

Edgecore OMP- 800/1600

Switch Specification

Revision .01



OPEN

Compute Project

Revision History

Revision	Date	Author	Description
.01	2/5/2016	Loren Staley	Initial Release

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<u>Description</u>	<u>Manufacturer</u>	<u>Part Number</u>
X86 Broadwell-DE CPU	Intel	XeonD-1548
SDRAM 4GB SO-DIMM w/ECC (x2 DDR4)	Micron	MTA18ASF1G72HZ-2G1A1
USB to NAND Flash 8GB	ATP	AF8GSSGH-AC2
SPI NOR Flash 8MB	Winbound	W25Q128FVSIG
TPM	ST Microelectronics	ST33ZP24AR28PVSP
Ethernet Controller	Intel	WGI210AT
CPLD	Altera	5M1270ZF256C5N
10GeB SPI Flash	Winbond	W25Q32FVSSIG
I210 SPI flash	Winbond	W25Q16DVSSIG
T2080 CPU	Freescale	T2080NSN8TTB
SDRAM (8GB per channel)	UNIGEN	UG10U7211P8UU-BDE *2
USB to NAND Flash 8GB	ATP	AF8GSSGH-AC2
NOR Flash 128MB	MICRON	JS28F00AM29EWA
Trusted Platform Module (TPM)	ST	ST33ZP24AR28PVSK
X86 Rangeley CPU	Intel	C2538 – 2.4GHz 3.0V
SDRAM 4GB SO-DIMM w/ECC (x2)	Innodisk	M3D0-4GHS2LPC 4GB 1.35V
USB to NAND Flash 8GB	ATP	AF8GSSGH-AC1
SPI NOR Flash 8MB (x2)	Winbound	W25Q64FVSSIG
Trusted Platform Module (TPM)	STMicroelectronics	ST33ZP24AR28PVSP ST
FPGA	Microsemi	A2F200M3F-FGG256
LC/FC PCB		
CPLD	Altera	EP4CGX15BF14C8N
Switching Silicon	Broadcom	BCM56960
10/100/1000 PHY	Broadcom	BCM54616S
System		
AC/DC Power Supply	Bel Power	PFE3000-12-069RA
Fans	Delta	FA122A09-F39

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Accton Technology Corporation, through its subsidiary Edgecore Networks.

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Scope

This document outlines the technical specifications for the Edgecore OMP-800/1600 Open Modular Platform submitted to the Open Compute Foundation.

Overview

This document describes the technical specifications of the OMP-800/1600 modular switch. The OMP-800/1600 is a cost optimized switch design focused on Folded CLOS network deployments which support 10G/25G/40G/50G/100G connectivity. The OMP-800/1600 switch supports either 256 or 512 QSFP28 ports that each can operate at 4x10Gb/4x25G with break out cables, 2x50G with break out cables, 40G with standard QSFP+ optics/DAC cables, and 100G with QSFP28 optics/DAC cables.

The OMP-800/1600 is a PHY-Less design with the QSFP28 connections directly attaching to the SERDES interfaces of the Broadcom 56960 switching silicon providing the lowest cost, latency, and power. OMP-800/1600 supports traditional features found in Data Center switches such as:

- Redundant field replaceable power supplies and fan units
- Support for “Front to Back” air flow direction
- Supports a modular CPU card that allows flexibility in the CPU and/or memory configurations that can be offered.
- The OMP-800 is a 10RU design that supports standard Open Rack deployments as well as standard 19” deployments if rotated 90°. (RU is 44.45mm)
- The OMP-1600 is a 20RU design that supports standard Open Rack deployments. (RU is 44.45mm)

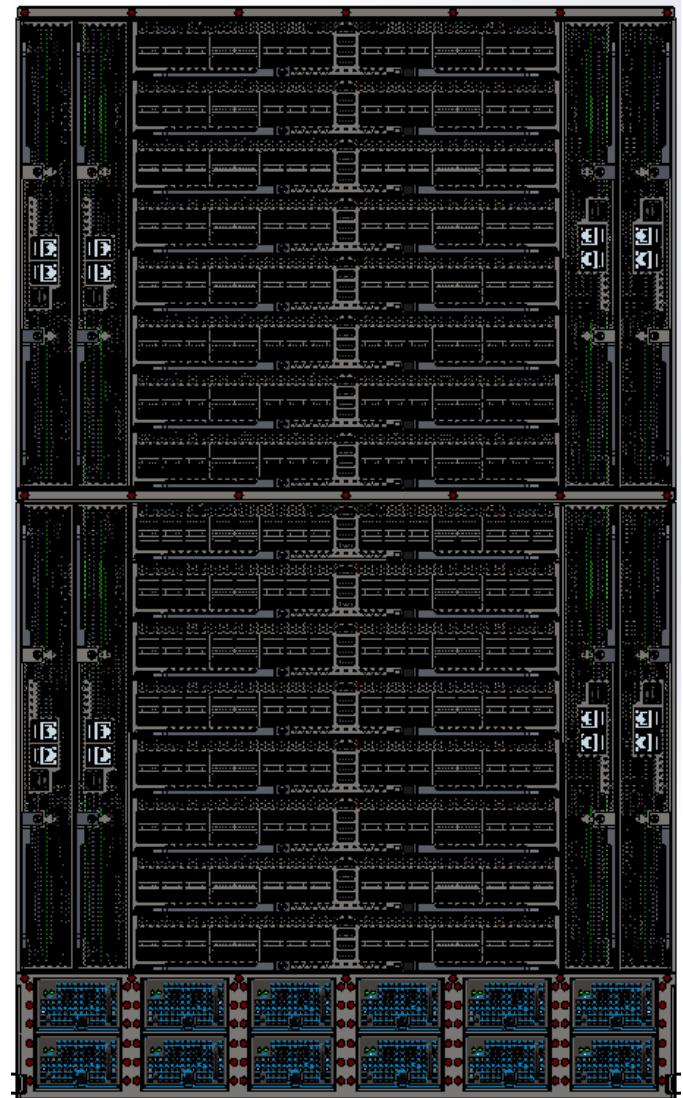
Physical Overview

Dimensions

	Inches	Millimeters
Length	30.0	762.0
Width	21.0	532.0
Height 256	17.5	444.5
Height 512	35.0	889.0

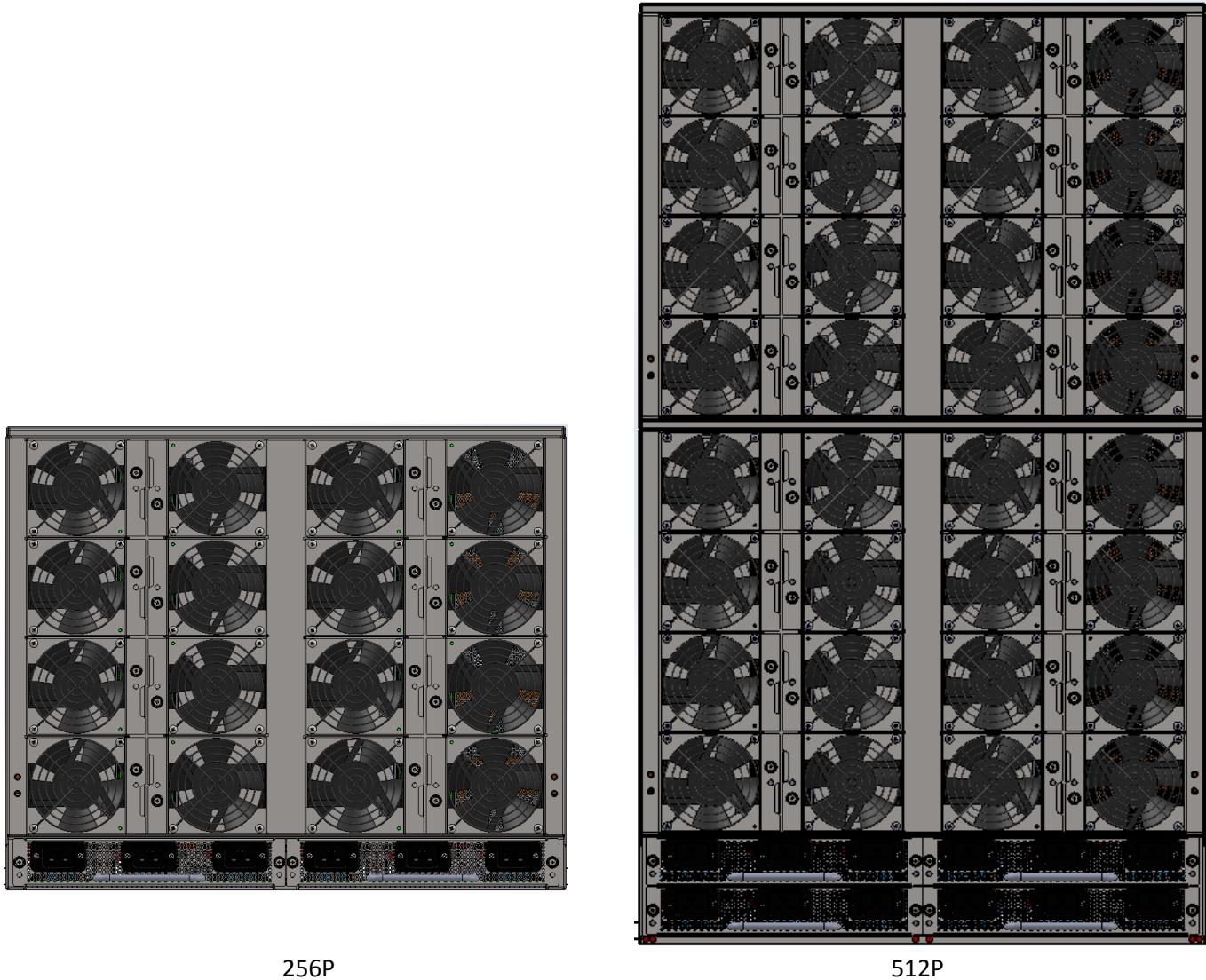


256P



512P

Rear View



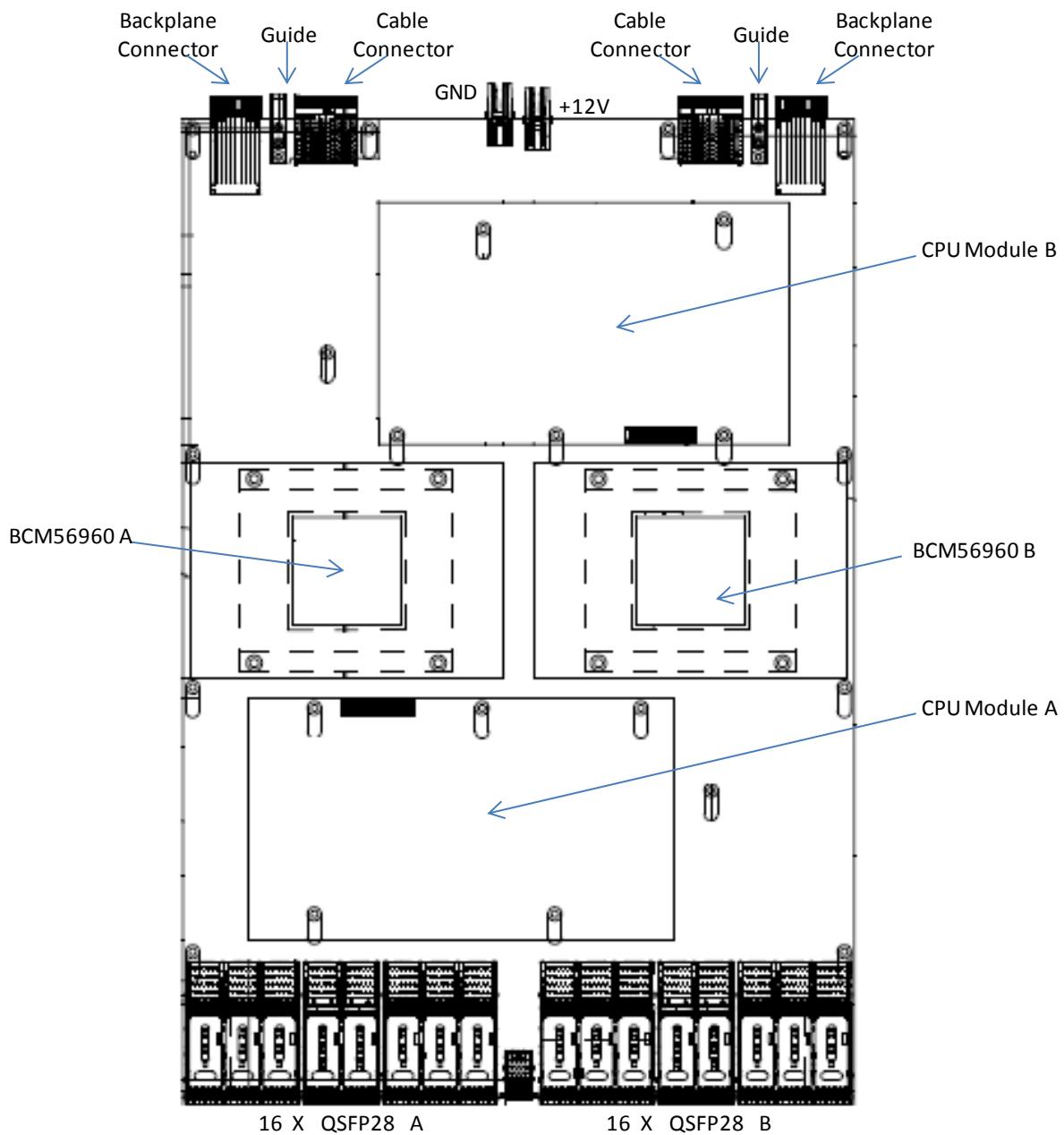
The rear view of the OMP-800/1600 includes the following key components:

- Sixteen or thirty two (4 Zones of 3+1) redundant hot swappable fan modules
 - LED per fan module to indicate status
- Six or twelve (N+N (3+3 or 6+6)) redundant hot swappable power supply modules
 - Two LEDs per power supply to indicate status

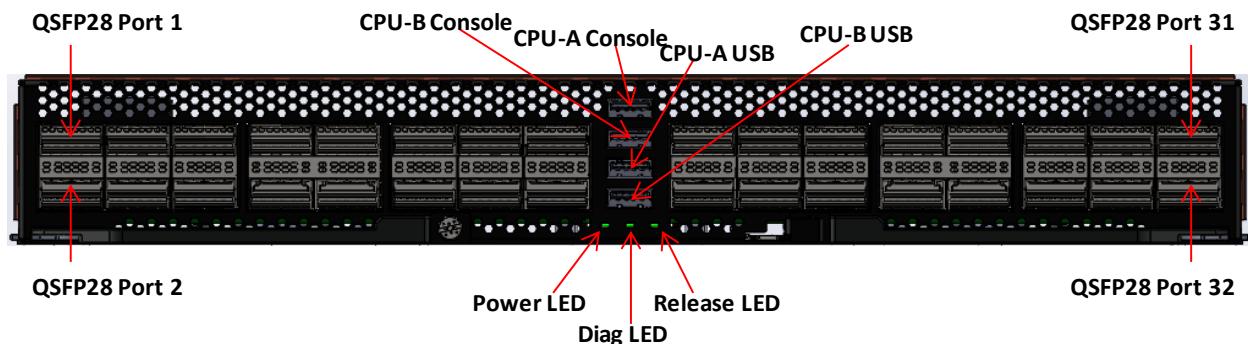
Field Replaceable Units

Top View – Line Card Tray

The top view of the OMP-800/1600 shows the PCBs and associated components in the OMP-800/1600 system



Front View – Line Card Tray



The front panel view of the OMP-800/1600 Line Card includes the following key components:

- Thirty two QSFP28 ports
 - Capable of operating at 100G/50G/40G/10G Ethernet with standard QSFP28/QSFP+ modules and/or appropriate break out cables.
- Status LEDs
- Mini USB 2.0 type "A" ports
 - Used for optional external storage
- Mini USB 2.0 type "A" RS232 console ports
 - Supports asynchronous mode with the default being eight data bits, one stop bit, no parity
- Pull out "Luggage tag" to show model number, serial number, and base MAC addresses

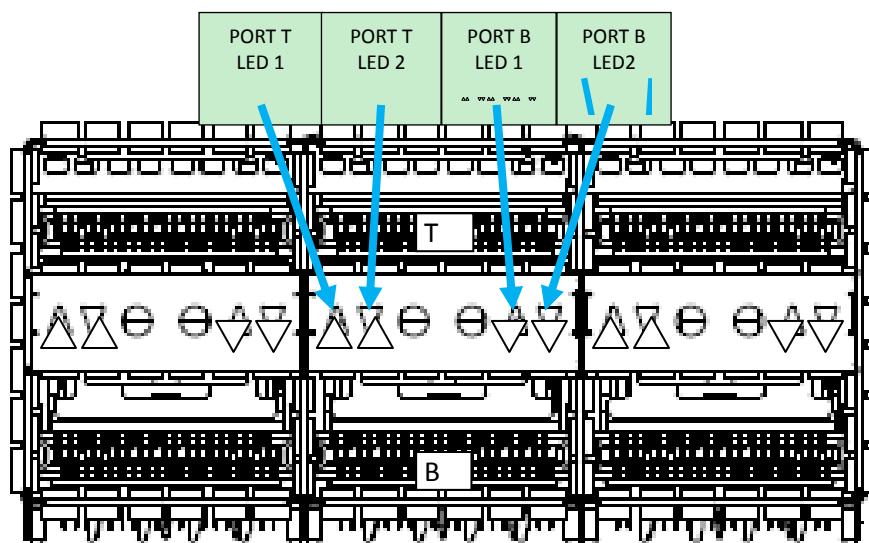
Line Card LED Definitions

OPERATING CONDITION	LED SIGNALING
POWER	
Normal Operation	Solid Green
Error/Failure/Bad	Solid Red,
Not Present	Off
DIAG	
Normal Operation	Solid Green
Error/Failure/Fault	Solid Red
LineCard boot in progress	Blinking Green
LineCard Location Indicated	Solid Blue
RELEASE	
Normal Operation	Solid Green
Release in Progress	Solid Red

LineCard QSFP28 LED Indicators

There are 64 RGB LEDs for 32 ports, and each port uses 2 RGB LEDs. The first LED indicates the configuration of the QSFP28 port. The LineCard supports 100G/40G and 2x50G/4x25G/4x10G breakout modes. Each supported configuration is shown by a different color. The second LED indicates Link (LED on) and Activity (LED blinking) of the QSFP28 port. The LED will be GREEN if each configured lane in the port is PRESENT and LINKED. The LED will be RED if any of the configured lanes is PRESENT and NOT LINKED. The LED will be OFF if no QSFP28 cable/transceiver is PRESENT. The LED CPLDs drive the R/G/B LEDs by de-coding the BCM56960 LED buses.

Note: LED2 blinks to indicate activity.



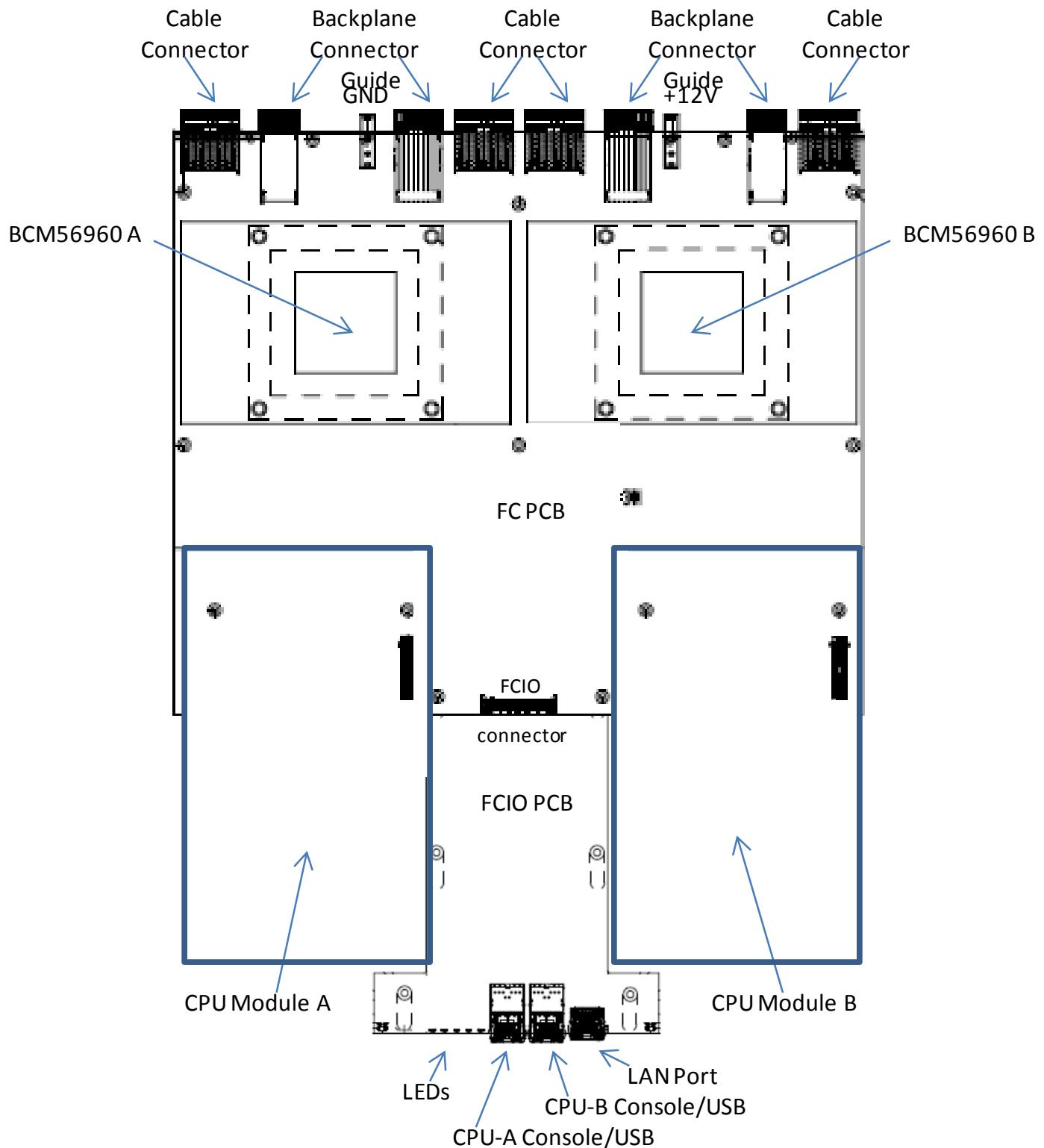
OPERATING CONDITION	LED SIGNALING
CONFIGURATION: LED1	
100G (4 x 25G)	Solid Blue
40G (4 x 10G)	Solid Orange
50G (2 x (2 x 25G))	Solid TBD
25G (4 x (1 x 25G))	Solid White
25G (4 x (1 x 25G))	Solid Green
not present	off
LINK/ACTIVITY: LED2	
All of the configured lanes are linked	Solid Green; blink if activity
Any of the configured lanes are NOT linked	Solid Red; blink if activity
not present	off

QSFP28 Interface Module Support

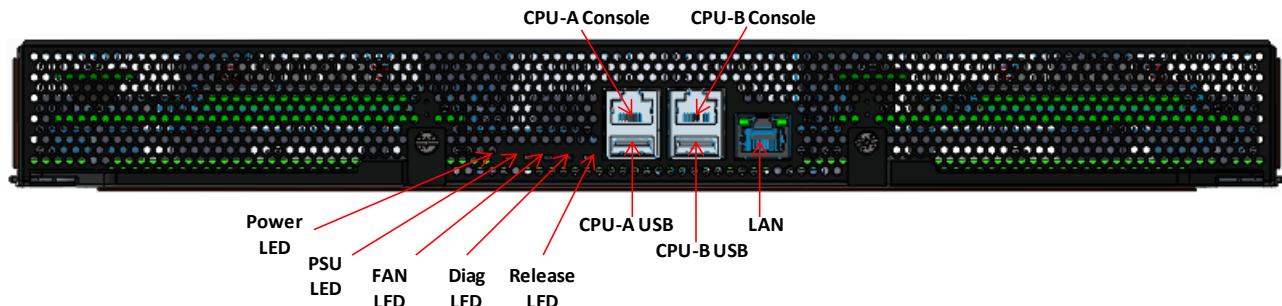
CATEGORY	DESCRIPTION
40Gb QSFP+ Optical Modules	Standard 40Gb QSFP+ modules including but not limited to: 40GBASE-SR4, 40GBASE-LR4, 40GBASE-ER, AOC Cables
40Gb Direct Attach Copper (DAC)	Standard DAC cables including but not limited to: Passive cables up to 7m, QSFP<>QSFP DAC, QSFP<>SFP+ DAC Breakout
QSFP28 Optics	Support for all standards complaint QSFP28 XCVRS including but not limited to 100GBASE-SR4, 100GBASE-LR4
QSFP28 Direct Attach Copper (DAC)	Standard DAC cables including but not limited to: Passive cables up to 3m, QSFP28<>QSFP28 DAC, QSFP28<>SFP28 DAC Breakout

Top View – Fabric Card Tray (includes FCIO PCB)

The top view of the OMP-800/1600 shows the PCBs and associated components in the OMP-800/1600 system



Front View – Fabric Card Tray (includes FCIO PCB)



The front panel view of the OMP-800/1600 Fabric Card includes the following key components:

- Status LEDs
- USB 2.0 type “A” port
 - Used for optional external storage
- RJ45 RS232 management port
 - Supports asynchronous mode with the default being eight data bits, one stop bit, no parity
- RJ45 10/100/1000 Ethernet management port
 - Connected to the integrated management LAN switch
- Pull out “Luggage tag” to show model number, serial number, and base MAC address

Fabric Card LED Definitions

OPERATING CONDITION	LED SIGNALING
POWER	
Normal Operation	Solid Green
Error/Failure/Bad	Solid Red,
Not Present	Off
DIAG	
Normal Operation	Solid Green
Error/Failure/Fault	Solid Red
LineCard boot in progress	Blinking Green
LineCard Location Indicated	Solid Blue
PSU	
Normal Operation	Solid Green
Error/Failure/Fault	Solid Red
FAN	
Normal Operation	Solid Green
Error/Failure/Fault	Solid Red
RELEASE	
Normal Operation	Solid Green
Release in Progress	Solid Red

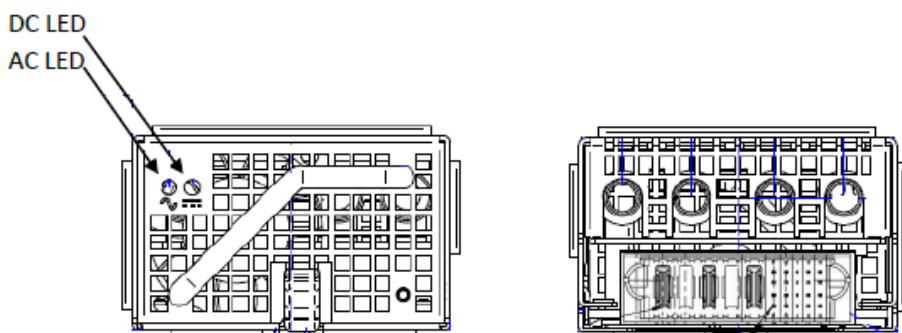
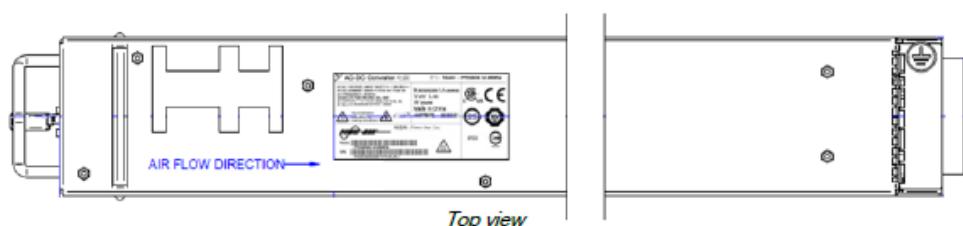
Table 0-1 FabricCard LED Definition

Power Supply Modules

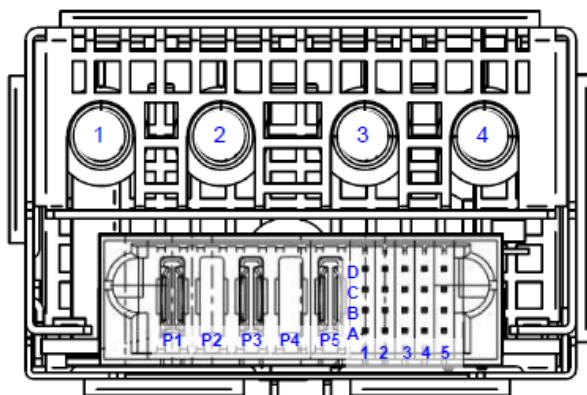
The OMP-800/1600 supports six or twelve redundant power supply modules as listed below

BelPower 3000 Watt PSU: AC Input Range 90-300VAC / 47-63Hz: DC Input Range 192-400VDC
PFE3000-12-069RA

	<u>Inches</u>	<u>Millimeters</u>
Length	21.85	555
Width	2.72	69
Height	1.65	42



PSU Pin-Out



PFE3000-12-069RA		
Pin	Signal Name	Description
3,4	V1	+12 VDC main output
1,2	PGND	+12 VDC main output ground
P1	LIVE	AC Live Pin
P2	N.C.	No connection
P3	NEUTRAL	AC Neutral Pin
P4	N.C.	No connection
P5	P.E.	Protective Earth Pin
A1	PSKILL	Power supply kill: active low
B1	PWOK_L	Power OK signal output: active low
C1	INOK_L	Input OK signal: active low
D1	PSON_L	Power supply on input: active low
A2	PRESENT_L	Power supply present: active low
B2	SGND	Signal ground
C2	SGND	Signal ground
D2	SGND	Signal ground
A3	SCL	I2C clock signal line
B3	SDA	I2C data signal line
C3	SMB_ALERT_L	SMB Alert signal output
D3	ISHARE	V1 current share bus
A4	EEPROM_WP	EEPROM write protect
B4	RESERVED	Reserved
C4	V1_SENSE_R	Main output negative sense
D4	V1_SENSE	Main output positive sense
A5	VSB	Standby positive output
B5	VSB	Standby positive output
C5	VSB_GND	Standby ground
D5	VSB_GND	Standby ground

Table 0-2 PSU Connector Definition

Power Supply LED Indicators

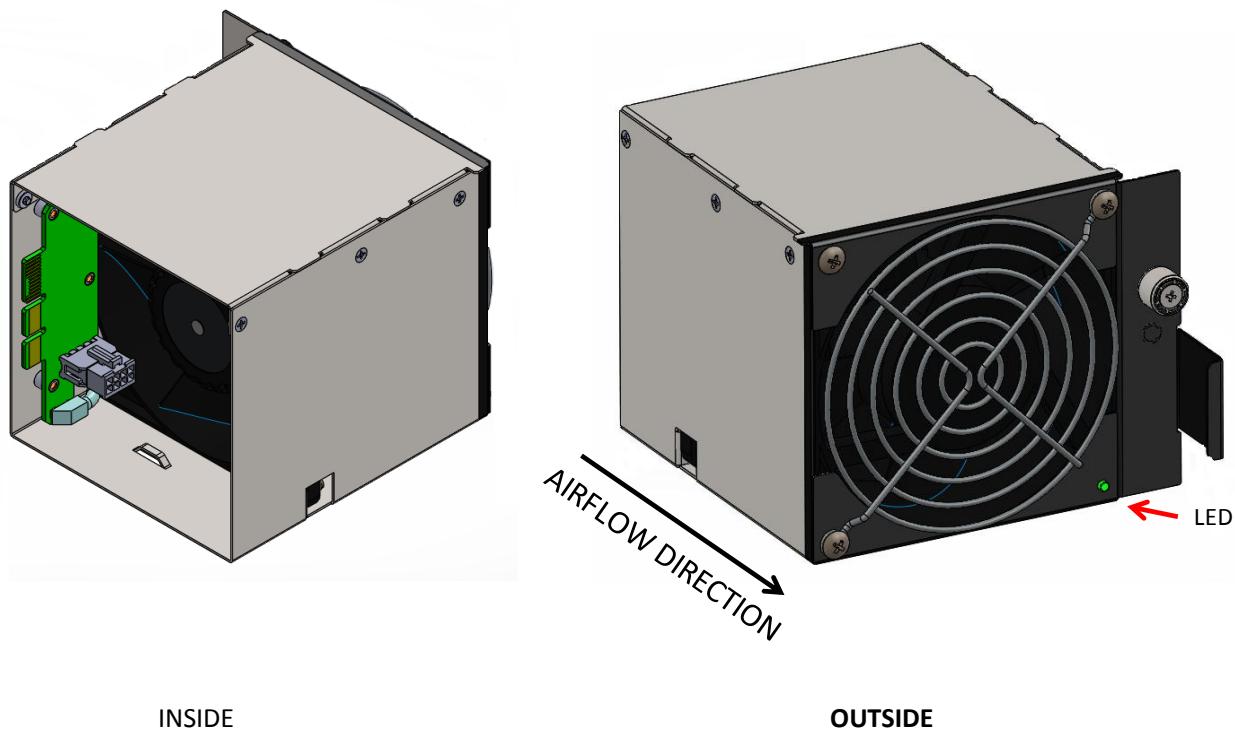
OPERATING CONDITION	LED SIGNALING
AC LED	
AC Line within range	Solid Green
AC Line UV condition	Off
DC LED (5)	
Normal Operation	Solid Green
PSON_L High	Blinking Yellow (1:1)
V1 or VSB out of regulation Over temperature shutdown Output over voltage shutdown (V1 or VSB) Output under voltage shutdown (V1 or VSB) Output over current shutdown (V1 or VSB)	Solid Yellow
Over temperature warning	Blinking Yellow/Green (2:1)
Minor fan regulation error (>5%, <15%)	Blinking Yellow/Green (1:1)

(5) The order of the criteria in the table corresponds to the testing precedence in the controller.

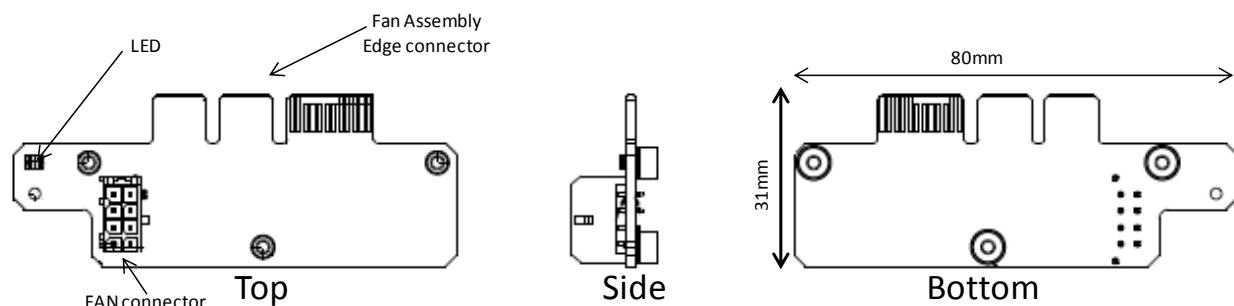
Fan Modules

The OMP-800/1600 supports sixteen or thirty two individual fan modules. Each fan module is a dual fan configuration (2 x 92mmx92mmx38mm) as shown below.

DESCRIPTION	MANUFACTURER	PART NUMBER
Dual Fan	DELTA	FA122A09-F39
	Inches	Millimeters
Length	4.45	113.0
Width	3.75	95.25
Height	3.75	95.25

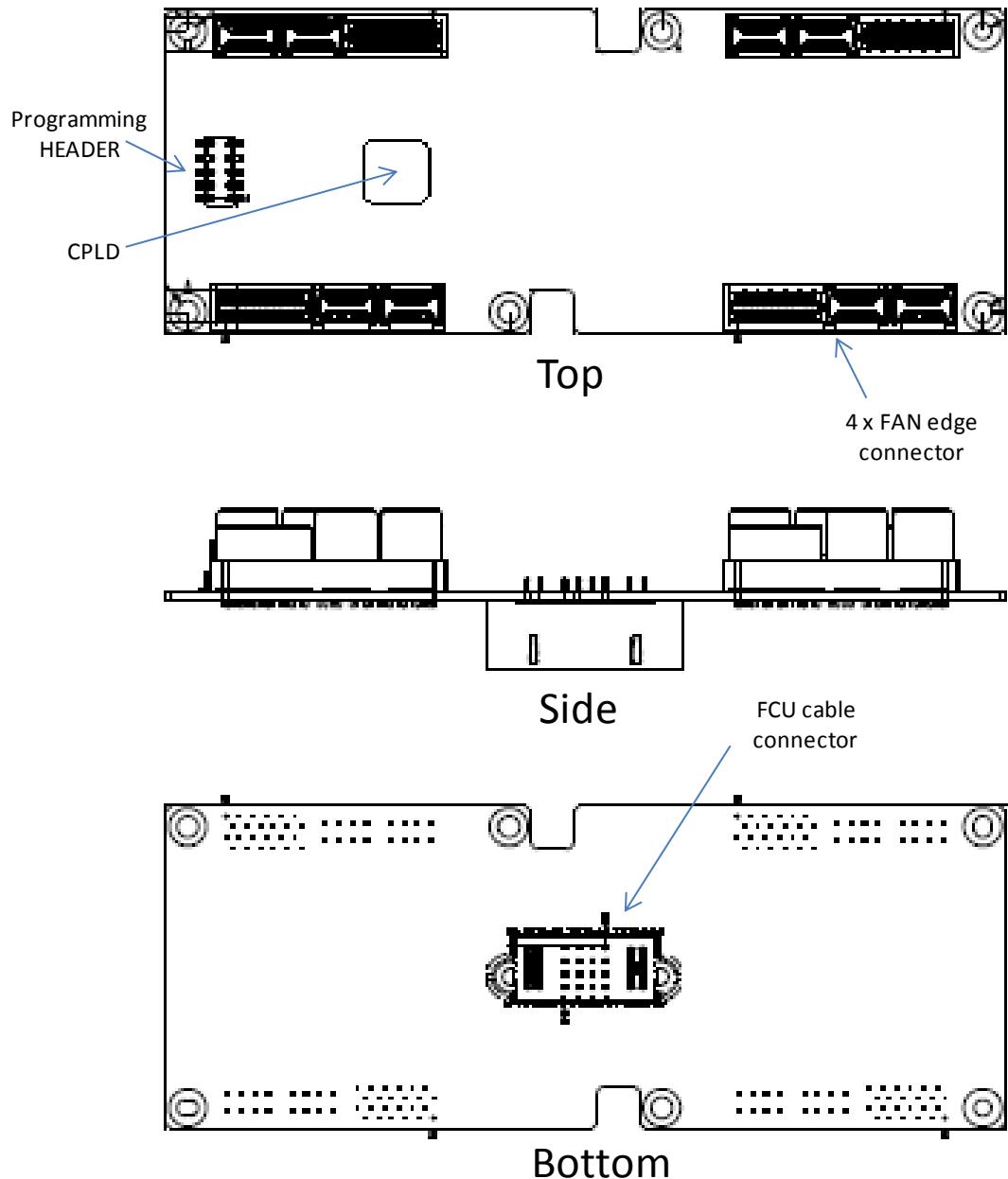


Fan Module PCB



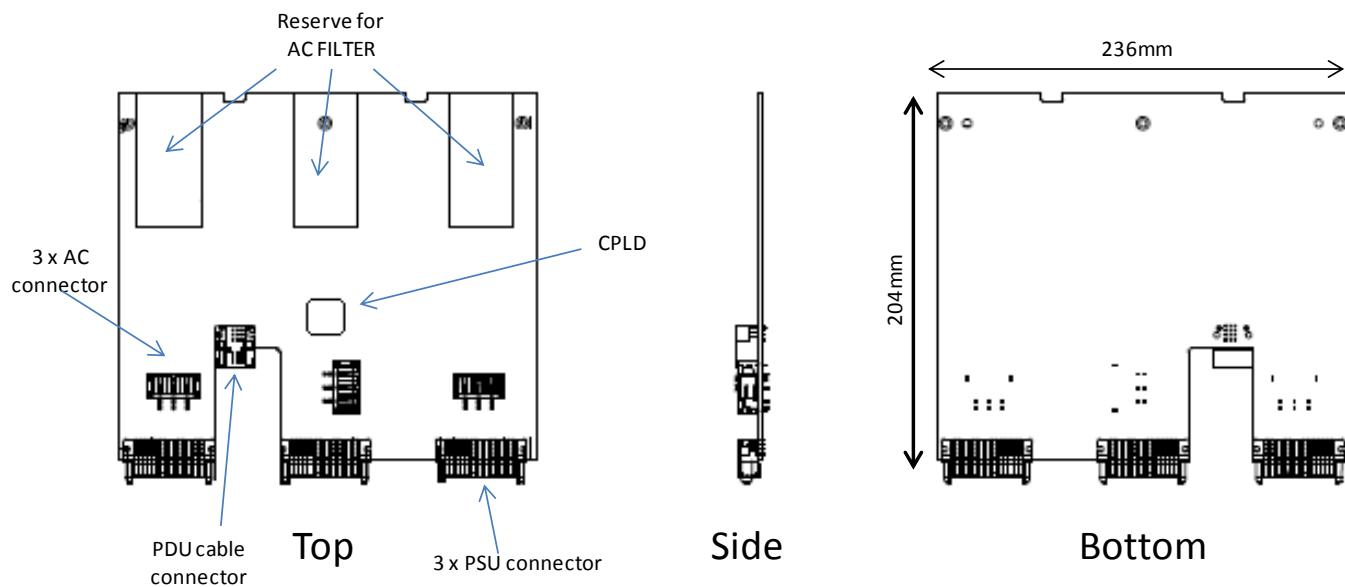
Fan Control Unit (FCU)

The OMP-800/1600 supports four or eight fan zones. Each fan zone uses a Fan Control Unit to control/monitor four FAN modules as shown below.

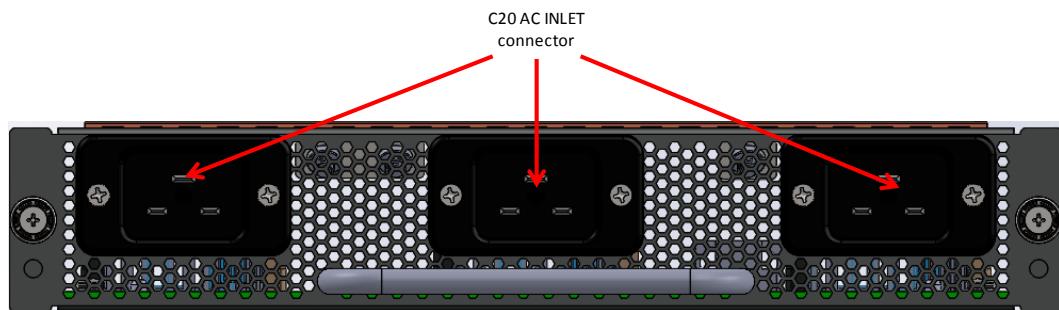


Power Distribution Unit (PDU)

The OMP-800/1600 supports N+N redundant power. Each power zone (N) uses one or two Power Distribution Units (PDU) to control/monitor three Power Supply modules as shown below.



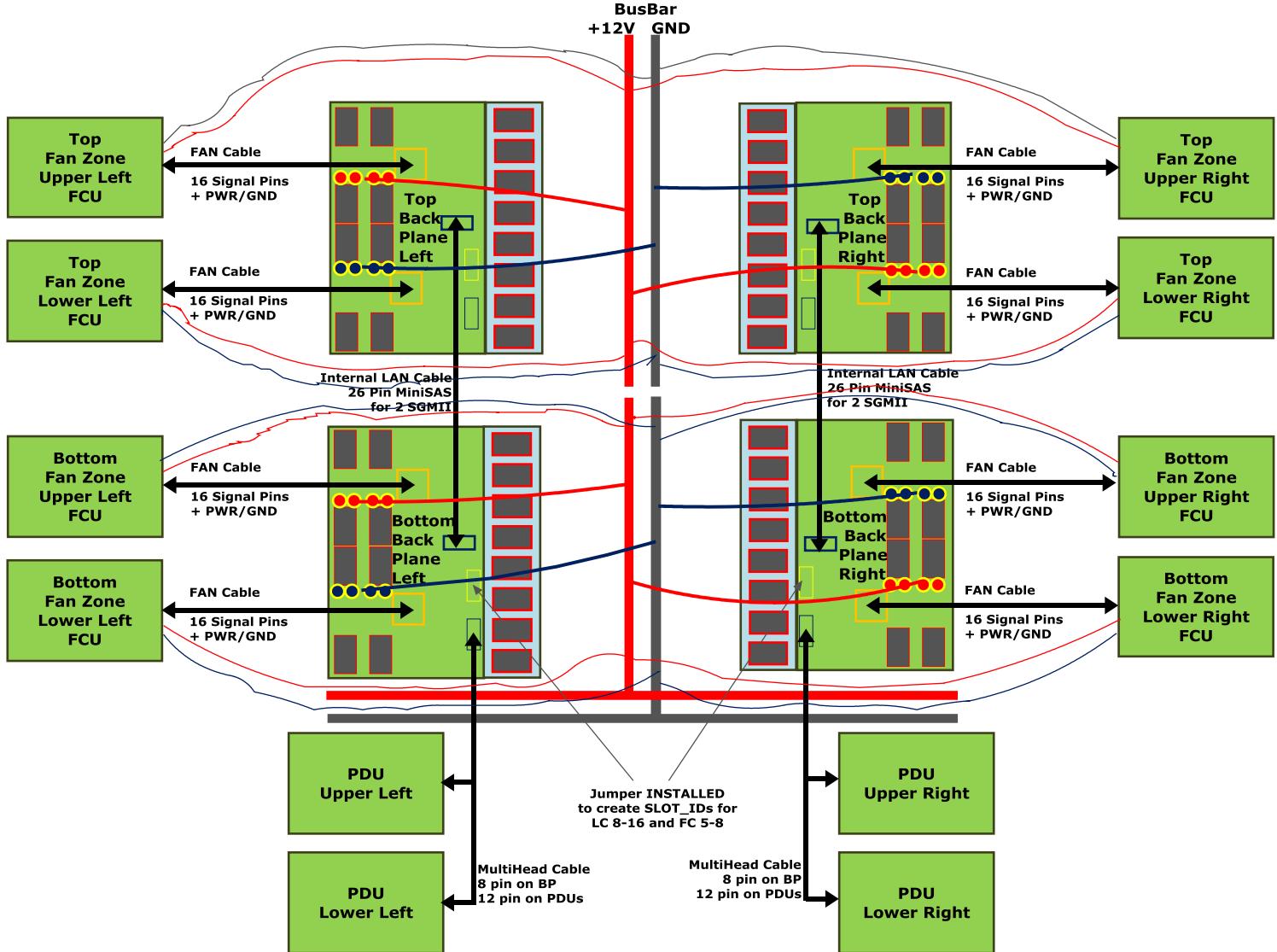
Front View - PDU



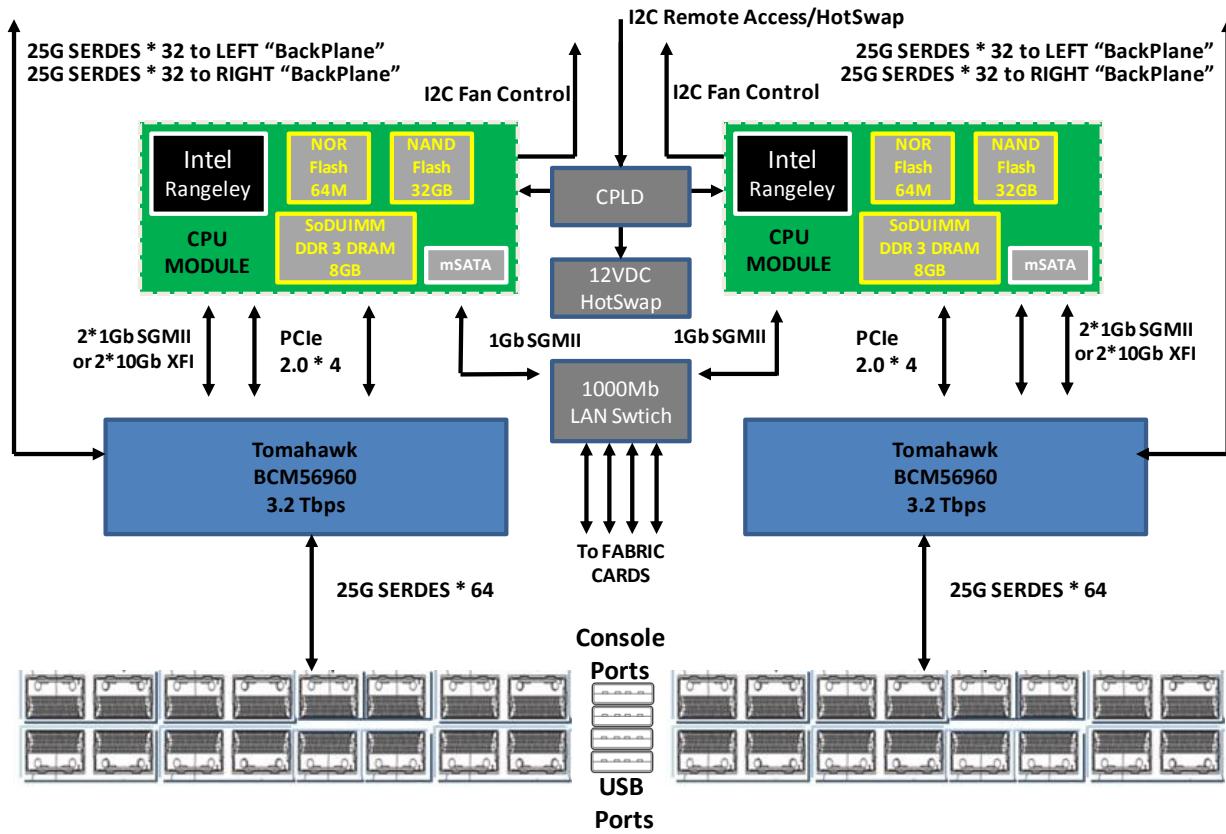
System Overview:

Internal Connections

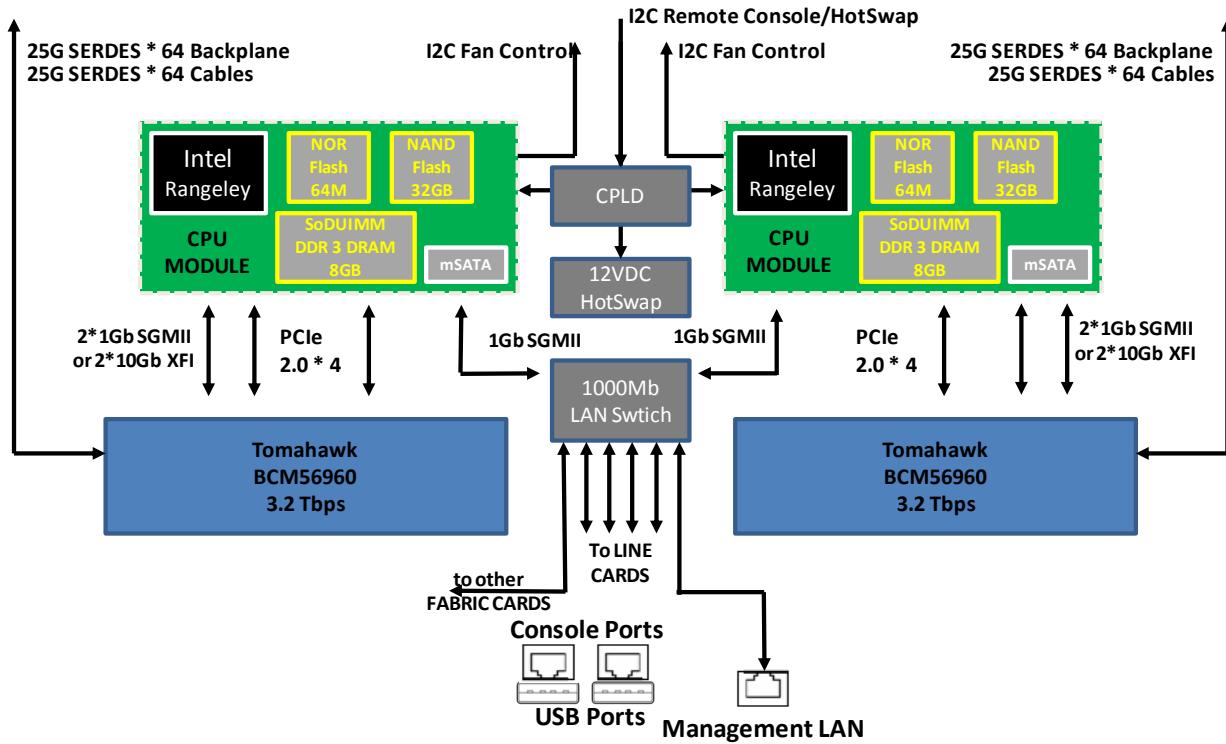
The Chassis uses many technologies to interconnect components internally. The LineCards and FabricCards are connected together using BackPlanes and Cables. Power is delivered to the LineCards directly by a 12V DC bus bar while the FabricCards receive power by cables connected to the bus bar. The FANS are connected using FAN Control Units(PCU) which are then connected to the BackPlanes by cables for signals and to the 12VDC bus bar by cables for power. The PDUs are connected to the BackPlanes by cables for signals and get power directly from the Power Supplies that are connected to a particular PDU. The following diagram show these interconnections.



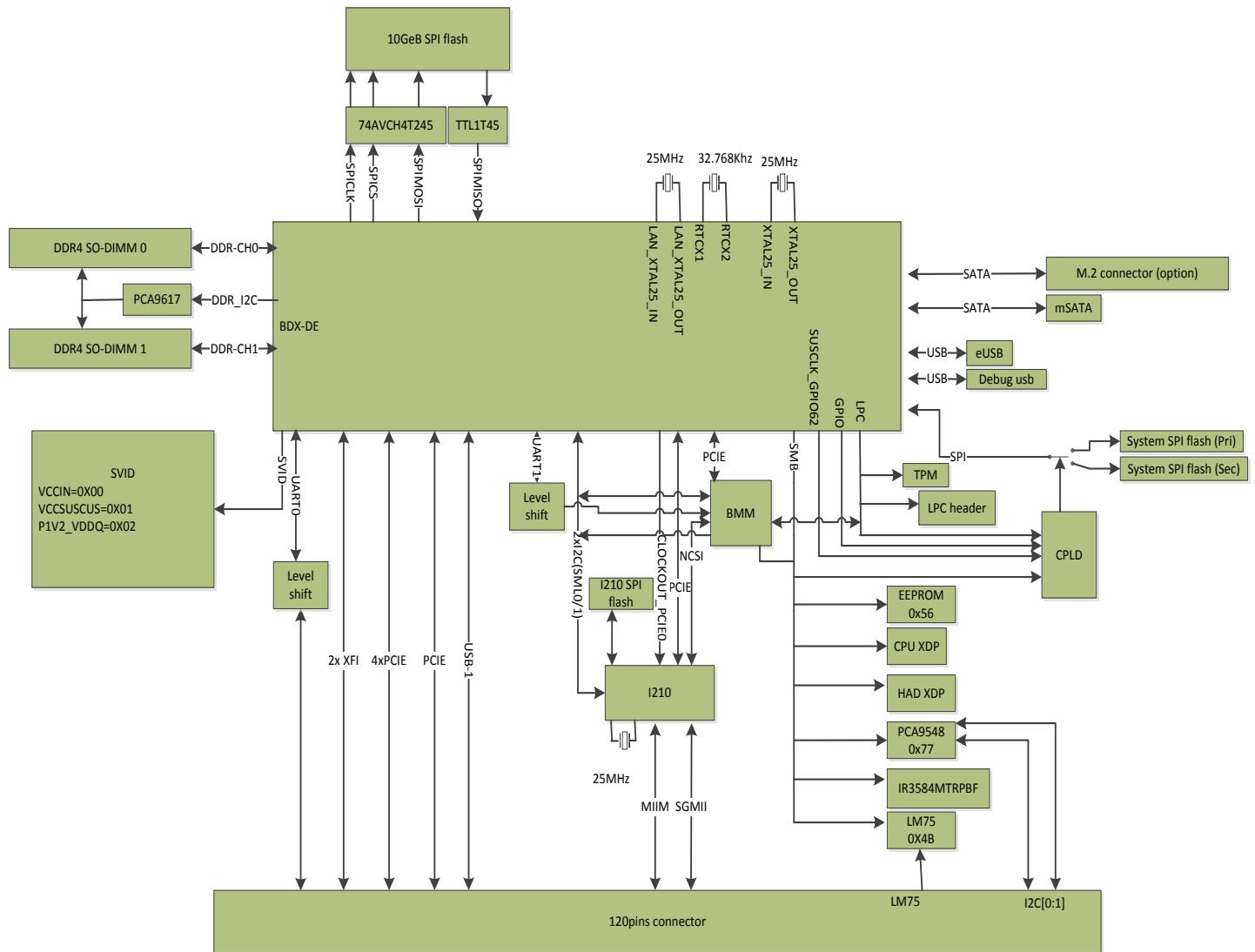
Line Card PCB Block Diagram



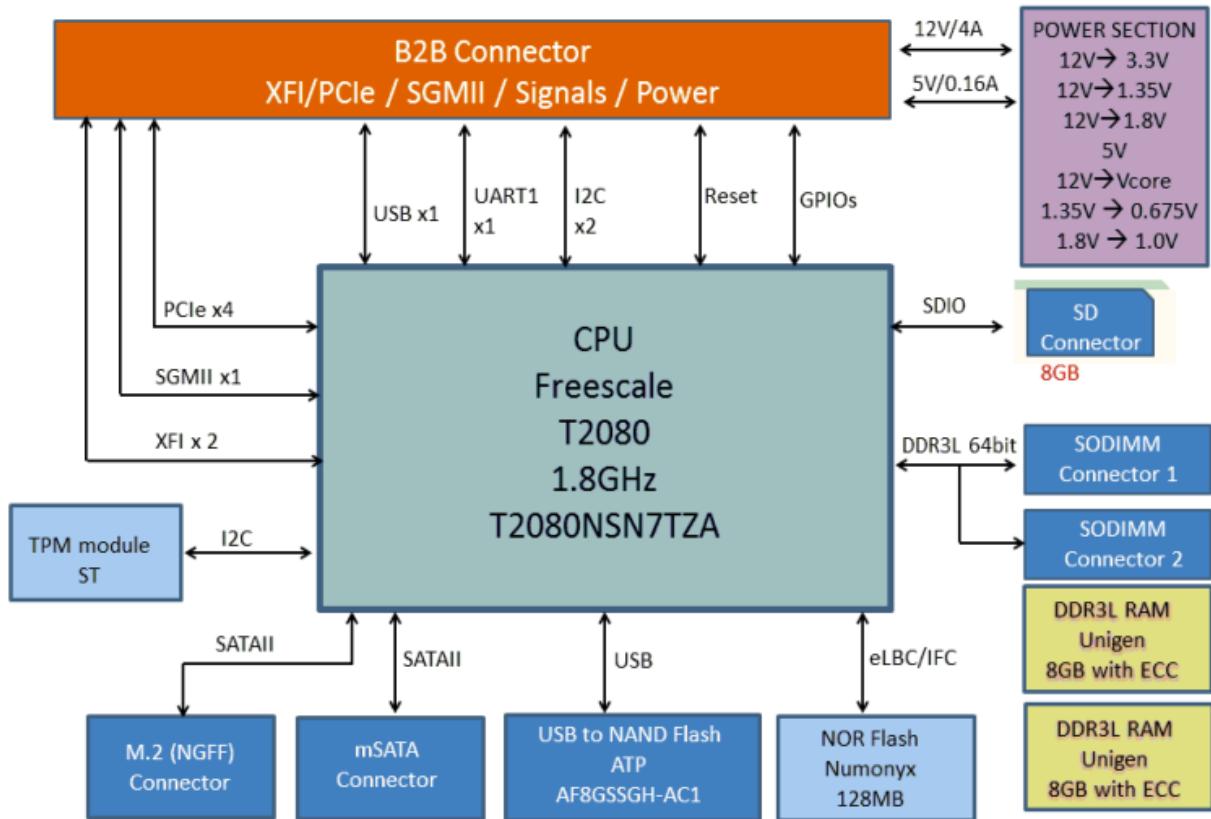
Fabric Card PCB Block Diagram



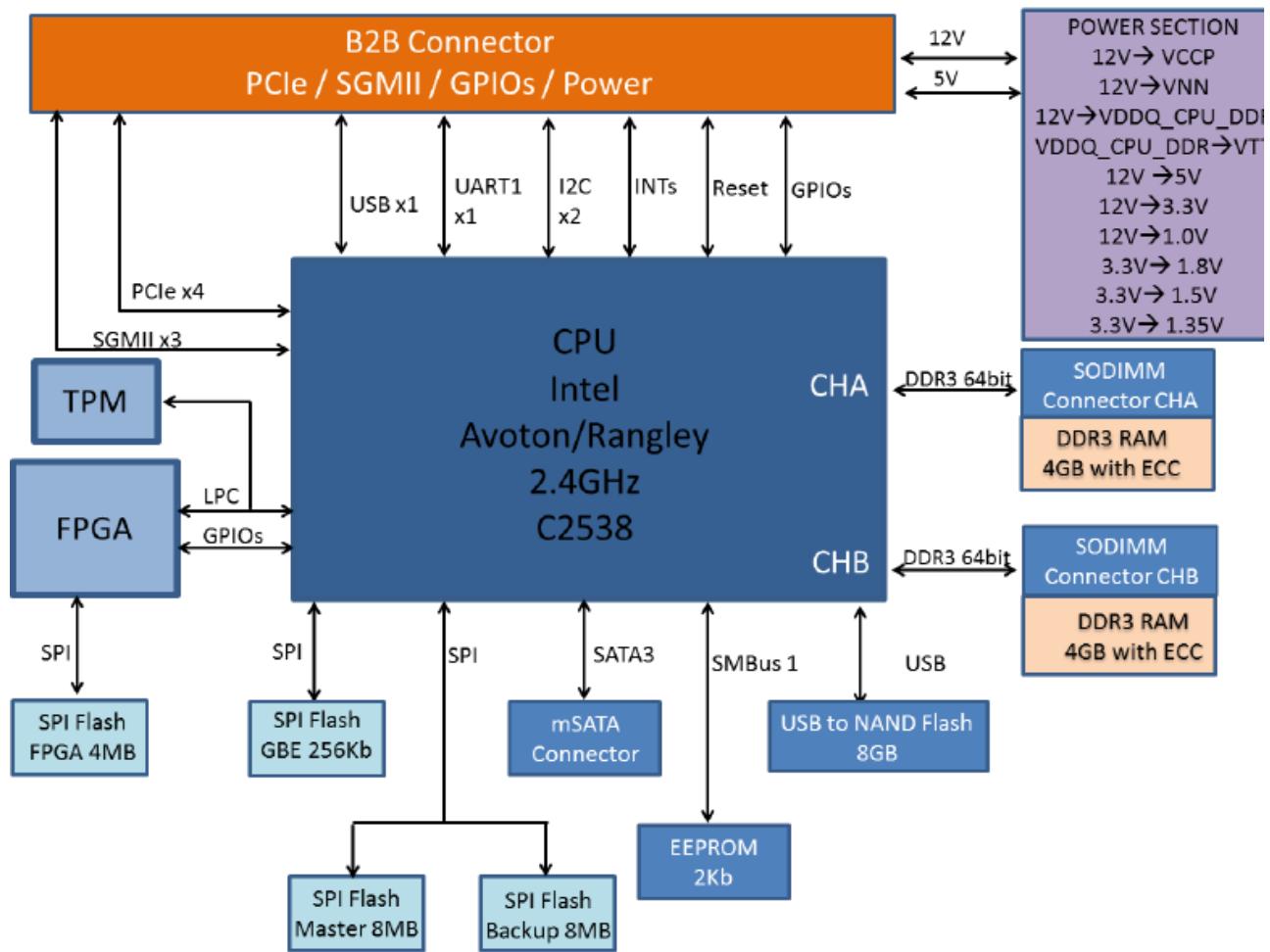
X86 Broadwell-DE CPU Module Block Diagram



T2080 CPU Module Block Diagram



X86 Rangeley CPU Module Block Diagram



PCB Board Set

The OMP-800/1600 is composed of 11 unique PCB assemblies as follows:

- Line Card switch PCB which supports the switching silicon and front panel connections
- Fabric Card switch PCB which supports the switching silicon
- Fabric Card I/O PCB which supports Fabric Card front panel connections
- Right Backplane which provides partial internal system interconnections
- Left Backplane which provides partial internal system interconnections
- X86 Broadwell-DE CPU module PCB which provides the control processor and associated components
- T2080 CPU module PCB which provides the control processor and associated components
- X86 Rangeley CPU module PCB which provides the control processor and associated components
- Fan Control PCB which provides connectivity for 4 Fan modules
- Fan Module PCB which provide fan control for each Fan module
- PDU Module which provides connectivity for 3 PSU modules

Line Card PCB

The Line Card PCB is an eighteen layer board supporting the switching silicon, front panel management ports, status LEDs, and connections to other PCBs required in building the system.

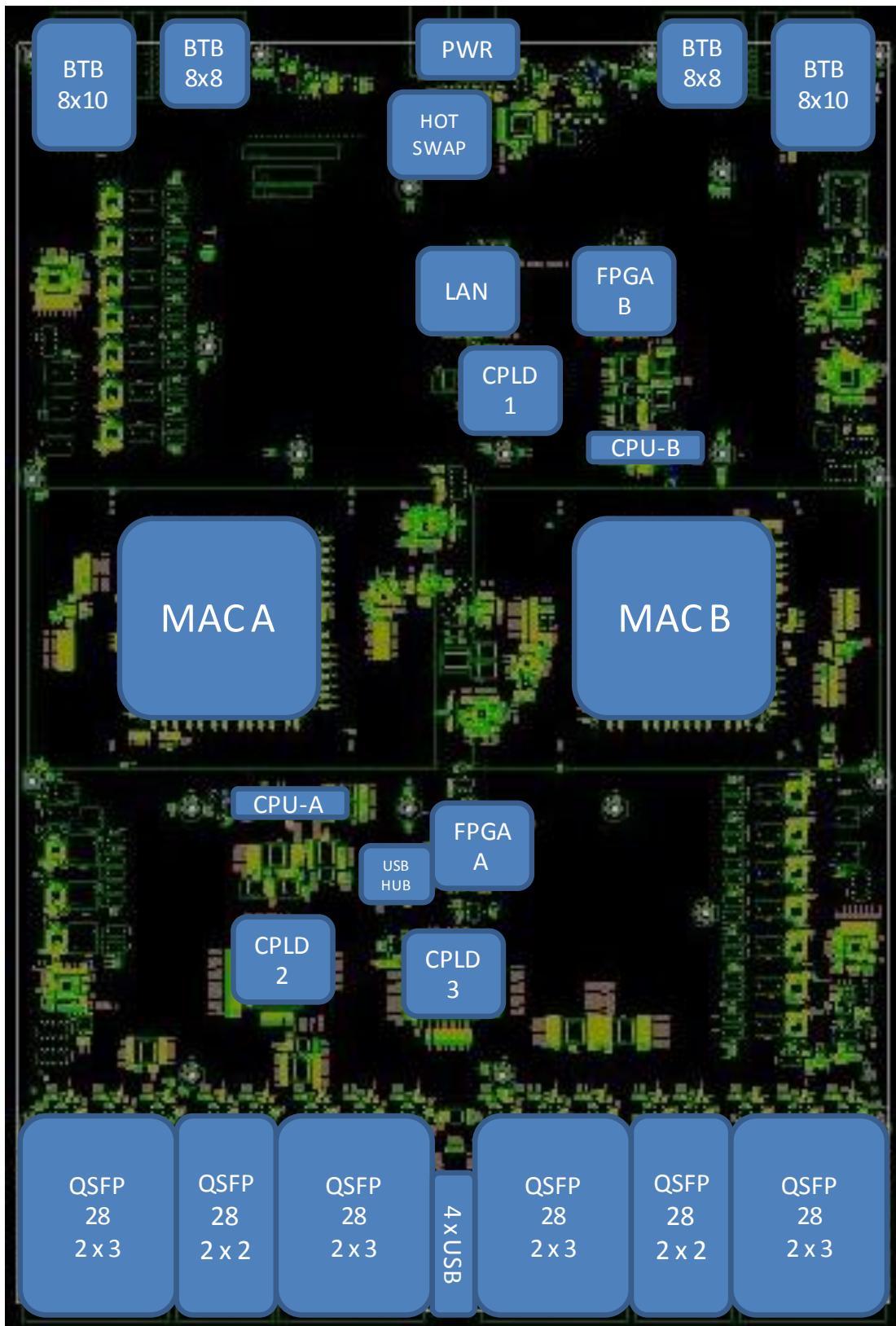
Line Card PCB Dimensions

	Inches	Millimeters
Length	19.70	500.00
Width	13.50	343.00

Line Card PCB major components

Description	Manufacturer	Part Number
MAC Switching Silicon	Broadcom	BCM 56960 (2 pieces)
Cage/Connector QSFP28 2x3	TE Connectivity	2227671-9 (4 pieces)
Cage/Connector QSFP28 2x2	TE Connectivity	2289129-2 (2 pieces)
FPGA	Altera	EP4CGX15BF14C8N (2 pieces)
CPLD	Altera	5M1270ZF256C5N (3 pieces)
4xUSB Connector	LOTES	AUSB0210
B2B connector CPU Module	SAMTEC	BSH-060-01-F-D-A-TR (2 pieces)
LAN	Broadcom	BCM5389
USB HUB	Microchip	USB2524
HOT SWAP	Analog Devices	ADM1278
BTB 8x8	TE Connectivity	2187320-1 (2 pieces)
BTB 8x10	TE Connectivity	2290194-1 (2 pieces)
PWR	TE Connectivity	1551953-1 (2 pieces)

Line Card PCB Top view



Line Card PCB stackup

Material Type	Material Const.		Fill	Type	Thk	Er
				S/M	.5	3.20
				Plt	1.70	
				Sig	.60	
FR408HR	1/2 oz HTE	1		.12	Preg	5.38 2.86
TU933	1035•72% + 1035•76%	2		.80	Pln	.60
High Tg Fr4	1/2 oz HVLP	3		.20	Sig	.60
TU933	.005 (2)1078	4		.60	Preg	6.40 2.93
High Tg Fr4	1/2 oz HVLP	5		.80	Pln	.60
TU933	(2)1078•69%	6		.20	Sig	.60
High Tg Fr4	1/2 oz HVLP	7		.60	Preg	6.40 2.93
TU933	(2)1078•69%	8		.80	Pln	1.20
High Tg Fr4	1 oz RTF	9			Core	5.00 3.07
TU933	.005 2116	10		.80	Pln	2.40
High Tg Fr4	2 oz RTF	11		.96	Preg	11.54 2.99
TU933	(2)1078•69% + 2116•59%	12		.80	Pln	2.40
High Tg Fr4	2 oz RTF	13			Core	5.00 3.11
TU933	.005 2116	14		.80	Pln	1.20
High Tg Fr4	1 oz RTF	15		.72	Preg	6.28 2.93
TU933	(2)1078•69%	16		.20	Sig	.60
High Tg Fr4	1/2 oz HVLP	17			Core	5.00 3.07
TU933	.005 (2)1078	18		.80	Pln	.60
High Tg Fr4	1/2 oz HVLP			.60	Preg	6.40 2.93
TU933	(2)1078•69%			.20	Sig	.60
High Tg Fr4	1/2 oz HVLP				Core	5.00 3.07
TU933	1035•72% + 1035•76%			.80	Pln	.60
FR408HR	1/2 oz HTE			.12	Preg	5.38 2.86
					Sig	.60
					Plt	1.70
					S/M	.5
						3.20

Fabric Card PCB

The Fabric Card PCB is a twenty two layer board supporting the switching silicon and connections to other PCBs required in building the system.

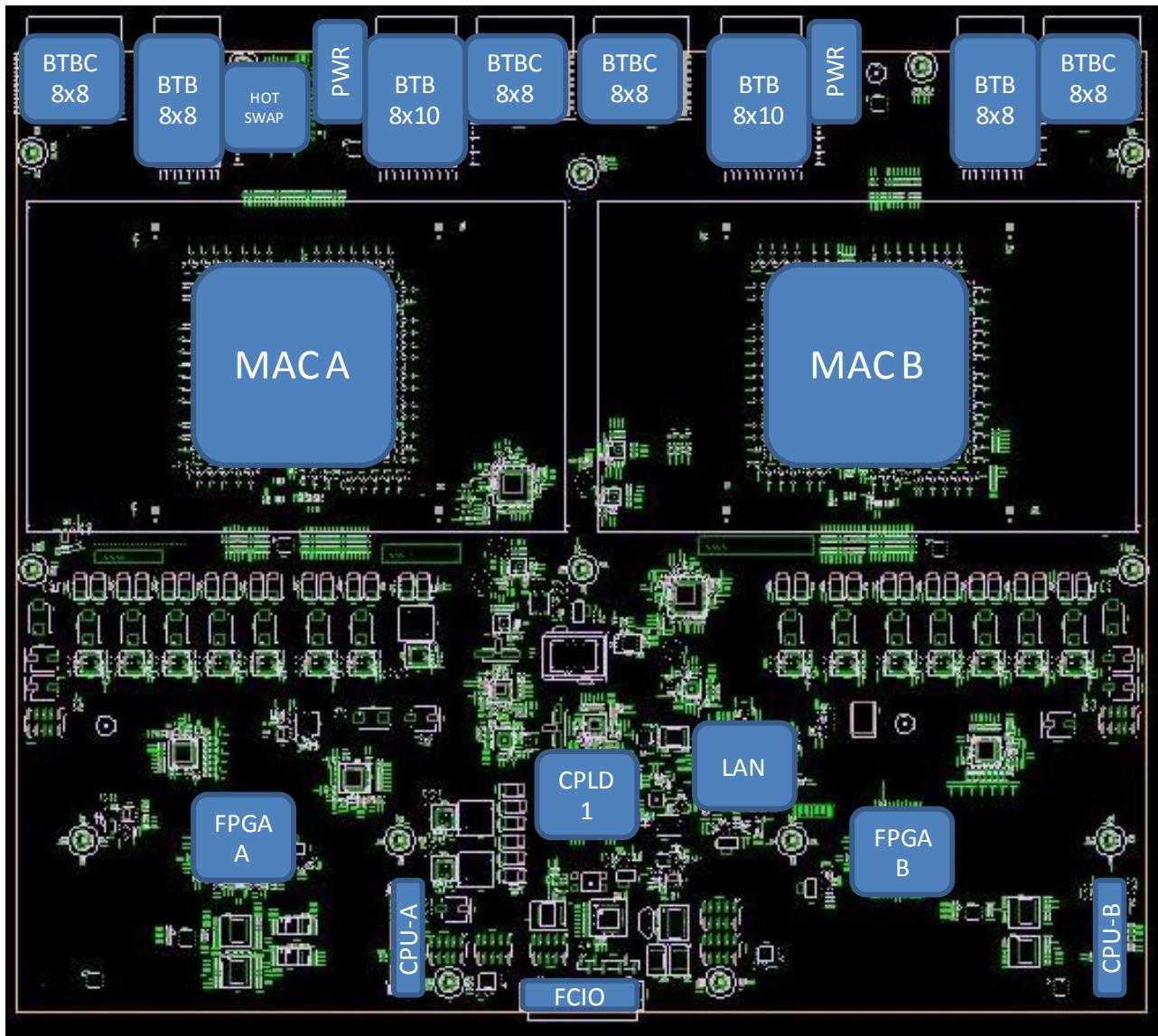
Fabric Card PCB Dimensions

	Inches	Millimeters
Length	12.54	318.50
Width	14.75	374.65

Fabric Card PCB major components

Description	Manufacturer	Part Number
MAC Switching Silicon	Broadcom	BCM 56960 (2 pieces)
FPGA	Altera	EP4CGX15BF14C8N (2 pieces)
CPLD	Altera	5M1270ZF256C5N
B2B connector CPU Module	SAMTEC	BSH-060-01-F-D-A-TR (2 pieces)
B2B connector IO Module	SAMTEC	BSH-060-01-F-D-RA-WT
LAN	Broadcom	BCM5396
HOT SWAP	Analog Devices	ADM1278
BTBC 8x8	TE Connectivity	2187320-1 (4pieces)
BTB 8x8	TE Connectivity	2274730-1 (2 pieces)
BTB 8x10	TE Connectivity	2290194-1 (2 pieces)
PWR	TE Connectivity	2085181-1 (2 pieces)

Fabric Card PCB Top view



Fabric Card PCB stackup

Material Type	Material Const.		Fill	Type	Thk	Er	
					120.1		
			S/M	.5	3.20		
			Plt	1.68			
			Sig	.60			
FR408HR	1/2 oz HTE		.12	Preg	4.88	3.07	
TU933	(2)1078+59%		.80	Pln	.60		
High Tg Fr4	1/2 oz HVLP			Core	5.00	3.07	
TU933	.005 (2)1078		.20	Sig	.60		
High Tg Fr4	1/2 oz HVLP		.60	Preg	4.40	3.07	
TU933	(2)1078+59%		.80	Pln	.60		
High Tg Fr4	1/2 oz HVLP			Core	5.00	3.07	
TU933	.005 (2)1078		.20	Sig	.60		
High Tg Fr4	1/2 oz HVLP		.60	Preg	4.40	3.07	
TU933	(2)1078+59%		.80	Pln	.60		
High Tg Fr4	1/2 oz HVLP			Core	5.00	3.07	
TU933	.005 (2)1078		.20	Sig	.60		
High Tg Fr4	1/2 oz HVLP		.60	Preg	4.40	3.07	
TU933	(2)1078+59%		.80	Pln	.60		
High Tg Fr4	1/2 oz HVLP			Core	5.00	3.07	
TU933	.005 (2)1078		.20	Sig	.60		
High Tg Fr4	1/2 oz HVLP		.60	Preg	4.40	3.07	
TU933	(2)1078+59%		.80	Pln	.60		
High Tg Fr4	1/2 oz HVLP			Core	5.00	3.07	
TU933	.005 (2)1078		.20	Sig	.60		
High Tg Fr4	1/2 oz HVLP		.60	Preg	4.40	3.07	
TU933	(2)1078+59%		.80	Pln	.60		
High Tg Fr4	1 oz RTF			Core	3.00	3.00	
TU933	.003 1078		.80	Pln	1.20		
High Tg Fr4	2 oz RTF			Core	3.00	3.00	
TU933	(3)1078+64%		.80	Pln	2.40		
High Tg Fr4	2 oz RTF			.96	Preg	8.04	3.00
TU933	.003 1078		.80	Pln	2.40		
High Tg Fr4	1 oz RTF			Core	3.00	3.00	
TU933	(2)1078+59%		.80	Pln	1.20		
High Tg Fr4	1/2 oz HVLP			.72	Preg	4.28	3.07
TU933	.005 (2)1078		.80	Pln	2.40		
High Tg Fr4	1/2 oz HVLP			Core	3.00	3.00	
TU933	(2)1078+59%		.80	Pln	1.20		
High Tg Fr4	1/2 oz HVLP			.72	Preg	4.28	3.07
TU933	.005 (2)1078		.80	Pln	2.40		
High Tg Fr4	1/2 oz HVLP			Core	5.00	3.07	
TU933	(2)1078+59%		.80	Pln	1.20		
High Tg Fr4	1/2 oz HVLP			.60	Preg	4.40	3.07
TU933	.005 (2)1078		.80	Pln	2.40		
High Tg Fr4	1/2 oz HVLP			Core	5.00	3.07	
TU933	(2)1078+59%		.80	Pln	1.20		
High Tg Fr4	1/2 oz HVLP			.60	Preg	4.40	3.07
TU933	.005 (2)1078		.80	Pln	2.40		
High Tg Fr4	1/2 oz HVLP			Core	5.00	3.07	
TU933	(2)1078+59%		.80	Pln	1.20		
High Tg Fr4	1/2 oz HVLP			.60	Preg	4.40	3.07
TU933	.005 (2)1078		.80	Pln	2.40		
High Tg Fr4	1/2 oz HVLP			Core	5.00	3.07	
TU933	(2)1078+59%		.80	Pln	1.20		
High Tg Fr4	1/2 oz HVLP			.60	Preg	4.40	3.07
TU933	.005 (2)1078		.80	Pln	2.40		
High Tg Fr4	1/2 oz HVLP			Core	5.00	3.07	
TU933	(2)1078+59%		.80	Pln	1.20		
High Tg Fr4	1/2 oz HVLP			.60	Preg	4.40	3.07
TU933	.005 (2)1078		.80	Pln	2.40		
High Tg Fr4	1/2 oz HVLP			Core	5.00	3.07	
TU933	(2)1078+59%		.80	Pln	1.20		
FR408HR	1/2 oz HTE			.60	Preg	4.40	3.07
				.20	Sig	.60	
				.12	Preg	4.88	3.07
				.80	Plt	1.68	
				S/M	.5	3.20	-

Fabric Card IO PCB

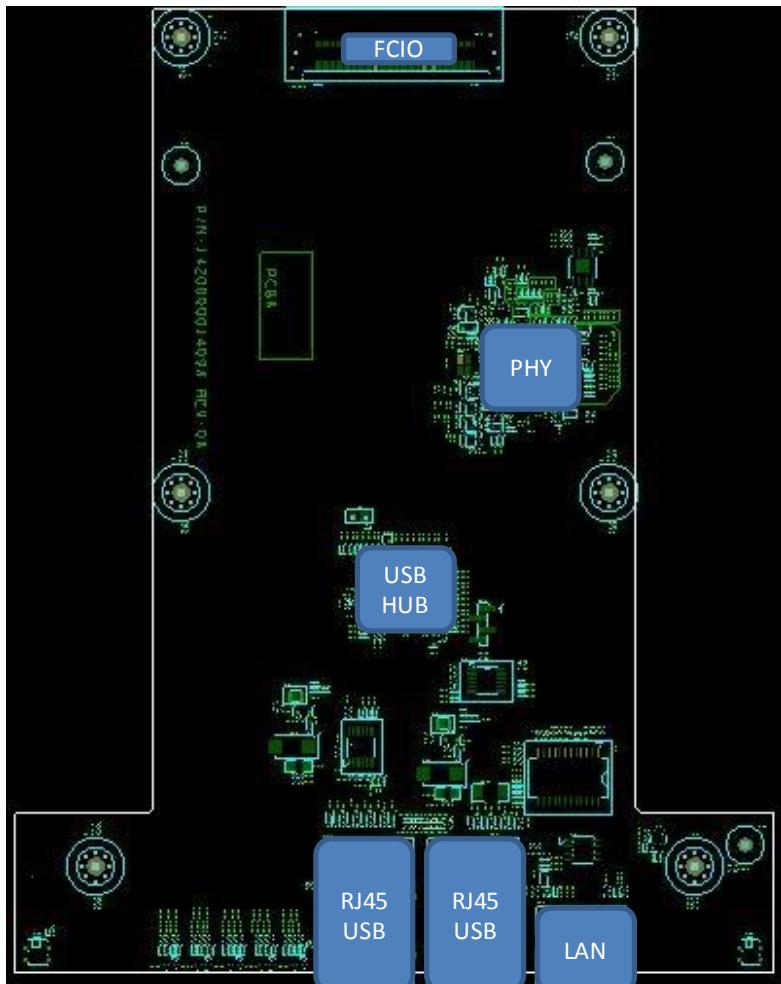
The Line Card PCB is an four layer board supporting the Fabric Card front panel networking and management ports, and status LEDs.

Fabric Card IO PCB Dimensions

	Inches	Millimeters
Length	7.09	180
Width	5.59	142

Fabric Card IO PCB major components

Description	Manufacturer	Part Number
FCIO Connector	Samtec	BSH-060-01-F-D-RA-WT
10/100/1000 PHY	Broadcom	BCM54616S
RJ45/USB Connector	TE Connectivity	1840035-1 (2 pieces)
LAN Connector	CZT	10221188G049
USB HUB	Microchip	USB2524



Fabric Card IO PCB stackup

Layer Name	Plane Description	Remain Copper (%)	Material	sheet	reduce after pressed	Material Thickness	Finish Thickness
	solder mask					0.50	0.50
Layer 1	Mixed		1/2oz HTE +Plating			1.70	1.70
	PRE-PREG		1080-64			3.00	2.76
Layer 2	Mixed	80	1oz HTE		0.24	1.20	1.20
	Core		1.2979			48.70	48.70
Layer 3		80	1oz HTE		0.24	1.20	1.20
	PRE-PREG		1080-64			3.00	2.76
Layer 4	Mixed		1/2oz HTE +Plating			1.70	1.70
	solder mask					0.50	0.50
Total Thickness=		1.55			0.48	61.50	61.02

Right Backplane PCB

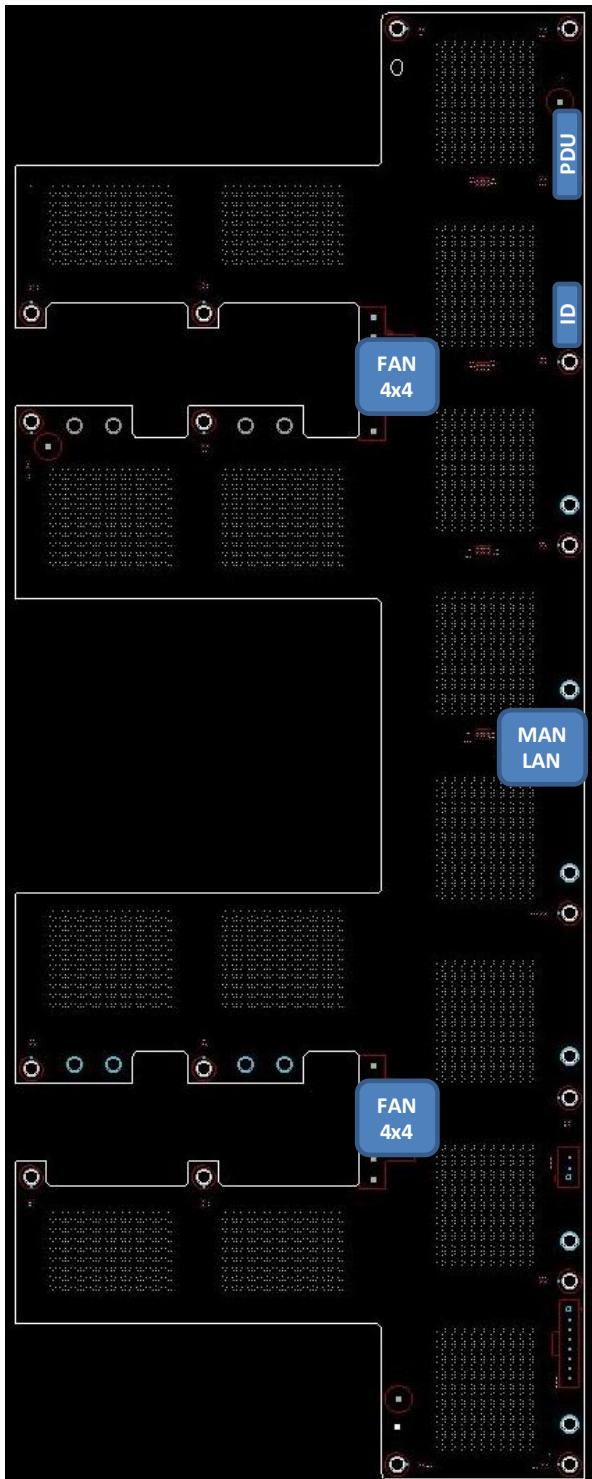
The Right Backplane (BPR) PCB is a twenty layer board supporting the switching connections between Line Cards and Fabric Cards, and connections to other PCBs required in building the system.

Right Backplane PCB Dimensions

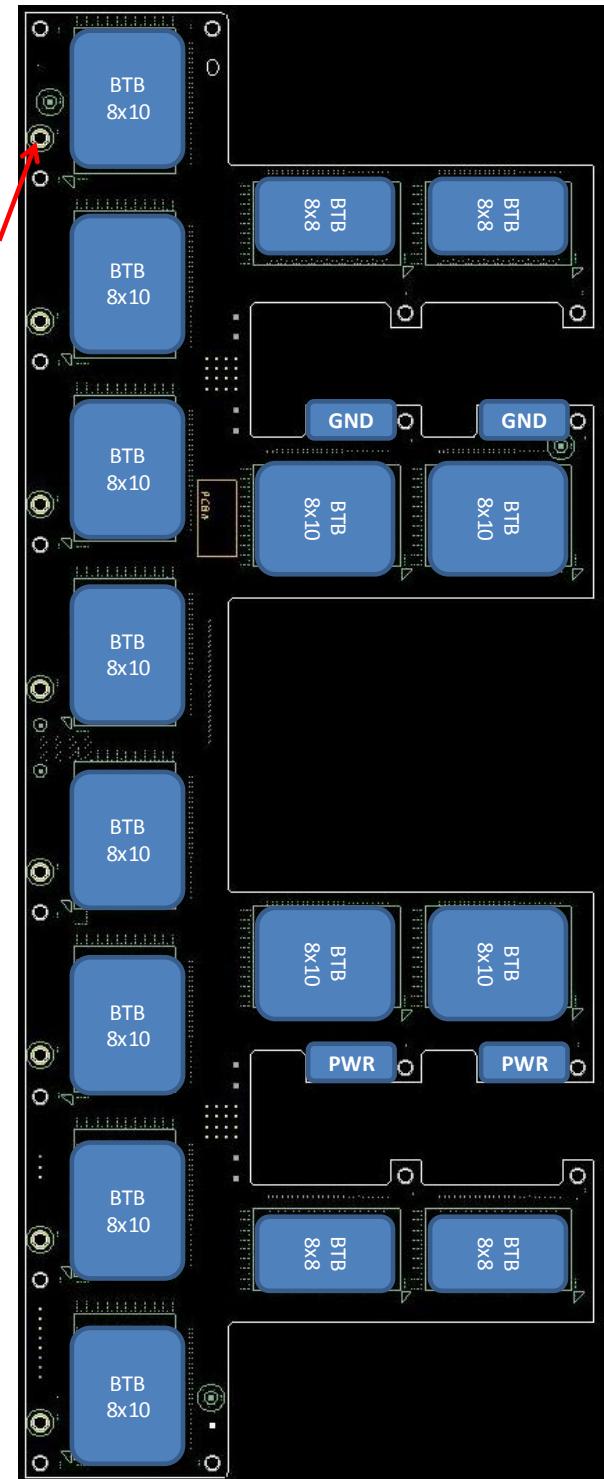
	Inches	Millimeters
Length	14.96	380
Width	5.79	147

Right Backplane PCB major components

Description	Manufacturer	Part Number
Guide Pin	TE Connectivity	223969-7
LAN connector	TE Connectivity	2227595-1
ID header	TE Connectivity	8-102202-4
FAN connector	TE Connectivity	6450814-2 (2 pieces)
PDU connector	TE Connectivity	5-1-4363-7
PWR	TE Connectivity	1766663-1 (4 pieces)
GND	TE Connectivity	1766663-2 (4 pieces)
BTB 8x8 header	TE Connectivity	2274731-1 (4 pieces)
BTB 8x10 header	TE Connectivity	2290193-1 (12 pieces)



BOTTOM



TOP

Left Backplane PCB

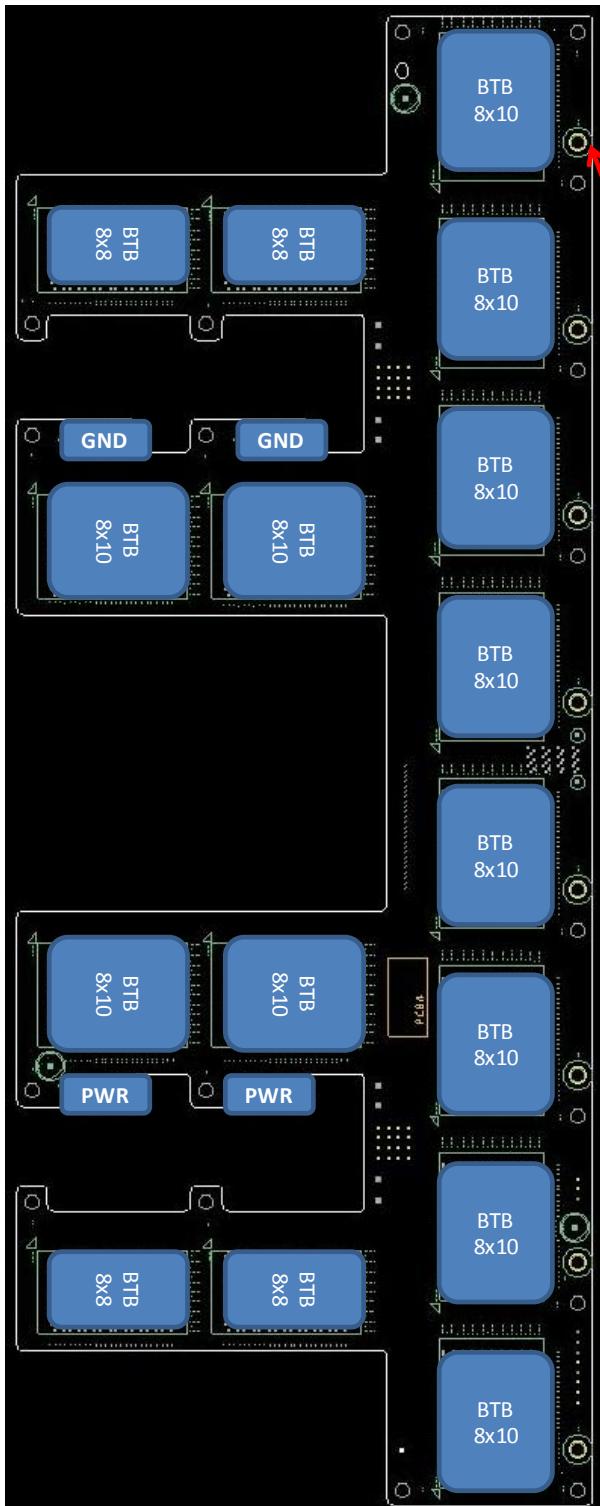
The Right Backplane (BPR) PCB is a twenty layer board supporting the switching connections between Line Cards and Fabric Cards, and connections to other PCBs required in building the system.

Left Backplane PCB Dimensions

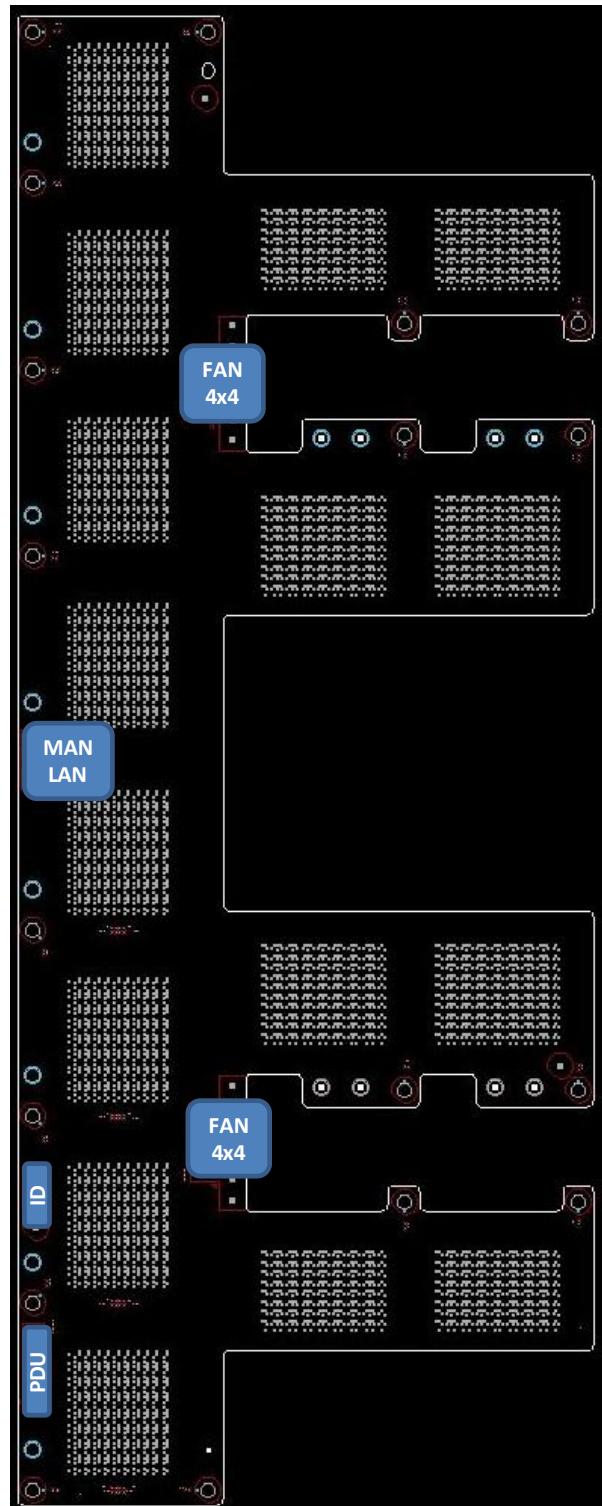
	Inches	Millimeters
Length	14.96	380
Width	5.79	147

Left Backplane PCB major components

Description	Manufacturer	Part Number
Guide Pin	TE Connectivity	223969-7
LAN connector	TE Connectivity	2227595-1
ID header	TE Connectivity	8-102202-4
FAN connector	TE Connectivity	6450814-2 (2 pieces)
PDU connector	TE Connectivity	5-1-4363-7
PWR	TE Connectivity	1766663-1 (4 pieces)
GND	TE Connectivity	1766663-2 (4 pieces)
BTB 8x8 header	TE Connectivity	2274731-1 (4 pieces)
BTB 8x10 header	TE Connectivity	2290193-1 (12 pieces)



8 x Guide Pin



TOP

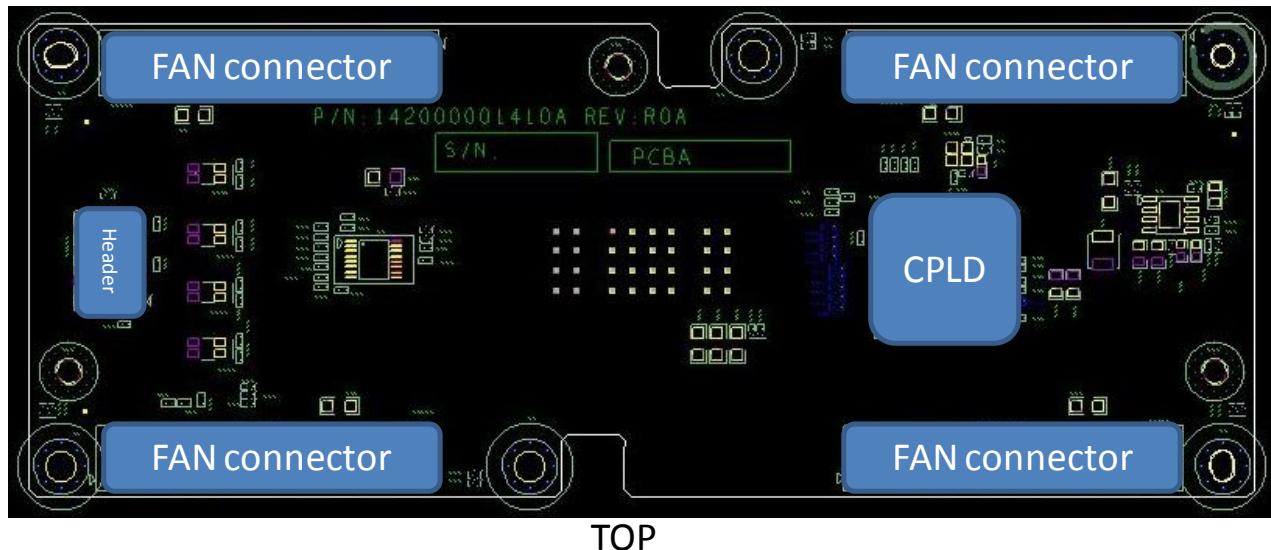
BOTTOM

Backplane (left,right) PCB stackup

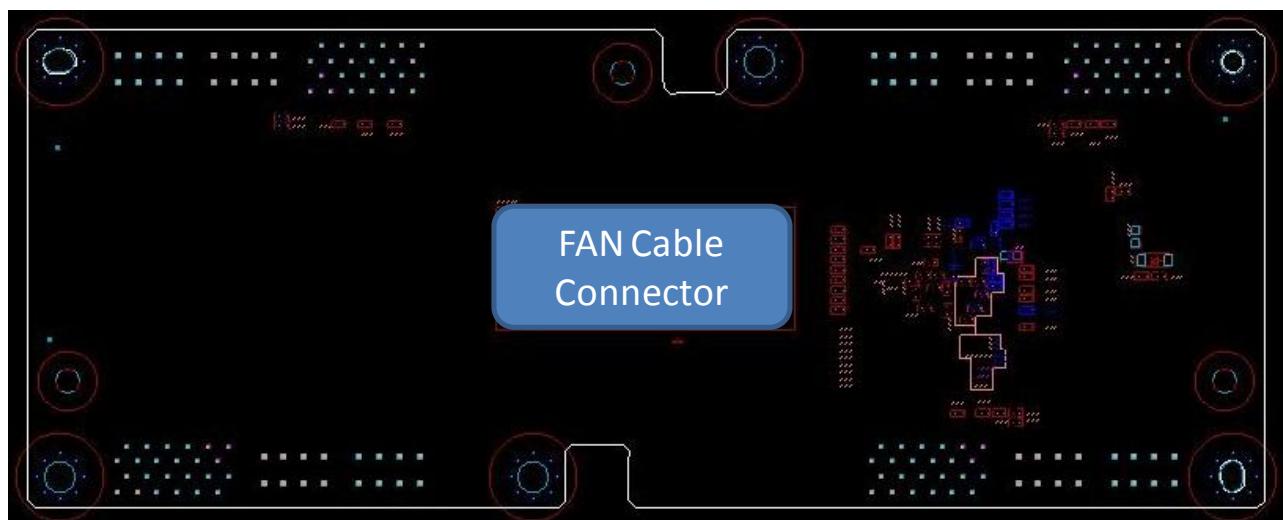
Material Type	Material Const.		Fill	Type	Thk	Er
					130.3	
	Pt					
FR408HR	1/2 oz HTE	1				
TU933	1035•76% + 1078•59%					
High Tg Fr4	1/2 oz HVLP	2				
TU933	.005 (2)1078					
High Tg Fr4	1/2 oz HVLP	3				
TU933	(3)1035•72%					
High Tg Fr4	1/2 oz HVLP	4				
TU933	.005 (2)1078					
High Tg Fr4	1/2 oz HVLP	5				
TU933	(3)1035•72%					
High Tg Fr4	1/2 oz HVLP	6				
TU933	.005 (2)1078					
High Tg Fr4	1/2 oz HVLP	7				
TU933	(3)1035•72%					
High Tg Fr4	1/2 oz HVLP	8				
TU933	.005 (2)1078					
High Tg Fr4	1/2 oz HVLP	9				
TU933	(3)1035•72%					
High Tg Fr4	1 oz HVLP	10				
TU933	.002 1035					
TU933	(2)1035•67%					
TU933	.002 1035					
High Tg Fr4	1 oz HVLP	11				
TU933	(3)1035•72%					
High Tg Fr4	1/2 oz HVLP	12				
TU933	.005 (2)1078					
High Tg Fr4	1/2 oz HVLP	13				
TU933	(3)1035•72%					
High Tg Fr4	1/2 oz HVLP	14				
TU933	.005 (2)1078					
High Tg Fr4	1/2 oz HVLP	15				
TU933	(3)1035•72%					
High Tg Fr4	1/2 oz HVLP	16				
TU933	.005 (2)1078					
High Tg Fr4	1/2 oz HVLP	17				
TU933	(3)1035•72%					
High Tg Fr4	1/2 oz HVLP	18				
TU933	.005 (2)1078					
High Tg Fr4	1/2 oz HVLP	19				
TU933	1035•76% + 1078•59%					
FR408HR	1/2 oz HTE	20				
	Pt					

FAN Control PCB

The Fan Control PCB is four layers and provides the power, management and connectivity for the four fan modules in each fan zone. The Fan PCB connects to the backplane PCBs via cable assemblies.



TOP



BOTTOM

FAN Control PCB major components

Description	Manufacturer	Part Number
Header		
FAN Module connector	Alltop	C21427-P26H3-Y
CPLD	Altera	10M04SCU169C8G
FAN Cable connector	TE Connectivity	2-645820-9

FAN Cable connector pinout

Name	Type	Net Name	Description
A1	in	I2C_FAN_LCA_SCL	I ² C clock for LineCard A
A2	iout	I2C_FAN_LCA_SDA	I ² C data for LineCard A
A3	in	I2C_FAN_LCB_SCL	I ² C clock for LineCard B
A4	iout	I2C_FAN_LCB_SDA	I ² C data for LineCard B
B1	in	I2C_FAN_LCC_SCL	I ² C clock for LineCard C
B2	iout	I2C_FAN_LCC_SDA	I ² C data for LineCard C
B3	in	I2C_FAN_LCD_SCL	I ² C clock for LineCard D
B4	iout	I2C_FAN_LCD_SDA	I ² C data for LineCard D
C1	in	I2C_FAN_FCA_SCL	I ² C clock for FabricCard A
C2	iout	I2C_FAN_FCA_SDA	I ² C data for FabricCard A
C3	in	I2C_FAN_FCB_SCL	I ² C clock for FabricCard B
C4	iout	I2C_FAN_FCB_SDA	I ² C data for FabricCard B
D1	in	I2C_FAN_MNGMT_SCL	I ² C clock for FabricCard access of FCU CPLD
D2	inout	I2C_FAN_MNGMT_SDA	I ² C data for FabricCard access of FCU CPLD
D3	out	FAN_INT_L	Interrupt to FabricCards
D4		N.C	No connection
P11	power	FAN_12V	12V Power
P12	power	FAN_12V	12V Power
P13	power	FAN_12V	12V Power
P14	power	FAN_12V	12V Power
P15	power	FAN_12V	12V Power
P16	power	FAN_12V	12V Power
P17	power	FAN_12V	12V Power
P18	power	FAN_12V	12V Power
P21	power	GND	12V return
P22	power	GND	12V return
P23	power	GND	12V return
P24	power	GND	12V return
P25	power	GND	12V return
P26	power	GND	12V return
P27	power	GND	12V return
P28	power	GND	12V return

Fan Module connector pinout

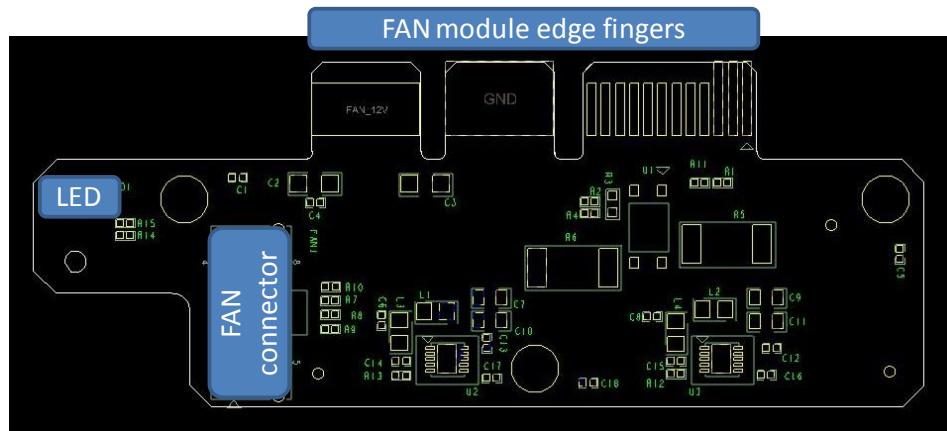
Name	Type	Net Name	Description
1	power	GND	3.3V return
2	power	GND	3.3V return
3	power	GND	3.3V return
4	in	FANxR_SENSOR	Rear fan speed sensor signal
5	in	FANxR_SENSOR	Rear fan speed sensor signal
6	in	FANxR_SENSOR	Rear fan speed sensor signal
7	in	PRESENT_FANx_L	Fan present signal: active low
8	in	PRESENT_FANx_L	Fan present signal: active low
9	in	PRESENT_FANx_L	Fan present signal: active low
10	in	FANx_SENSOR	Front fan speed sensor signal
11	in	FANx_SENSOR	Front fan speed sensor signal
12	in	FANx_SENSOR	Front fan speed sensor signal
13	out	FAN_MOS_CTRL_Fx	Fan speed override signal
14	inout	MIN_FAN_Gx	LED green signal
15	out	MIN_FAN_Rx	LED red signal
16	out	EN_FANx	Enable fan
17	out	EN_FANx	Enable fan
18	out	EN_FANx	Enable fan
19	out	FAN_PWM_x	PWM fan speed signal
20	out	FAN_PWM_x	PWM fan speed signal
21	out	FAN_PWM_x	PWM fan speed signal
22	power	VDD3P3	3.3V Power
23	power	VDD3P3	3.3V Power
24	power	VDD3P3	3.3V Power
P1A1	power	GND	12V return
P1A2	power	GND	12V return
P1A3	power	GND	12V return
P1A4	power	GND	12V return
P1B1	power	GND	12V return
P1B2	power	GND	12V return
P1B3	power	GND	12V return
P1B4	power	GND	12V return
P2A1	power	FAN_12V	12V Power
P2A2	power	FAN_12V	12V Power
P2A3	power	FAN_12V	12V Power
P2A4	power	FAN_12V	12V Power
P2B1	power	FAN_12V	12V Power
P2B2	power	FAN_12V	12V Power
P2B3	power	FAN_12V	12V Power
P2B4	power	FAN_12V	12V Power

FAN Control PCB stackup

Layer Name	Plane Description	Remain Copper (%)	Material	sheet	reduce after pressed	Material Thickness	Finish Thickness
	solder mask					0.50	0.50
Layer 1	Mixed		1/2oz HTE +Plating			1.70	1.70
	PRE-PREG		1080-64			3.00	2.76
Layer 2	Mixed	80	1oz HTE		0.24	1.20	1.20
	Core		1.2979			48.70	48.70
Layer 3		80	1oz HTE		0.24	1.20	1.20
	PRE-PREG		1080-64			3.00	2.76
Layer 4	Mixed		1/2oz HTE +Plating			1.70	1.70
	solder mask					0.50	0.50
Total Thickness=		1.55			0.48	61.50	61.02

FAN Module PCB

The Fan Module PCB is four layers and provides the power, management and connectivity for each fan module. The Fan Module PCB connects to the Fan Control PCBs via edge fingers.



TOP

FAN Module PCB major components

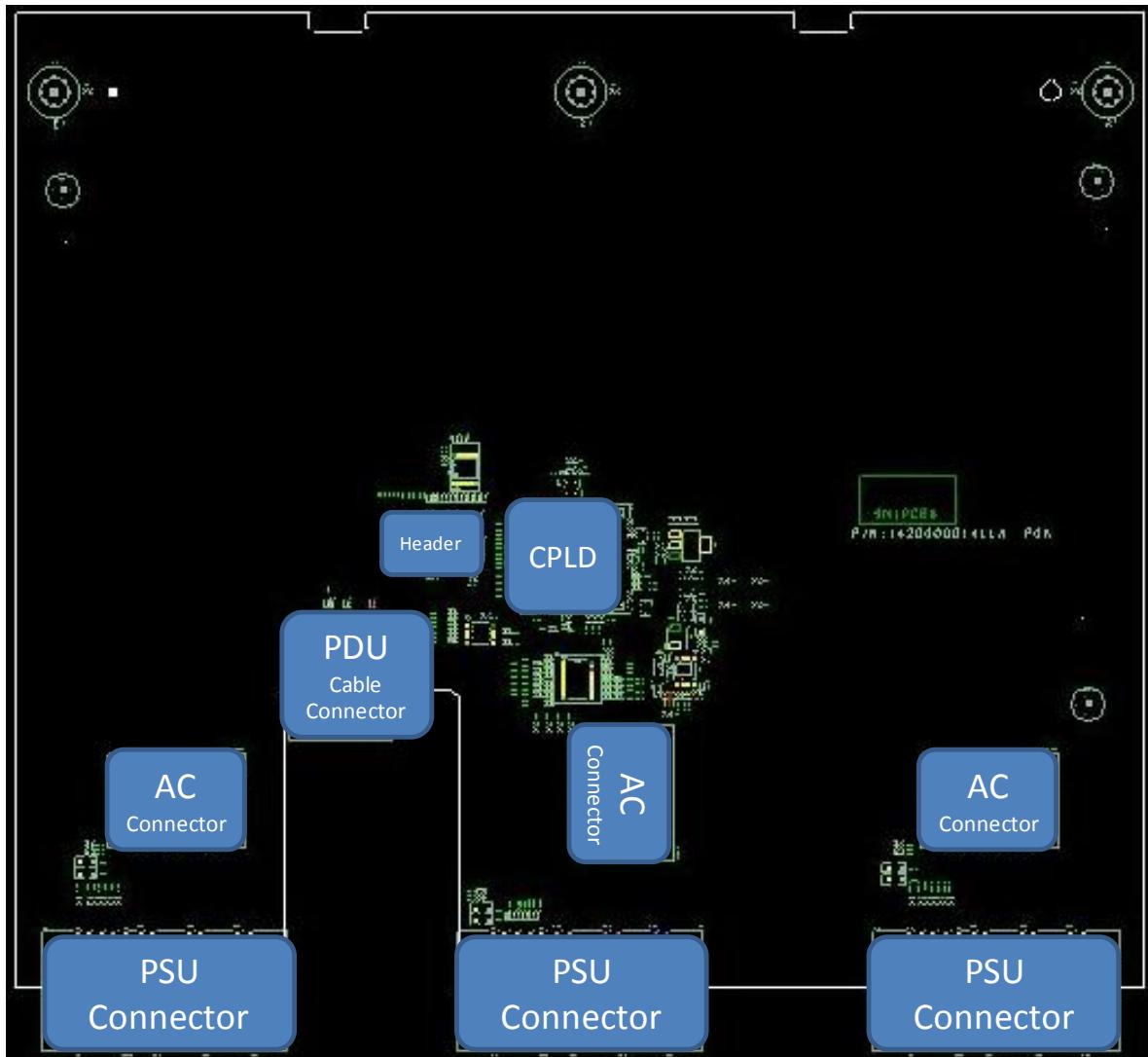
Description	Manufacturer	Part Number
LED, G/R		
FAN modules connector	n/a	edge fingers
FAN connector	FCI	10127721-08GLF

FAN Module PCB stackup

Layer Name	Plane Description	Remain Copper (%)	Material	sheet	reduce after pressed	Material Thickness	Finish Thickness
	solder mask					0.50	0.50
Layer 1	Mixed		1/2oz HTE +Plating			1.70	1.70
	PREPReG		1080-64			3.00	2.76
Layer 2	Mixed	80	1oz HTE		0.24	1.20	1.20
	Core		1.2979			48.70	48.70
Layer 3	PREPReG	80	1oz HTE		0.24	1.20	1.20
	Mixed		1080-64			3.00	2.76
Layer 4			1/2oz HTE +Plating			1.70	1.70
	solder mask					0.50	0.50
Total Thickness=		1.55			0.48	61.50	61.02

PDU PCB

The PDU PCB is four layers and provides the power, management and connectivity to connect AC power to three PSU modules. The PDU PCBs connects to the backplane PCBs via cable assemblies.



PDU PCB major components

Description	Manufacturer	Part Number
Header		
AC connector	Molex	43160-7303
CPLD	Altera	10M04SCU169C8G
PSU connector	TE Connectivity	1-6450872-4
PDU Cable connector	TE Connectivity	1551953-1

PDU PCB stackup

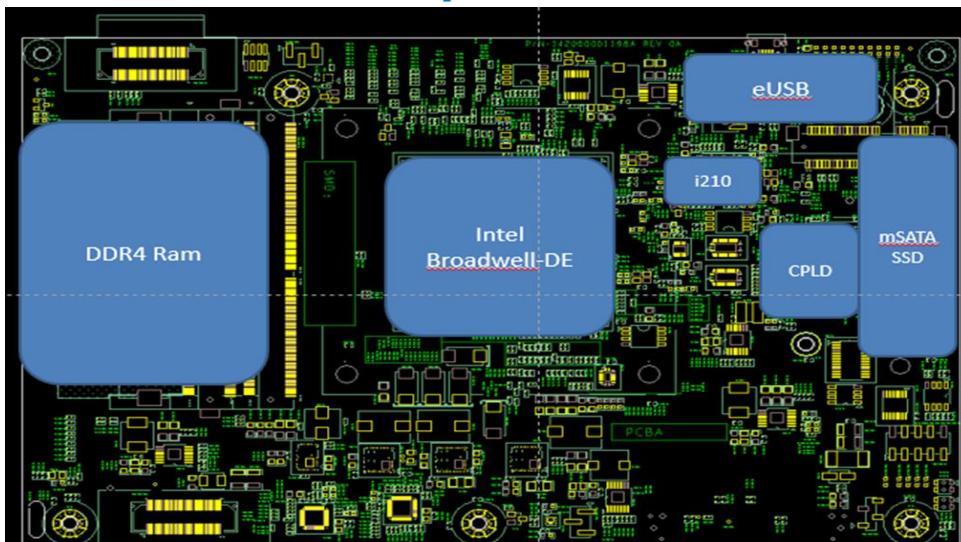
Layer Name	Plane Description	Remain Copper (%)	Material	sheet	reduce after pressed	Material Thickness	Finish Thickness
	solder mask					0.50	0.50
Layer 1	Mixed		1/2oz HTE +Plating			1.70	1.70
	PRE-PREG		1080-64			3.00	2.76
Layer 2	Mixed	80	1oz HTE		0.24	1.20	1.20
	Core		1.2979			48.70	48.70
Layer 3		80	1oz HTE		0.24	1.20	1.20
	PRE-PREG		1080-64			3.00	2.76
Layer 4	Mixed		1/2oz HTE +Plating			1.70	1.70
	solder mask					0.50	0.50
Total Thickness=		1.55			0.48	61.50	61.02

X86 Broadwell-DE CPU Module PCB

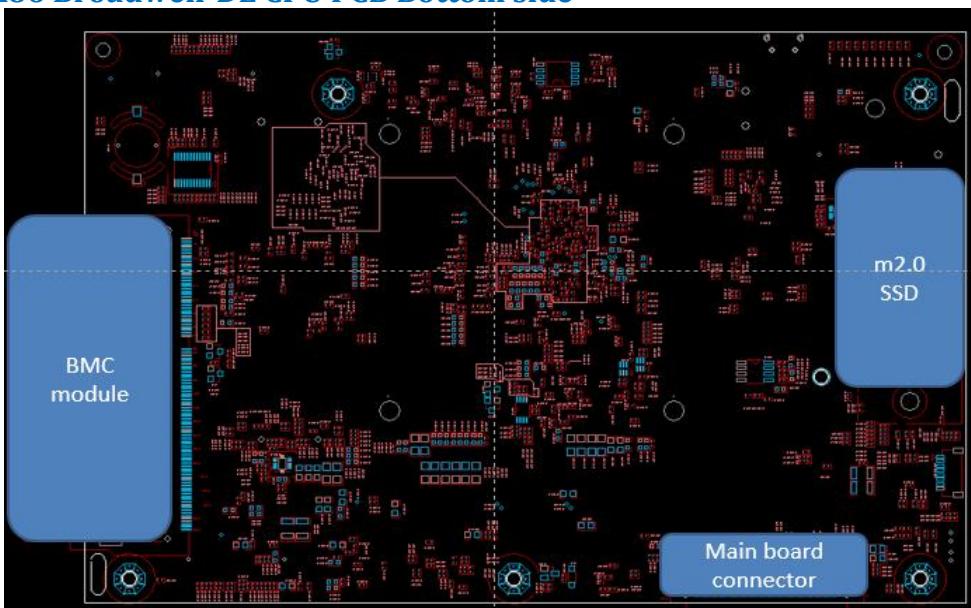
The x86 CPU module is a 12 layer PCB and supports the communication processor and associated components for the CPU subsystem. The communication processor utilized is an Intel® Xeon® processor D series communication processor. The Intel® Xeon® processor D product family is the first Intel® Xeon® SoC optimized to deliver Intel Xeon processor performance and enhanced total cost of ownership (TCO) for hyperscale workloads.

The Intel® Xeon® processor D product family supports high levels of I/O integrations, including 10GbE. The Intel Xeon processor D product family also includes data center processor features such as error correcting code (ECC). With high levels of I/O integration and energy efficiency.

X86 Broadwell-DE CPU PCB Top side



X86 Broadwell-DE CPU PCB Bottom side



X86 Broadwell-DE CPU PCB Dimensions

	Inches	Millimeters
Length	7.32	186.02
Width	4.86	123.5

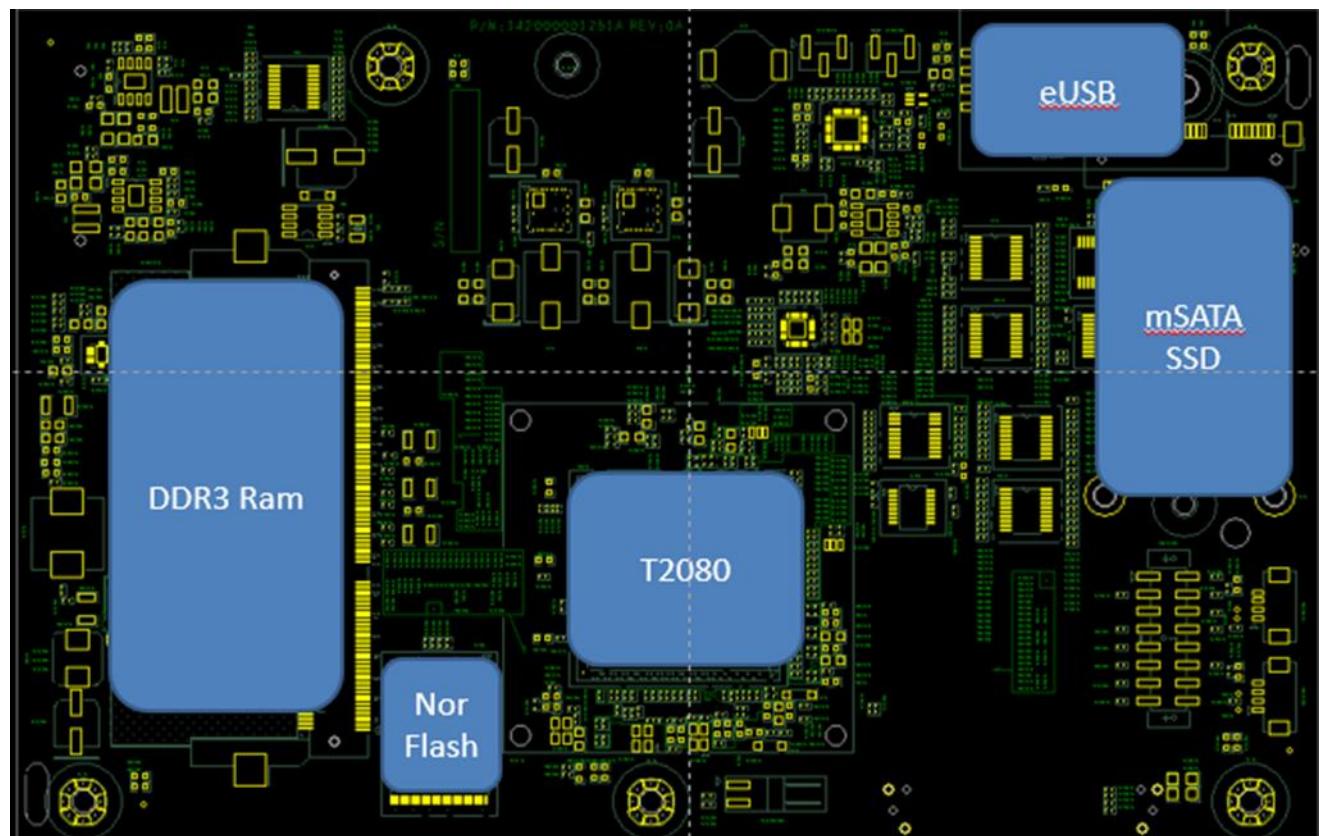
X86 Broadwell-DE CPU PCB major components

Description	Manufacturer	Part Number
CPU	Intel	XeonD-1548
SDRAM 8GB per channel	Micron	MTA18ASF1G72HZ-2G1A1
USB to NAND Flash 8GB	ATP	AF8GSSGH-AC2
SPI NOR Flash	Winbond	W25Q128FVSIG
Trusted Platform Module (TPM)	ST	ST33ZP24AR28PVSP
mSATA Connector	TE	1775838-2
M.2 connector	Concraft	213BAAA42FA
BMC Connector	FOXCONN	AS0A626-H2S6-7H
B2B Connector	SAMTEC	BTH-060-03-F-D-A-K-TR
Ethernet Controller	Intel	WGI210AT
CPLD	Altera	5M1270ZF256C5N
10GeB SPI Flash	Winbond	W25Q32FVSSIG
I210 SPI flash	Winbond	W25Q16DVSSIG

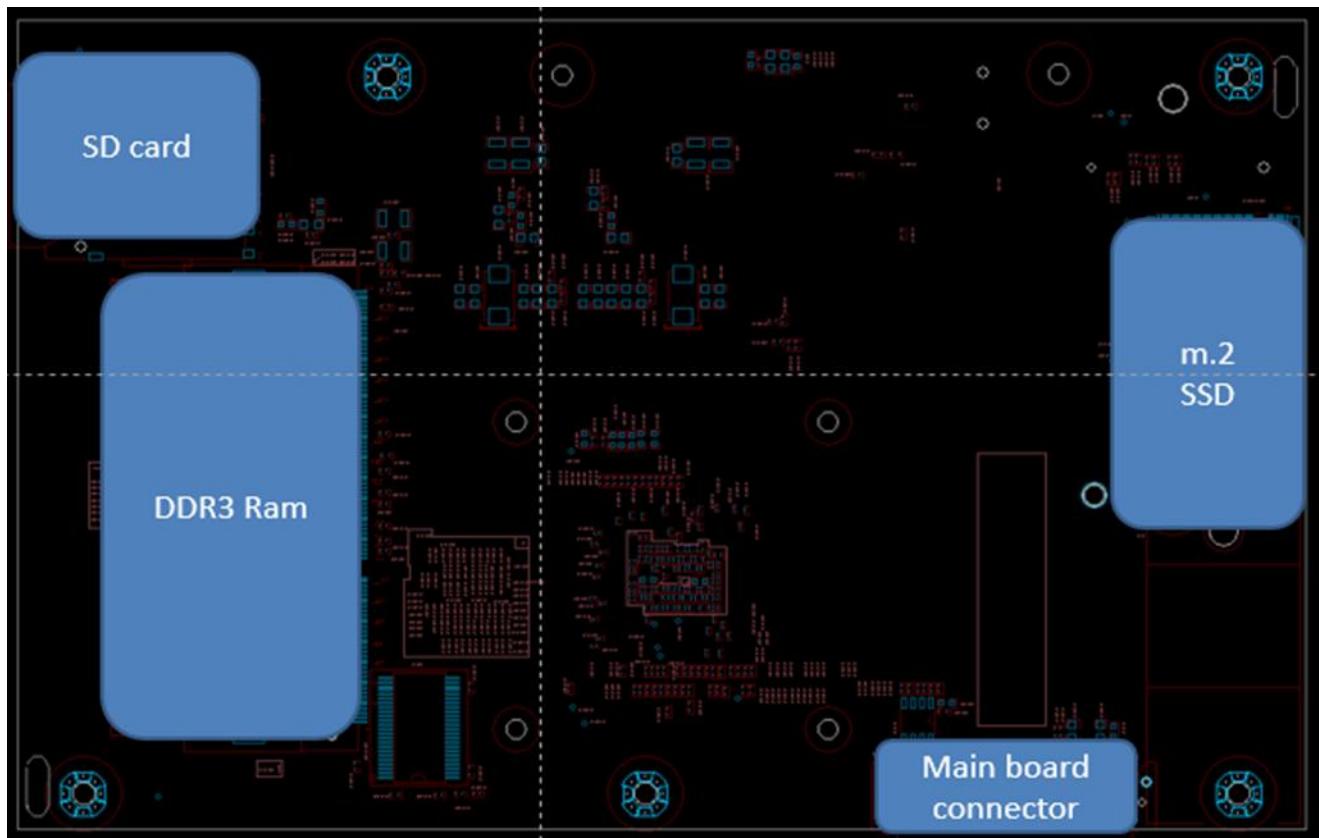
T2080 CPU Module PCB

The T2080 CPU module is an 8 layer PCB and supports the communication processor and associated components for the CPU subsystem. The communication processor utilized is the Freescale Semiconductor T2080 QorIQ processor. The T2080 QorIQ integrated multicore communications processor combines 4 dualthreaded cores built on Power Architecture® technology with high-performance data path acceleration and network and peripheral bus interfaces required for networking, telecom/datacom, wireless infrastructure, and military/aerospace applications.

T2080 CPU PCB Top side



T2080 CPU PCB Bottom side



CPU PCB Dimensions

	<u>Inches</u>	<u>Millimeters</u>
Length	5.98	151.9
Width	4.83	122

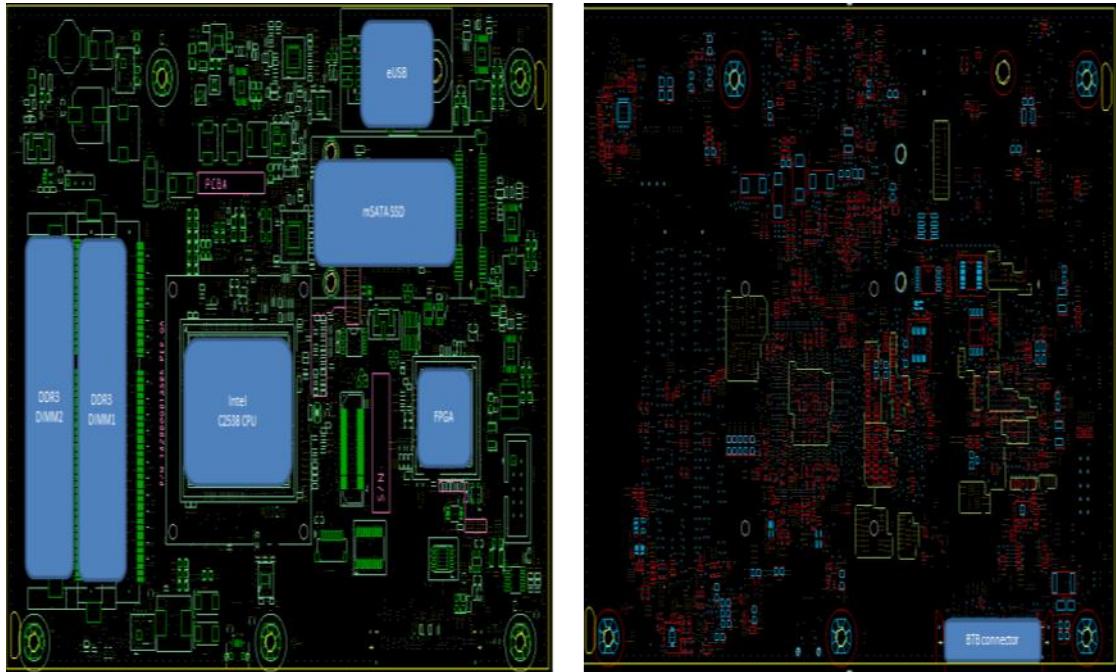
CPU PCB major components

Description	Manufacturer	Part Number
CPU	Freescale	T2080NSN7PNC 1.5GHz 1.0V FCPBGA780 FREESCALE
CPU	FREESCALE	T2080NSN8TTB
SDRAM (8GB per channel)	UNIGEN	UG10U7211P8UU-BDE
USB to NAND Flash 8GB	ATP	AF8GSSGH-AC2
NOR Flash (128MB)	MICRON	JS28F00AM29EWHA
Trusted Platform Module (TPM)	ST	ST33ZP24AR28PVSK
mSATA Connector	TE	1775838-2
M.2 connector	CONCRAFT	213BAAA32FA
SD Connector	CVILUX	CSD-09A001D
B2B Connector	SAMTEC	BTH-060-03-F-D-A-K-TR

X86 Rangeley CPU Module PCB

The x86 CPU module is a 12 layer PCB and supports the communication processor and associated components for the CPU subsystem. The communication processor utilized is an Intel Atom C2000 series communication processor. This family of Intel SoCs offers a wide range of pin compatible options scaling from two to eight cores, a thermal design power (TDP) of 7W to 20W, integrated HW acceleration, and Intel Xeon Instruction Set Architecture compatibility.

X86 Rangeley CPU PCB Top and Bottom side



X86 Rangeley CPU PCB Dimensions

	<u>Inches</u>	<u>Millimeters</u>
Length	7.33	186
Width	4.86	123.5

X86 Rangeley CPU PCB major components

Description	Manufacturer	Part Number
CPU	Intel	C2538 – 2.4GHz 3.0V
SDRAM 4GB SO-DIMM w/ECC (x2)	Innодиск	M3D0-4GHS2LPC 4GB 1.35V
USB to NAND Flash 8GB	ATP	AF8GSSGH-AC1
SPI NOR Flash 8MB (x2)	Winbond	W25Q64FVSSIG
Trusted Platform Module (TPM)	STMicroelectronics	ST33ZP24AR28PVSP ST
FPGA	Microsemi	A2F200M3F-FGG256
mSATA Connector	TE Connectivity	1775838-2
B2B Connector	SAMTEC	BTH-060-03-F-D-A-K-TR

120 Pin CPU PCB to Main PCB Connector

ES7632BT 120 Pin	ES7632BT 120 Pin	General Function	CONNECTOR			General Function	ES7632BT 120 Pin	ES7632BT 120 Pin
			PIN #	PIN #				
(I)LM75BD_SCLK	IN	TEMP_ANODE	IN/OUT	119	120	OUT	I2C_2_SCL	IN
(O)LM75BD_SDA	IN/OUT	TEMP_CATHODE	IN/OUT	117	118	IN	MGMT_RS232_DCD	IN
GND		GND	-	115	116	IN/OUT	GPIO	Not Used
CPU_MP PHY_SGMII_TX_0_S_P	OUT	MPHYS_GMII TX_P	OUT	113	114	IN/OUT	I2C_2_SDA	IN/OUT
CPU_MP PHY_SGMII_TX_0_S_N	OUT	MPHYS_GMII TX_N	OUT	111	112	IN/OUT	GPIO	Not Used
GND		GND	-	109	110	IN	INTERRUPT	GND
MPHYS_CPU_SGMII_RX_0_S_N	IN	MPHYS_SGMII_RX_N	IN	107	108	IN	INTERRUPT	OUT
MPHYS_CPU_SGMII_RX_0_S_P	IN	MPHYS_SGMII_RX_P	IN	105	106	OUT	MGMT_RS232_DTR	OUT
GND		GND	-	103	104	IN/OUT	PROCHOT#	GND
CPU_MP PHY_MDC	OUT	GPIO(MPHY_MDC)	OUT	101	102	IN/OUT	GPIO	PCIE_OOB_RX_P
Not Used		INTERRUPT(MPHY)	IN	99	100	OUT	THRMTRIPW	IN
CPU_MP PHY_MDIO	IN/OUT	GPIO(MPHY_MDIO)	IN/OUT	97	98	IN	INTERRUPT	PCIE_OOB_RX_N
GND		GND	-	95	96	IN	MGMT_RS232_RXD	GND
IP_UART0_SOUT	IN	GPIO	IN/OUT	93	94	IN	MGMT_RS232_CTS	IN
CPLD23_INT_CPU	IN		IN	91	92	IN	INTERRUPT	UART1_RX
1PPS_CPU	IN	GPIO	IN/OUT	89	90	OUT	MGMT_RS232_TXD	IN
GND		GND	-	87	88	IN	INTERRUPT	UART1_TX
GND		GND	-	85	86	-	GND	MAC_INT_L
CPU_XFI_EC_TX_0_P	OUT	DIFF_PAIR_TX_0_P	OUT	83	84	IN/OUT	MGMT_USB_N	IN/OUT
CPU_XFI_EC_TX_0_N	OUT	DIFF_PAIR_TX_0_N	OUT	81	82	IN/OUT	MGMT_USB_P	IN/OUT
GND		GND	-	79	80	-	GND	GND
GND		GND	-	77	78	OUT	HWIO	OUT
CPU_XFI_EC_RX_0_P	IN	DIFF_PAIR_RX_0_P	IN	75	76	OUT	MGMT_RS232 RTS	OUT
CPU_XFI_EC_RX_0_N	IN	DIFF_PAIR_RX_0_N	IN	73	74	OUT	HWIO	OUT
GND		GND	-	71	72	IN/OUT	GPIO	RESET_SYS_CPLD
GND		GND	-	69	70	OUT	JTAG_RST#	CPU_TMS
CPU_XFI_EC_RX_2_P	IN	DIFF_PAIR_RX_1_P	IN	67	68	OUT	HWIO	CPU_JTAG_RST
CPU_XFI_EC_RX_2_N	IN	DIFF_PAIR_RX_1_N	IN	65	66	IN/OUT	GPIO	PI014_RST
GND		GND	-	63	64	IN/OUT	GPIO	CPU_TDO
GND		GND	-	61	60	IN/OUT	GPIO	CPU_TCK
CPU_XFI_EC_TX_2_P	OUT	DIFF_PAIR_TX_1_P	OUT	59	60	IN/OUT	I2C_0_SDA	IP_UART0_SIN
CPU_XFI_EC_TX_2_N	OUT	DIFF_PAIR_TX_1_N	OUT	57	58	OUT	I2C_0_SCL	Not Used
GND		GND	-	55	56	IN	INTERRUPT	Not Used
GND		GND	-	53	54	OUT	HWIO	SYS_CPLD_INT_CPU
CPU_PEX_PCIEA_TX_0_P	OUT	PCIE_TX_2_P	OUT	51	52	IN	RESET_MODULE_REQ#	IN
CPU_PEX_PCIEA_TX_0_N	OUT	PCIE_TX_2_N	OUT	49	50	OUT	I2C_1_SCL	USB1_PWRFAULT
GND		GND	-	47	48	IN/OUT	I2C_1_SDA	Manu_RST
GND		GND	-	45	46	OUT	RESET_SYS_REQ#	I2C_0_SDA
CPU_PEX_PCIEA_TX_1_N	OUT	PCIE_TX_3_P	OUT	43	44	IN	SYS_PWR_GOOD	RESET_MAC
CPU_PEX_PCIEA_TX_1_P	OUT	PCIE_TX_3_N	OUT	41	42	OUT	HWIO	CPU_THERMALTRIP
GND		GND	-	39	40	-	GND	USB1_VBUS
GND		GND	-	37	38	-	GND	GND
PEX_CPU_PCIEA_RX_0_N	IN	PCIE_RX_2_P	IN	35	36	OUT	PCIE_TX_0_P	OUT
PEX_CPU_PCIEA_RX_0_P	IN	PCIE_RX_2_N	IN	33	34	OUT	PCIE_TX_0_N	OUT
GND		GND	-	31	32	-	GND	GND
GND		GND	-	29	30	-	GND	GND
PEX_CPU_PCIEA_RX_1_N	IN	PCIE_RX_3_P	IN	27	28	IN	PCIE_RX_0_P	IN
PEX_CPU_PCIEA_RX_1_P	IN	PCIE_RX_3_N	IN	25	26	IN	PCIE_RX_0_N	IN
GND		GND	-	23	24	-	GND	GND
GND		GND	-	21	22	-	GND	GND
CPU_PEX_PCIEB_TX_1_N	OUT	PCIE_TX_1_P	OUT	19	20	IN	PCIE_RX_1_P	IN
CPU_PEX_PCIEB_TX_1_P	OUT	PCIE_TX_1_N	OUT	17	18	IN	PCIE_RX_1_N	IN
GND		GND	-	15	16	-	GND	GND
GND		GND	-	13	14	-	GND	GND
GND		GND	-	11	12	-	GND	GND
VCC12		12VDC	-	9	10	-	12VDC	VCC12
VCC12		12VDC	-	7	8	-	12VDC	VCC12
VCC5P0		5VDC	-	5	6	-	12VDC	VCC12
VCC5P0		5VDC	-	3	4	-	12VDC	VCC12
VCC5P0		5VDC	-	1	2	-	12VDC	VCC12

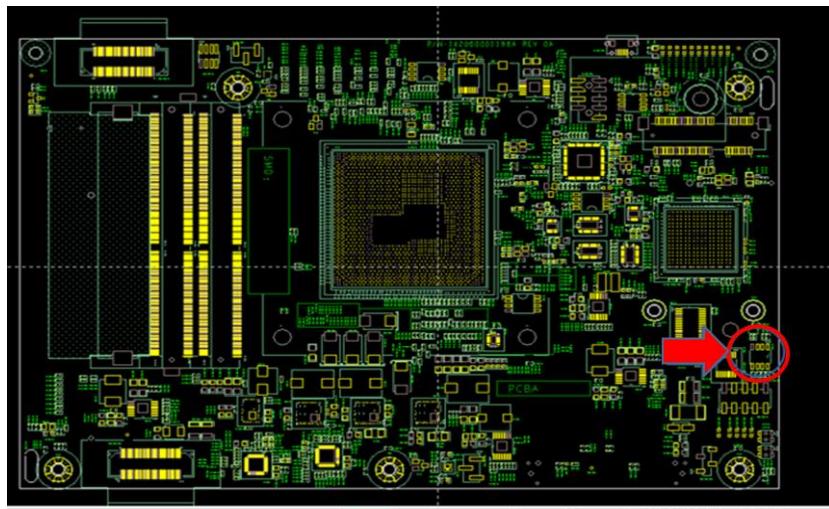
Thermal Monitoring

The OMP-800/1600 contains 16/32 system fans used to cool the system. There are many sensors to detect temperature at specific locations within the system. The system supports six temperature sensors on the main PCBA for each LineCard or FabricCard and one temperature sensor on each CPU board.

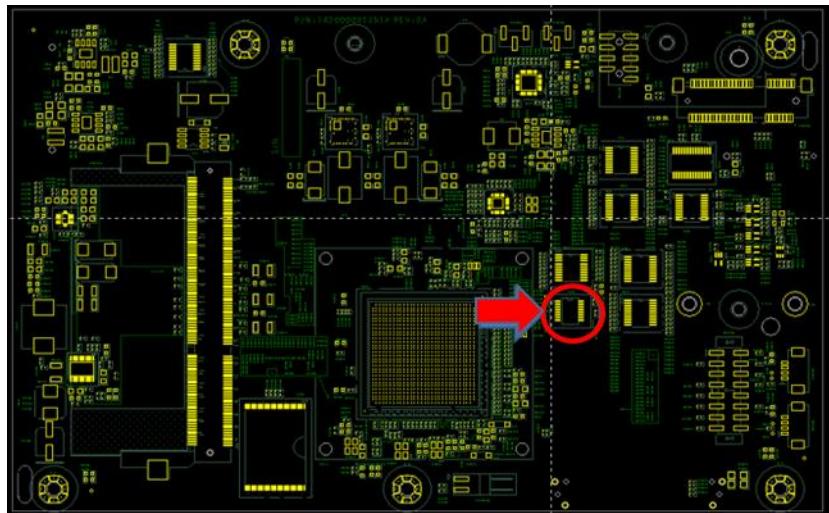
LineCard PCB Thermal sensor locations

FabricCard PCB Thermal sensor locations

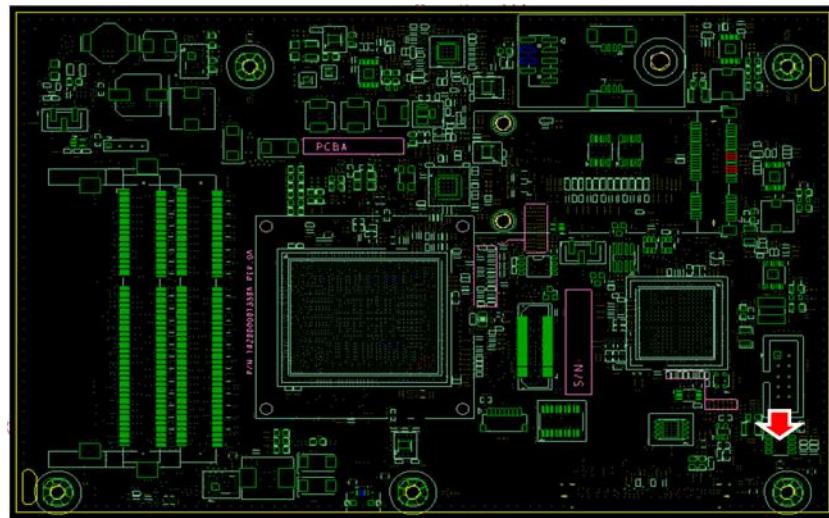
X86 Broadwell-DE CPU Module thermal sensor location



T2080 CPU Module thermal sensor location



X86 Rangeley CPU Module thermal sensor



Software Support

The OMP-800/1600 supports a base software package composed of the following components:

BIOS support

The OMP-800/1600 Supports AMI AptioV BIOS version A01 or greater with the x86 CPU module

U-Boot

The OMP-800/1600 Supports U-Boot version 1.4.0.2 or greater with the T2080 CPU module

ONIE

The OMP-800/1600 supports ONIE version 2014.08 or greater with the T2080 CPU Module

Open Network Linux

See <http://opennetlinux.org/> for latest supported version

Specifications

Power Consumption

The total estimated system power consumption of the OMP-800 is ~7kWatts.

Environmental

- Weight OMP800 ~320lbs / 145kg
- 0 to 40 Degrees C operating range
- -40 to 40 Degrees C storage temperate range
- Humidity 5% to 95% non-condensing (operational and storage)
- Vibration – IEC 68-2-36, IEC 68-2-6
- Shock – IEC 68-2-29
- Acoustic Noise Level – Under xxdB in 40 degree C
- Altitude - 15,000 (4572 meters) tested operational altitude

Safety

- UL/ Canada
- CB (Issued by TUV/RH)
- China CCC

Electromagnetic Compatibility

- CE
- EN55022 Class A
- EN55024
- EN61000-3-2
- EN61000-3-3
- FCC Title 47, Part 15, Subpart B Class A
- VCCI Class A
- CCC

ROHS

Restriction of Hazardous Substances (6/6)

Compliance with Environmental procedure 020499-00 primarily focused on Restriction of Hazardous Substances (ROHS Directive 2002/95/EC) and Waste and Electrical and Electronic Equipment (WEEE) .