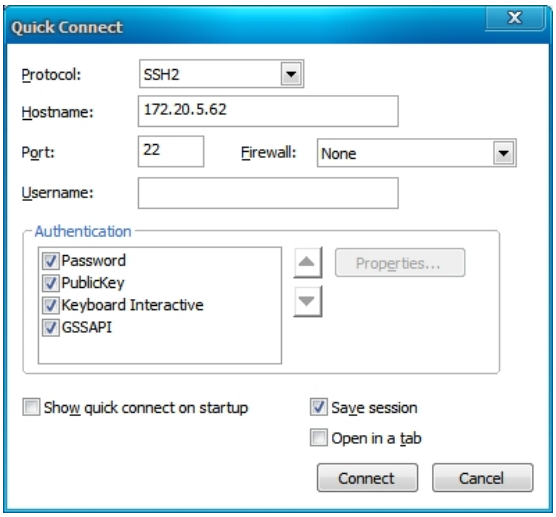
Step 2

Connect the Ethernet port of a laptop/PC to the LMP MGT port on the front panel of the aTCA‐3710 using an Ethernet cable.



Step 3

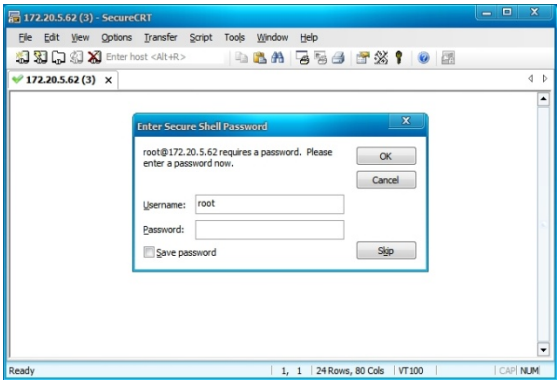
Start a terminal emulator application (e.g. SecureCRT) on the laptop/PC with the IP of the aTCA-3710, for example (assuming IP address of LMP MGT port is 172.20.5.62):



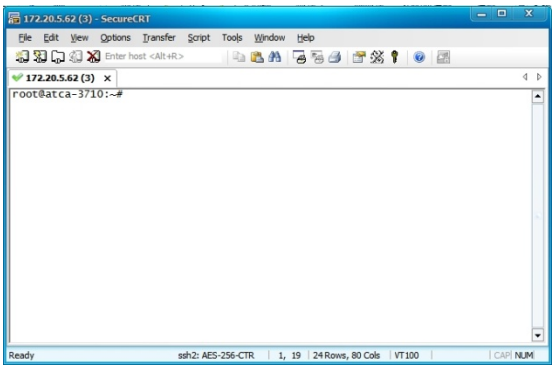
Step 4

Login to the aTCA‐3710.

User: root
Password: (no password)



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8.2.3 Boot into CLI for Base Switch Management

BCM SDK will start automatically when the aTCA-3710 boots up. The user can boot into CLI for Base switch management as follows:

1. Login to the LMP OS.
2. Use “telnet localhost 9895” to access the BCM SMB diagnostic shell.

```
root@atca-3710:/usr/local/bcm# telnet localhost 9895
Trying 127.0.0.1...
Connected to localhost.
Escape character is '^]'.
BCM.0>
```

8.2.4 Boot into CLI for Fabric Switch Management

BCM SDK will start automatically when the aTCA-3710 boots up. The user can boot into the CLI for Fabric switch management as follows:

1. Boot into the CLI for Base switch management first. Please refer to “Boot into CLI for Base Switch Management” above.

2. Change the management CLI from Base switch to Fabric switch.

```
root@atca-3710:/usr/local/bcm# telnet localhost 9895
Trying 127.0.0.1...
Connected to localhost.
Escape character is '^]'.
BCM.0> 1:
Default SOC device set to 1
BCM.1>
```


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9 Configuring and Managing the Fabric Switch

Information on configuring and managing the Fabric switch is contained in the "Broadcom SMB Diagnostic Shell Quick Start Guide". To receive a copy of this document, please contact your ADLINK representative.

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Appendix I. Advanced Operation

Switching I/O between Front Panel and Base Switch

The Fabric Switch (BCM56842) connects to SFP+ ports on the front panel by default. One 10GbE port can be switched to the Base Switch (BCM56334). Refer to Figure 20. Switching I/O between Front Panel and Base Switch.

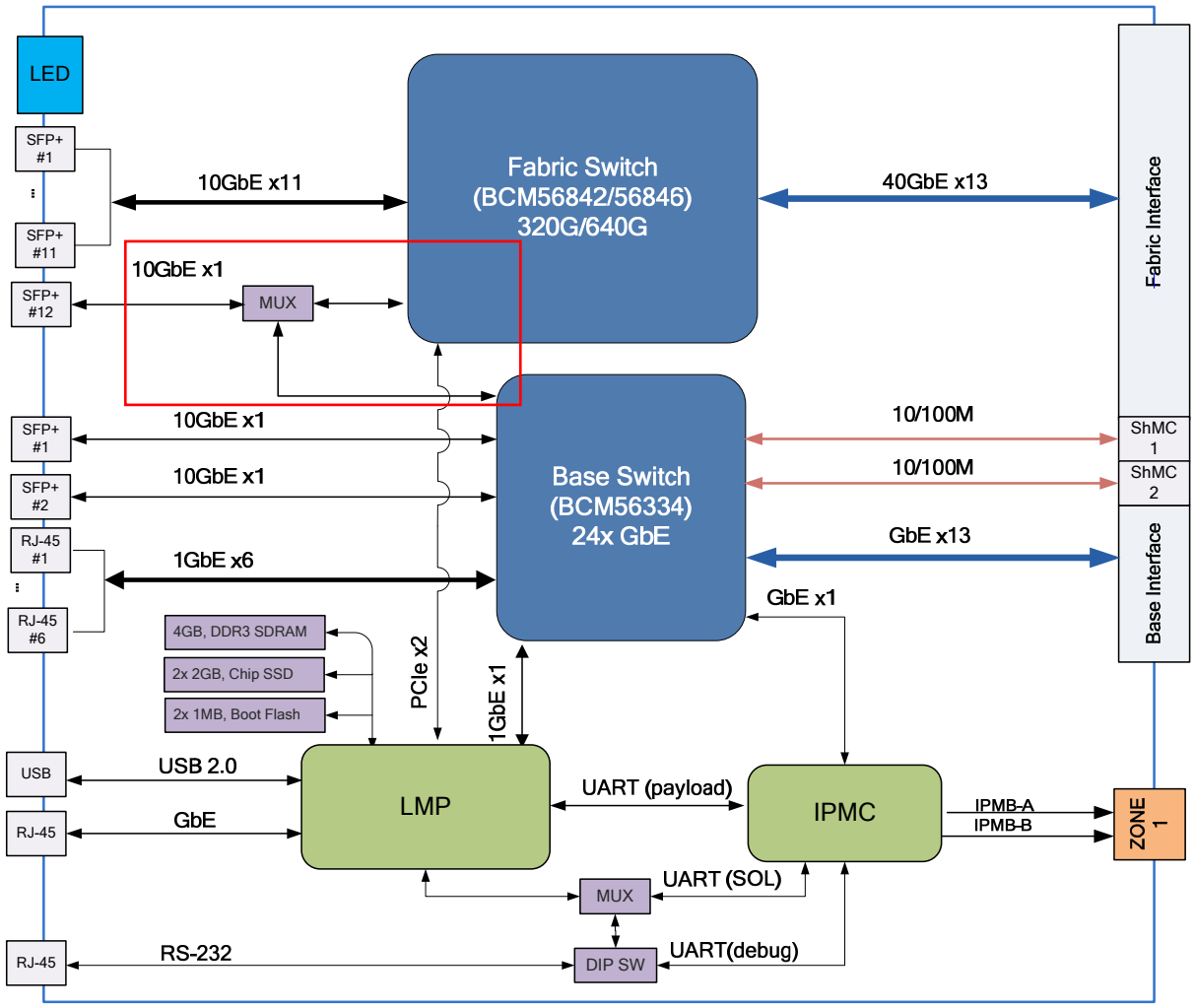


Figure 20. Switching I/O between Front Panel and Base Switch

Check the switch status. The BCM56842 connects to the front panel by default.

```
root@atca-3710:~# ipmitool raw 0x2e 0x71 0x13 0x5f 0x00
  13 5f 00 01
```


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Switch one 10GbE port of the BCM56842 to the Base Switch (BCM56334) and check the status.

```
root@atca-3710:~# ipmitool raw 0x2e 0x70 0x13 0x5f 0x00 0x00
  13 5f 00
root@atca-3710:~# ipmitool raw 0x2e 0x71 0x13 0x5f 0x00
  13 5f 00 00
```

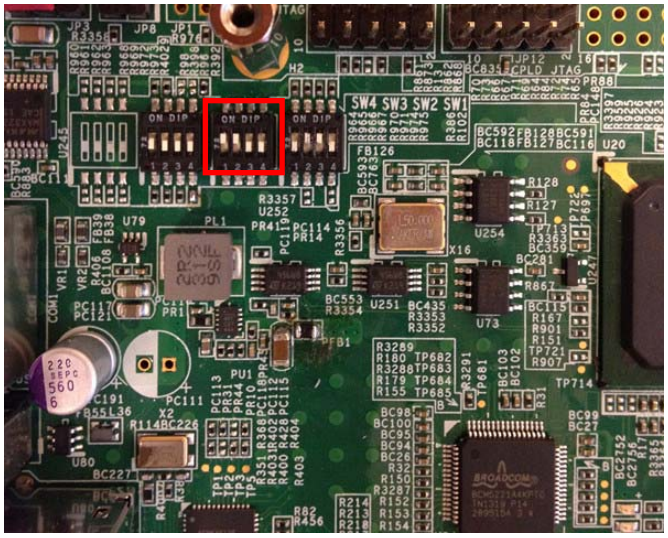
Set the BCM56842 to default status.

```
root@atca-3710:~# ipmitool raw 0x2e 0x70 0x13 0x5f 0x00 0x01
  13 5f 00
```

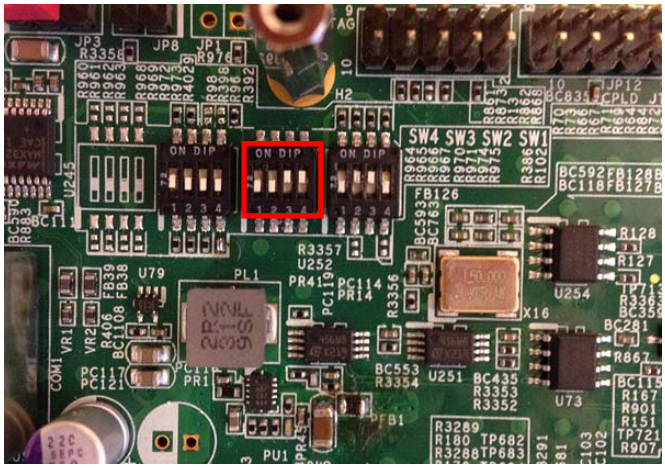
Switch UART Serial Port between Front Panel and IPMC

One UART serial port connects to either the front panel RJ- 45 console port or to the SOL port (Smart Fusion A2F500 UART #0), but not to both at the same time.

The user can switch the RJ-45 serial port on the front panel to connect to either the LMP or to the IPMC. The UART serial port connects to the LMP by default. The DIP switch setting shown is: SW2-1 ON, SW2-2 ON.



The UART serial port connects to the IPMC in debug mode. The DIP switch setting show is: SW2-3 ON, SW2-4 ON.



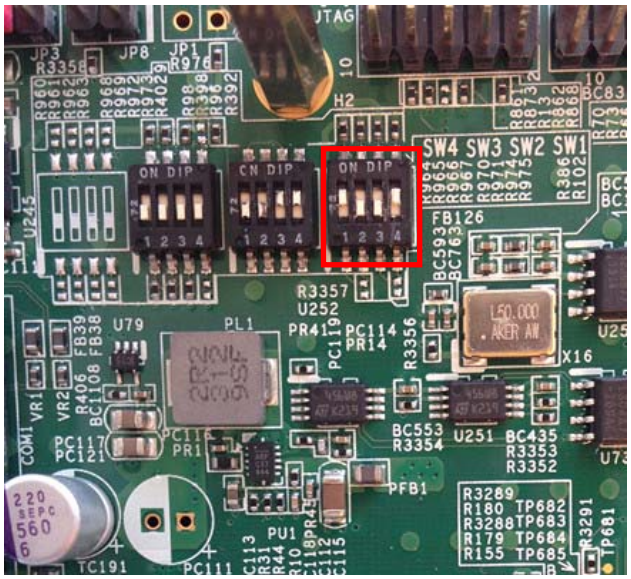
Appendix II. Software Setup/Update/Recovery

U-Boot Installation

Building U-boot

When there is no U-boot on the aTCA-3710, perform the following actions

1. Boot the aTCA-3710 from an SD card, SW1-1 ON, SW1-4 ON.



2. Copy the U-boot firmware to SPI flash.

```
=>mmc read 500000 8 514
=>sf probe 0; sf erase 0 0xa0000; sf write 0x500000 0 0xa0000
```

Updating U-boot

Refer to “BSP/Embedded Linux/BCM SDK Installation” below for detailed information.

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BSP/Embedded Linux/BCM SDK Installation

The steps for BSP installation and updating are the same. Please perform the following actions:

1. Enter U-boot and set MAC addresses

```
=> mac port 2
=> mac 0 00:30:64:22:22:12
=> mac 1 00:31:64:22:11:23
=> mac save
Programming passed.
EEPROM:OK
=> mac
MAC EEPROM Contents:
Eth0: 00:30:64:22:22:12
Eth1: 00:31:64:22:11:23
System Flags: 0xff
CRC: 79c14dc7
```

2. Install TFTP server (tftp-server), put the BSP upgrade files at the tftpboot, a sample tftp configure in CentOS.

```
      service tftp
{
      socket_type       = dgram
      protocol          = udp
      wait              = yes
      user              = root
      server            = /usr/sbin/in.tftpd
      server_args       = -s /home/work/ATCA_3710/target/boot -c
      disable           = no
      per_source        = 11
      cps               = 100 2
      flags             = IPv4
}
```


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```
[root@dell-3 ~]# service xinetd restart
[root@dell-3 ~]# ls /home/work/ATCA_3710/target/boot
atca-3710.dtb                                rootfs.ext2.gz.uboot    vendor-drops.tgz
fsl_fman_ucode_P2041_106_1_4.bin.ucode    u-boot.bin
fsl-image-full-rootfs.tar.gz                 uImage
```

3. Boot into RAM based rootfs.

```
=> setenv ethact FM1@DTSEC4
=> setenv ipaddr 172.20.5.62
=> setenv serverip 172.20.5.198
=> ping 172.20.5.198
Using FM1@DTSEC4 device
host 172.20.5.198 is alive
=> saveenv
=> tftp 1000000 uImage; tftp c00000 atca-3710.dtb;    tftp 2000000 rootfs.ext2.gz.uboot;
=> setenv bootargs root=/dev/ram rw console=ttyS0,115200 ramdisk_size=50000000;
bootm 1000000 2000000 c00000
```

4. Update U-boot/BSP/BCM-SDK by executing /sbin/lmp-installer. Change the IP address and TFTP server IP those of your actual environment, and save the file.

```
root@atca-3710:~# vi /sbin/lmp-installer
ipaddr=172.20.5.252
serverip=172.20.5.198
is640G=1    //for 320G set is640G=0
```

5. Trigger the update. It will take about 15 minutes to complete.

```
root@atca-3710:~# /sbin/lmp-installer
fsl-image-full-rootf     1% |                                        |   3980k    0:01:45 ETA
.............
***** start of config_uenv
***** end of config_uenv
root@atca-3710:~# reboot
```


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Note: The normal upgrade method is performed by executing the command: “root@atca-3710:~# /sbin/lmp-installer”. This upgrades both the main and backup systems at the same time, but incurs a small risk. If the new SDK/BSP image has a boot bug, then the board will not be bootable after the upgrade as both systems will be replaced by the new image. To avoid this risk, the main and backup systems can upgraded separately by running the command: “root@atca-3710:~# /sbin/lmp-installer step”. This allows the user to select which system to upgrade (main or backup).

Redundant LMP Firmware & Boot

The U-boot image is stored in an SPI flash memory. On the aTCA-3710, the LMP has two such U-boot flash memories in a primary and a redundant fashion.

Boot Auto-Switch

The user can enable the boot auto-switch function to U-boot to automatically switch to the redundant flash when the primary flash memory fails.

1. Connect to the aTCA-3710 by COM port and enter U-boot prompt.

```
U-Boot 2011.09-svn15 (Dec 09 2013 - 10:32:33)
CPU0: P2041E, Version: 2.0, (0x82180120)
Core: E500MC, Version: 3.2, (0x80230032)
……
Net:    Initializing Fman
SF:     Detected SST25VF080B with page size 4 KiB, total 1 MiB
Fman1: Data at 7fe32630 is not a firmware
No ethernet found.
Hit any key to stop autoboot:  0
=>
```

2. Enable boot auto-switch and check the status. “0” means the boot auto-switch function is disabled; “1” means the boot auto-switch function is enabled.

```
=> ipmi auto-boot-switch 1
=> ipmi auto-boot-switch
Auto boot switch status: 1 (0: disable, 1: enable)
```

Boot Manual Switch

The user can also manually set which flash memory the U-boot boots from by using a command at the U-boot prompt.

```
=> ipmi active-flash
active-flash: 0
=> ipmi switch-active
=> ipmi active-flash
active-flash: 1
```


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IPMI Firmware Update Procedure

The aTCA-3710 supports firmware update (IPMC FW) over various interfaces (LAN, serial interface or IPMB). Please follow the procedures listed below to update the IPMC firmware.

Note: IPMB-0 will be disabled during the IPMC firmware update process. This is a limitation of the IPMC controller (SmartFusion A2F500).

Update over Serial Interface

The following IPMItool command line parameters are used for communicating with the carrier IPMC via a serial interface:

- **-I serial-terminal**

This parameter instructs the IPMItool utility to use the serial interface for communications with the carrier IPMC.

- **-D <dev[:baudrate]>**

This parameter specifies the serial device and baud rate settings to use. For Linux hosts, the serial device is the system path to the device node (e.g. /dev/ttyS0).

Perform the following steps to update the IPMC firmware:

Step 1: Prepare an external host PC with Linux OS and connect it to the serial port on the aTCA-3710 via the COM port (USB Mini-B on the front panel). Put the IPMItool utility and new firmware image on the host PC. Enter the following command:

```
[root@localhost 3710]# ./ipmitool –I serial-terminal –D /dev/ttyS0:115200 hpm upgrade
hpm1fw.img activate
```

Step 2: Enter “y” when prompted and wait until the string “firmware update procedure successful” is displayed.

Update over LAN

The following IPMItool command line parameters are used for communicating with the carrier IPMC via LAN:

- **-I lan**

The parameter instructs the IPMItool utility to use the RMCP protocol for communicating with the IPMC.

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■ **-H <IP address >**

The parameter specifies the IP address of the IPMC.

Perform the following steps to update firmware:

Step1: Prepare an external host PC with Linux OS and connect it to the target aTCA-3710 via Base Interface. Put the IPMItool utility and the new firmware image on the host PC. Enter the following command:

```
[root@localhost 3710]# ./ipmitool –I lan –H 172.17.172.134 hpm upgrade hpm1fw.img
activate
```

Step2: Select “y” when prompted and wait until the string “firmware update procedure successful” is displayed.

To update other images (IPMC BOOT LOADR, FPGA, etc), just replace the target image and the file name while typing command.

Item	File name
IPMC firmware	hpm1fw.img
IPMC Boot Loader	hpm1boot.img
FPGA	hpm1iap.img

Note:

1. Make sure the payload power is off (M1 state) before updating the FPGA firmware.

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Safety

1. Please read these safety instructions carefully.
2. Please keep this User‘s Manual for future reference.
3. When installing/mounting or uninstalling/removing equipment, turn off power and unplug any power cords/cables. Use a moist towel or cloth for cleaning.
4. For pluggable equipment, the socket-outlet shall be installed near the equipment and shall be easily accessible.
5. Please keep this equipment from humidity.
6. Lay this equipment on a stable surface when installing. A drop or fall could cause injury.
7. Make sure to use recommended voltage and power source settings when connect the equipment to the power outlet.
8. Place the power cord such a way that people cannot step on it. Do not place anything over the power cord.
9. All cautions and warnings on the equipment should be noted.
10. If the equipment is not used for an extended period of time, disconnect the equipment from its power source to avoid being damaged by transient overvoltage.
11. Never pour any liquid into openings; this could cause fire or electrical shock.
12. Never attempt to fix the equipment. For safety reasons, the equipment should only be serviced by qualified personnel.
13. If one of the following situations arises, get the equipment checked by an authorized technician:
    a. The Power cord or plug is damaged.
    b. Liquid has penetrated into the equipment.
    c. The equipment has been exposed to moisture.
    d. The equipment has not work well or you can not get it work according to user‘s manual.
    e. The equipment has dropped and damaged.
    f. If the equipment has obvious sign of breakage.

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Consignes de Sécurité

1. Veuillez lire attentivement ces consignes de sécurité.
2. Veuillez garder ce manuel de l'utilisateur pour référence ultérieure.
3. Une entrée de courant est fournie pour l'entretien de l'appareil débranché. Débrancher l'appareil des prises de courant et utiliser cette entrée de courant avant entretien ou nettoyage. Utilisez un tissu humide ou un chiffon pour le nettoyage.
4. Pour les appareils raccordés, la prise de courant doit être installée près de l'appareil et doit être facilement accessible.
5. Ne pas exposer les appareils à l'humidité.
6. Posez ces appareils sur une surface stable pour les installer. Une chute peut provoquer des blessures.
7. Vérifiez la tension de la source d'alimentation lorsque vous branchez l'appareil à la prise de courant.
8. Placez le cordon d'alimentation de telle manière que personne ne puisse marcher dessus. Ne rien placer sur le cordon d'alimentation.
9. Tous les avertissements concernant ces appareils doivent être respectés.
10. Si un appareil n'est pas utilisé pendant longtemps, débranchez-le du réseau électrique pour éviter qu'il soit endommagé par une surtension.
11. Ne jamais verser de liquide dans les ouvertures, cela pourrait provoquer un incendie ou une décharge électrique.
12. Ne jamais ouvrir l'appareil. Pour des raisons de sécurité, l'appareil ne doit être ouvert que par un personnel qualifié.
13. Si l'une des situations suivantes se présente, faites vérifier l'appareil par le personnel de service :
    g. Le cordon d'alimentation ou la prise sont endommagés.
    h. Du liquide est entré dans l'appareil.
    i. L'appareil a pris l'humidité.
    j. L'appareil ne fonctionne pas bien ou vous ne pouvez pas le faire fonctionner conformément au manuel de l'utilisateur.
    k. L'appareil est tombé et est endommagé.
    l. L'appareil présente des signes évidents de bris.

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