EDGECORE Networks Corporation

# Edgecore AS7926-40/80X

## Switch Specification

**Revision 1.0**

OPEN

Compute Project

## Revision History

| Revision | Date | Author | Description |
|---|---|---|---|
| 1.0 | 9/15/2018 | Jeff Catlin | Initial Draft |
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# Contents

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| | AS7926-40/80X |
|---|---|
| CPU sub-system | CPU: Intel Xeon D1519 1.5G<br>DDR SDRAM: 8GB x 2 2133MHz with ECC (SO-DIMM) DDR4<br>SPI Flash (Boot): 16MB x 2<br>mSATA: 128GB MLC<br>TPM: SLB 9665XT2.0 FW5.63 INFINEON |
| Management | UART RS232 console port (RJ45), Out-band Management Ethernet port (RJ45), 2xSFP+ |
| MAC | Broadcom BCM88690 |
| Ethernet Ports | 40/80 x 100G QSFP28 |
| BMC | AST2400 ( optional) |
| Gearbox | Broadcom BCM 81724 |
| Power Supply | 1600W PSU Acbel FSJ001-610G |
| Cooling | 4/8 fan-tray modules with 60mm x60mm x 76mm 12V fans, hot-swappable |

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## Scope

This document outlines the technical specifications for the Edgecore AS7926-40/80K Open Aggregation Router Platform submitted to the Open Compute Foundation.

## Overview

This document describes the technical specifications of the AS7926-40/80K Open Aggregation Router designed by Edgecore Networks Corporation. The AS7926-40/80X is a cost optimized design focused on the aggregation of 100G connections. The AS7926-40/80K is offered in two different form factors being a forty port 100G switch composed of a single main PCB and CPU module, and an eighty port 100G switch composed of a main PCB , a matching mezzanine PCB, and CPU module. The components used to make up the 40 and 80 port SKUs are largely the same so both have been combined into one specification.

The AS7926-40/80K Aggregation Router is based upon Broadcom's StrataDNX silicon namely the BCM 88690 (AKA Jericho2) and the BCM16K (AKA OP2).

The BCM 88690 silicon is geared toward next generation carrier aggregation deployments supporting advanced features such as

- 8GB Deep packet buffering
- Support for native 400G Ethernet interfaces
- Off Chip expandability of databases and statistical gathering
- Over 60K wire rate queues
- Over 190K meters

The BCM16K is included in the AS7926-40/80K designs and provides the off-chip database expandability and statistical gathering for the BCM 88690 silicon. The BCM16K provides massive expandability of IPv4/V6 routing tables, ACL tables, and enhanced statistical gathering capabilities.

The AS7926-40/80K designs utilize Broadcom's BCM 81724 gearbox silicon to maximize the 100G port density of the native PAM4 50G serdes contained in the BCM88690. It is envisioned that future designs will remove these gearboxes exposing the native PAM 4 seders of the 88690 for various 400G main PCB and Mezzanine PCB configurations yielding additional SKUs.

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The AS7926-40/80X supports traditional features found in switches such as:

- Redundant field replaceable power supply 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.
- Support for AC or DC power supply units

# Physical Overview

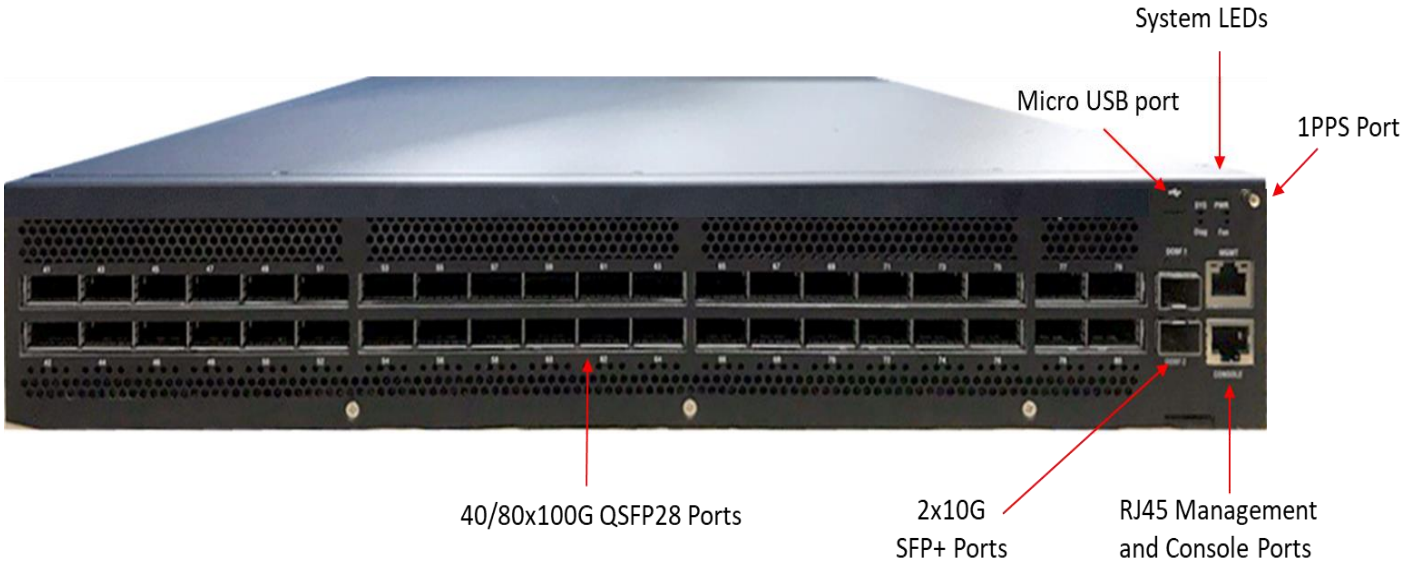
## Front View

## Rear View

## Dimensions

| AS7926-80X (80X100G) | Inches | Millimeters |
|---|---|---|
| Length | 29.75 | 755.65 |
| Width | 17.26 | 438.4 |
| Height | 5.14 | 130.5 |
| | | |
| AS7926-40X (40x100G) | | |
| Length | 29.75 | 755.65 |
| Width | 17.26 | 438.4 |
| Height | 3.45 | 87.7 |

## Front View Detail




## Front Panel Ports

- Micro USB port console port
  - Used for storage and file transfer
- RJ45 Console Port
  - Used for RS232 type management
- RJ45 10/100/1000 Ethernet management port
  - Connected directly to the system CPU
- 2x10G SFP+ ports
  - Connected directly to the system CPU
- 1PPS output port

## Console Port

The console port interface conforms to the RJ45 electrical specification.

The interface supports asynchronous mode with default eight data bits, one stop bit, and no parity. The unit will operate at any one of the following baud rates:

- 9600, 19200, 38400, 57600, **115200 (Default)**

| Pin number | Pin name | Pin number | Pin name |
|---|---|---|---|
| **1** | RTS | **2** | UART_TXD |
| **3** | | **4** | |
| **5** | GND | **6** | UART_RxD |
| **7** | | **8** | CTS |

## Network ports

| | |
|---|---|
| QSFP28 Ports | Standard 40Gb QSFP+ modules including but not limited to: 40GBASE-SR4, 40GBASE-LR4, 40GBASE-ER, AOC Cables |
| QSFP28 Ports | Standard 40G DAC cables including but not limited to: Passive cables up to 7m, QSFP<> QSFP DAC, QSFP<>SFP+ DAC Breakout |
| QSFP28 Ports | Support for all standards complaint QSFP28 XCVRS including but not limited to 100GBASE-SR4, 100GBASE-LR4 |
| QSFP28 Ports | Standard DAC cables including but not limited to: Passive cables up to 3m, QSFP28<> QSFP28 DAC, QSFP28<>SFP28 DAC Breakout |

## LEDs

### Network Port LEDs

There are two LEDS per QSFP28 port being a configuration LED and a status LED. The states of these LEDs are defined below.

| OPERATION CONDITION | LED SINGALING |
|---|---|
| **Configuration LED1** | |
| 100G (4x25G) | Solid Blue (B) |
| 40G (4x10G) | Solid Yellow (R+G) |
| 2 x 50G (2x25G) | Solid Cyan (B+G) |
| 4 x 25G (1x25G) | Solid Magenta (R+B) |
| 4 x 10G (1x10G) | Solid Green (G) |
| All lanes link down | 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 Yellow; blink if activity |
| All lanes link down | Off |

### Network Port LED states

| | LED1 | LED2 |
|---|---|---|
| Before boot to Linux;all ports: | | |
| Port in link down status | | |
| Port linked up in 100G, traffic passing | | blinking |
| Port linked up in 100G, no traffic passing | | |
| Port linked up in 40G, traffic passing | | blinking |
| Port linked up in 40G, no | | |

| | | |
|---|---|---|
| traffic passing | | |
| Port breakout in 2x50G, 2 lanes linked up, traffic passing |  |  blinking |
| Port breakout in 2x50G, 2 lanes linked up, no traffic passing |  |  |
| Port breakout in 2x50G, only 1 lane linked up, traffic passing |  |  blinking |
| Port breakout in 2x50G, only 1 lane linked up, no traffic passing |  |  |
| Port breakout in 4x25G, 4 lanes linked up, at least 1 lane has traffic passing |  |  blinking |
| Port breakout in 4x25G, 4 lanes linked up, all 4 lanes have no traffic passing |  |  |
| Port breakout in 4x25G, less than 4 lanes linked up, at least 1 lane has traffic passing |  |  blinking |
| Port breakout in 4x25G, less than 4 lanes linked up, all lanes have no traffic passing |  |  |
| Port breakout in 4x10G, 4 lanes linked up, at least 1 lane has traffic passing |  |  blinking |
| Port breakout in 4x10G, 4 lanes linked up, all 4 lanes have no traffic passing |  |  |
| Port breakout in 4x10G, less than 4 lanes linked up, at least 1 lane has traffic passing |  |  blinking |
| Port breakout in 4x10G, less than 4 lanes linked up, all lanes have no traffic passing |  |  |

## 2 x SFP+ LEDs

A single LED is provided for each SFP+ port described blow

| LED | Color | Mode |
|---|---|---|
| SFP+ Port LED | On/Flashing Green | SFP+ port has a valid link at 10G.<br>Flashing indicates activity. |
| | On/Flashing Yellow | SFP+ port has a valid link at 1G.<br>Flashing indicates activity. |
| | OFF | There is no link on the port. |

## RJ45 Management Port LED

The RJ45 management port supports 1G/ 100M / 10M speed. Two port LEDs are integrated into the RJ-45, yellow at the left side and green at the right side.

**Figure 0-1** Management Port LED

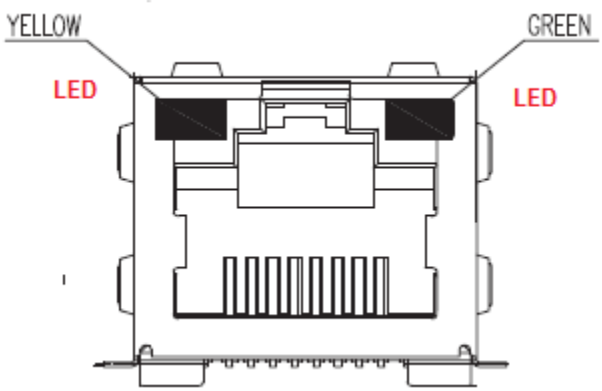



**Table 0-1** Management Port LED Definition

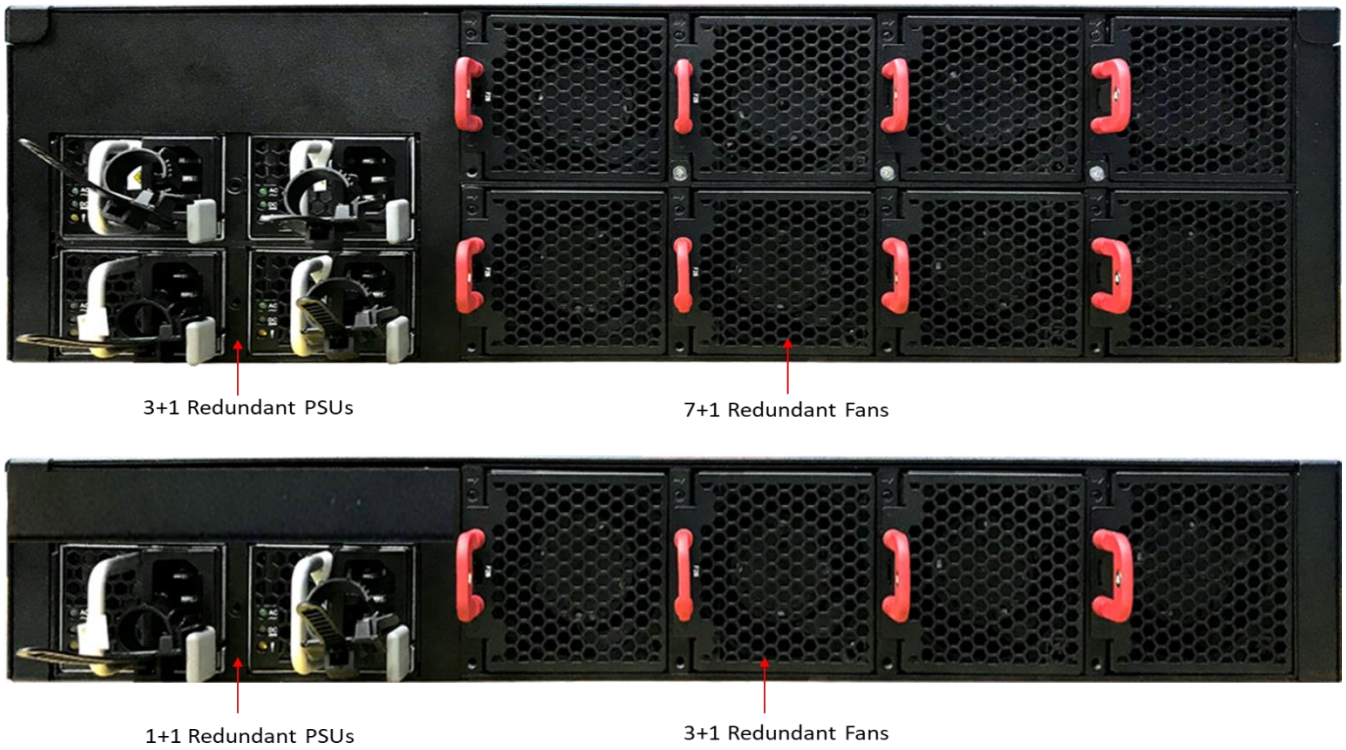
| LED | Color | Mode |
|---|---|---|
| LED | Green solid | Valid Link |
| | Yellow Flashing | Active Traffic |
| | off | No link |

## System LEDs

The AS7926-40/80X  contains five LEDs to indicate the status of the system as described below.

| System LED Definition | | |
|---|---|---|
| LED | CONDITION | STATUS |
| PWR<br>(Power Supply Status) | Green | This power is operating normally. |
| | Amber | PWR present but not all power on or at least one PSU power is fault. |
| | Off | Power supply not present. |
| System<br>(Diagnostic) | Green | System self-diagnostic test successfully completed. |
| | Green Blink | System self-diagnostic test is in progress. |
| | Amber | System self-diagnostic test has detected a fault. |
| FAN | Green | System FAN operating normally. |
| | Amber | At least one system fan is in fault condition |
| | Off | Not a particular switch that technician need to find. |
| LOC | Amber Flashing | Flashing by remote management command.  Assists the technician in finding the right device for service in the rack. |
| | OFF | Not set by remote management |
| | | |

## Rear View Detail




The rear view of the AS7926-40/80X includes the following key components:

- Redundant hot swappable fan modules
  - LED per fan module to indicate status
  - Color coding handle to indicate airflow direction
- Redundant Hot Swappable power supply modules
  - LED per PSU to indicate status
  - Color coding handle/Tab to indicate airflow direction

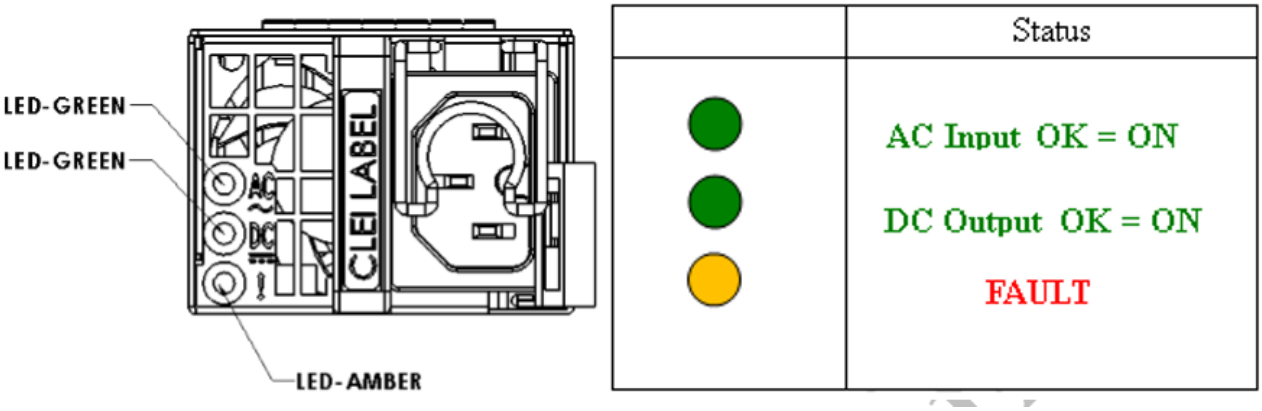
## Power Supply Modules

The AS7926-40/80X supports the AcBel Power supply model FSJ001-610G. Information on this power supply is provided below:

### Load range

| Load Range | | | | |
|---|---|---|---|---|
| **Voltage** | **Minimum Continuous** | **Maximum Continuous** | **OCP** | **Max. Power** |
| +5VSB | 0A | 3A | 6A | 1000W |
| +12V | 1A | 83.33A / 133.33A (L/H) | 100A / 160A (L/H) | 1600W |

## LEDs




## Fan tray

The AS7926-40/80K utilizes fan modules from Invni model # PF60761BX-Q120-S99. Information is provided below:

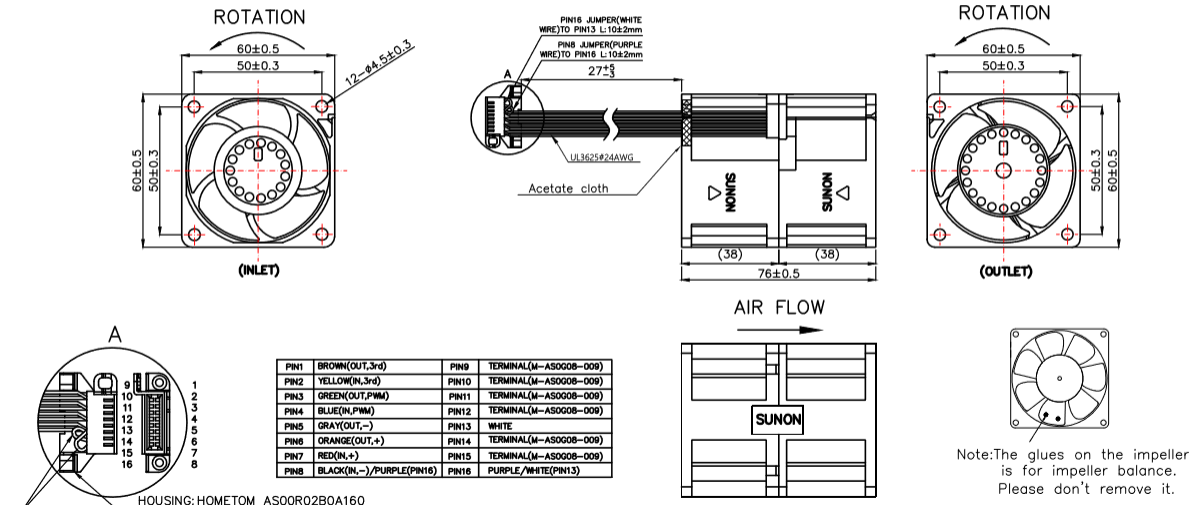
## LED

A single LED is provided on each fan module to indicate status

Green – Power functioning normally
Amber – Power fan fault
Off – No power

| | |
|---|---|
| **RATED SPEED** | **20800/17900 RPM ± 10% at rated voltage** |
| **AIR FLOW** | **86.1 CFM** |
| **STATIC PRESSURE** | **5.55 Inch-$H_2O$** |
| **ACOUSTIC NOISE** | **72.8 dB(A)** |

| Screw Type (Pan head) | Torque | Screw Spec | |
|---|---|---|---|
| | | Size | Standard |
| Machine screw | 3～4 Kgf-cm | M4.0 | JIS B1111-1974 |
| Self-tapping screw | 5～6 Kgf-cm | ϕ5.0 | JIS B1122 Type 2 |







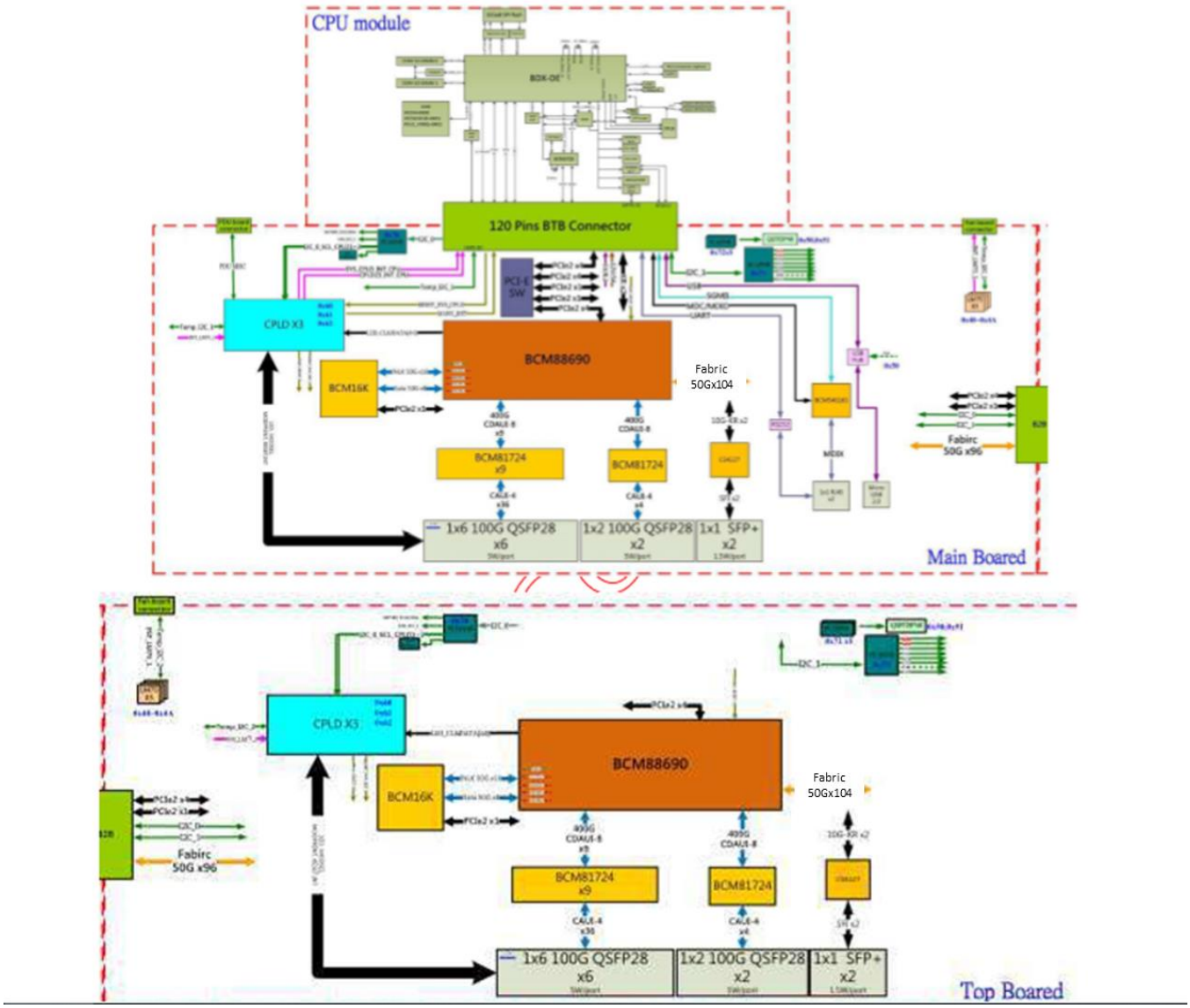
| | | | |
|---|---|---|---|
| PIN1 | BROWN(OUT,3rd) | PIN9 | TERMINAL(M-AS0G08-009) |
| PIN2 | YELLOW(IN,3rd) | PIN10 | TERMINAL(M-AS0G08-009) |
| PIN3 | GREEN(OUT,PWM) | PIN11 | TERMINAL(M-AS0G08-009) |
| PIN4 | BLUE(IN,PWM) | PIN12 | TERMINAL(M-AS0G08-009) |
| PIN5 | GRAY(OUT,-) | PIN13 | WHITE |
| PIN6 | ORANGE(OUT,+) | PIN14 | TERMINAL(M-AS0G08-009) |
| PIN7 | RED(IN,+) | PIN15 | TERMINAL(M-AS0G08-009) |
| PIN8 | BLACK(IN,-)/PURPLE(PIN16) | PIN16 | PURPLE/WHITE(PIN13) |






Note:The glues on the impeller is for impeller balance. Please don't remove it.

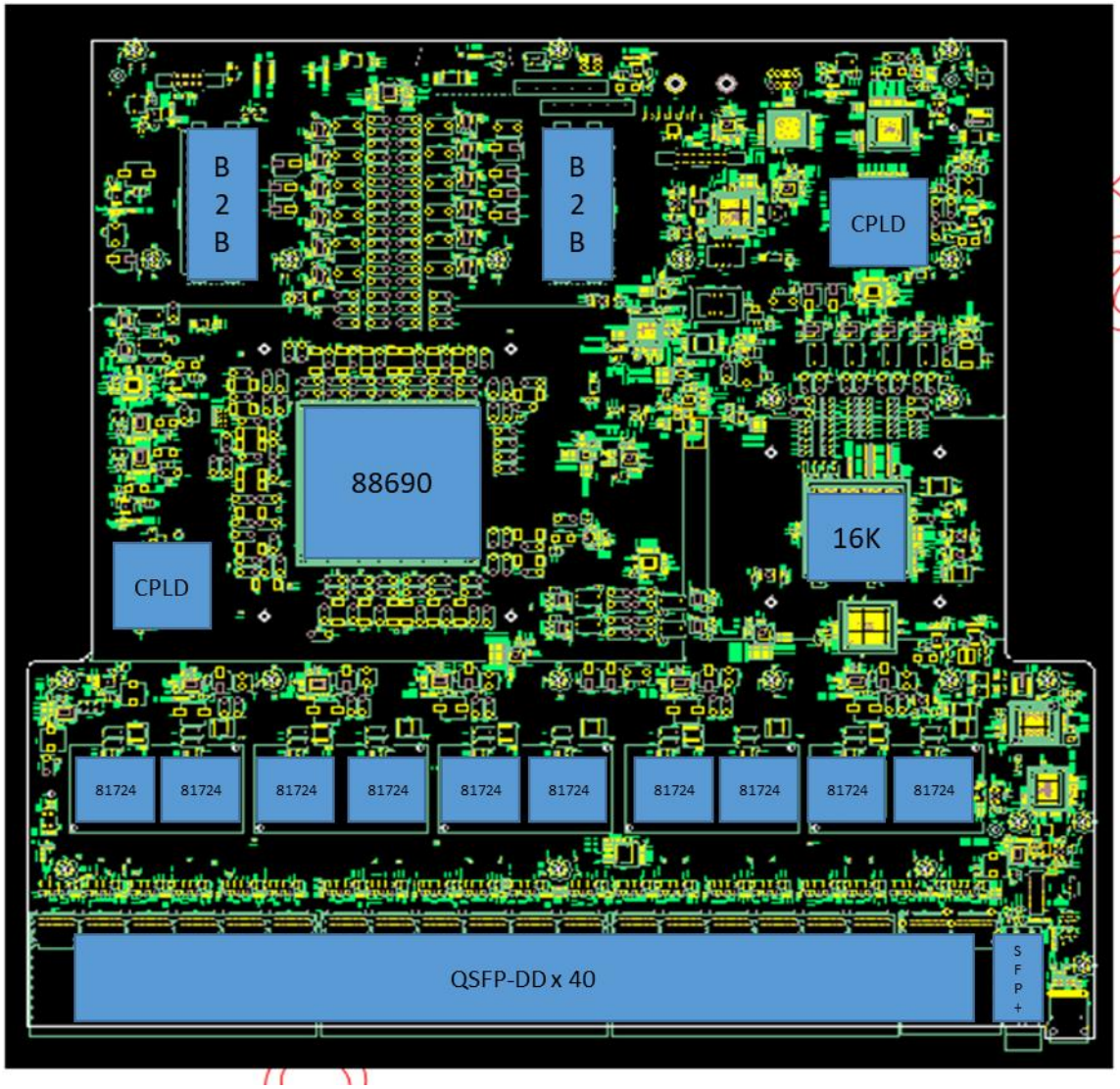
## System Overview
### Block Diagram



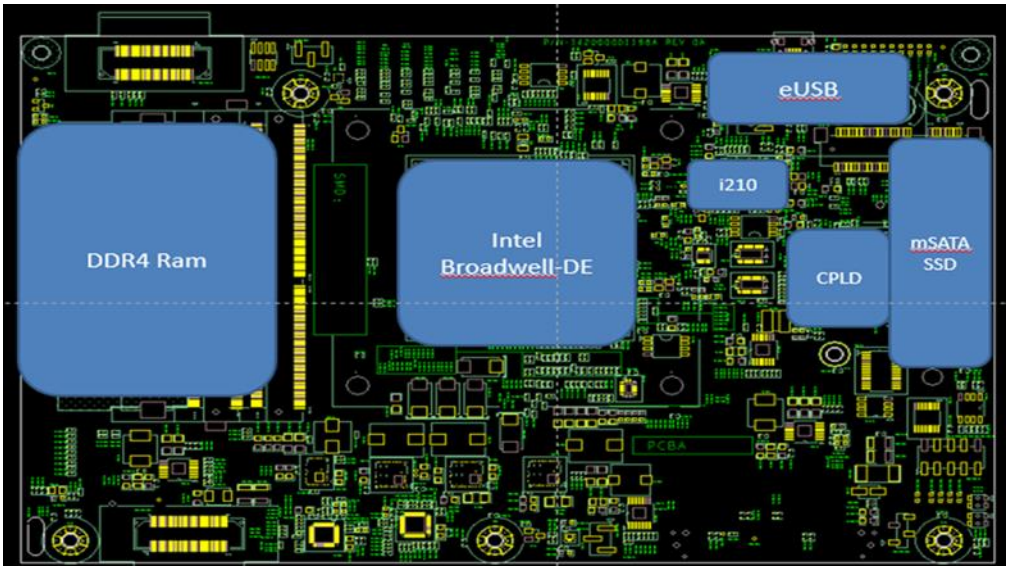

The AS7926-40/80X System is composed of the following PCB assemblies:

- Main PCB – Supports Broadcom 88690 Jericho 2, Broadcom 16K OP2, Broadcom 81724 Gearboxes, and associated supporting circuitry.
- Mezzanine PCB - Supports Broadcom 88690 Jericho 2, Broadcom 16K OP2, Broadcom 81724 Gearboxes, and associated supporting circuitry (nearly identical to the Main PCB)
- CPU Module – Supports Intel x86 Broadwell-DE CPU and associated Storage, Memory, and supporting circuitry
- Fan PCB – Supports CPLD to control system fans and connection of system fans
- Power distribution PCB – Provides power connectivity between system PCBs and power supply modules

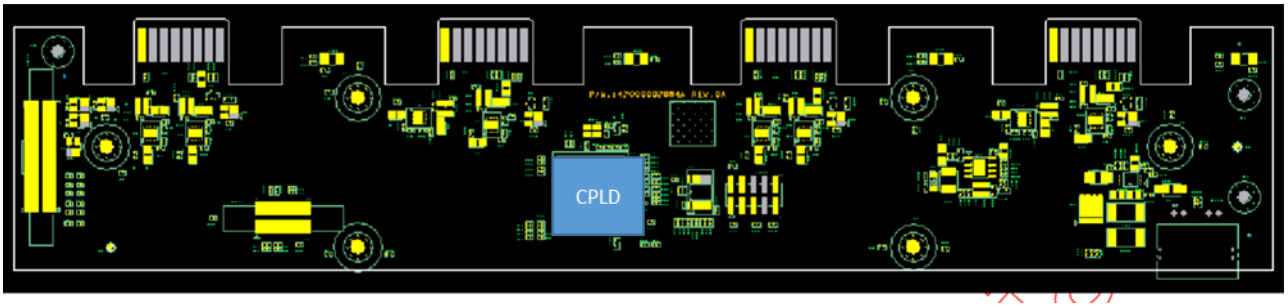
## Main / Mezzanine PCB



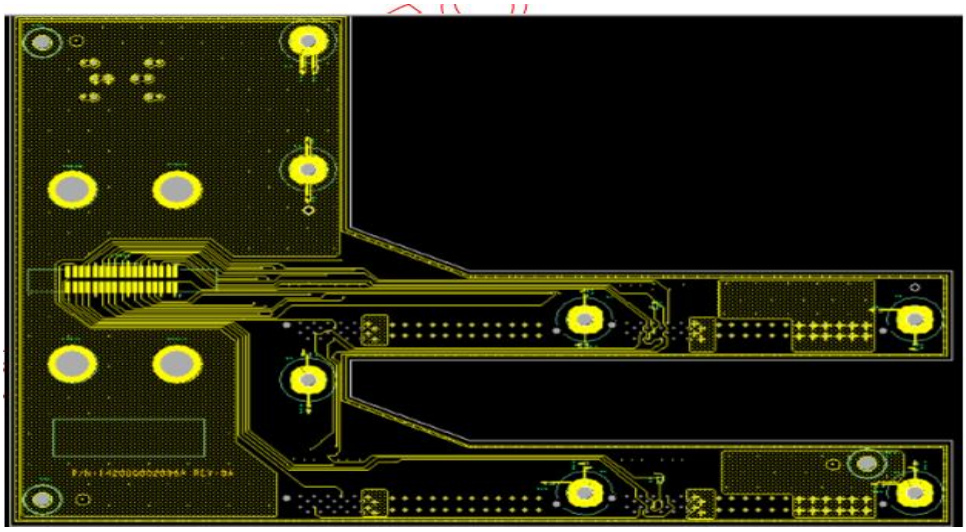
## CPU PCB




## Fan PCB




## Power PDU PCB



## Software Support

The AS7926-40/80X supports a base software package composed of the following components:

## BIOS support

The AS7926-40/80X Supports AMI AptioV BIOS version A01 or greater with the x86 CPU module

## ONIE

See https://github.com/opencomputeproject/onie/tree/master/machine/accton for the latest supported version

## Open Network Linux

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

## Power Consumption

The total estimated system power consumption of the AS7926-40X is ~1300 Watts. This is based upon worst case power assumptions for traffic, optics used and environmental conditions. Typical power consumption will be less.

The total estimated system power consumption of the AS7926-80X is ~2250 Watts. This is based upon worst case power assumptions for traffic, optics used and environmental conditions. Typical power consumption will be less.

## 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

- Reference Documents
  1) ATT-TP-76200

## Safety

- UL (CAN/CSA 22.2 No 60950-1 & UL60950-1)
- CB (IEC/EN60950-1)
- CCC (GB4943.1-2011)
- BSMI (CNS14336-1)

## Electromagnetic Compatibility

- CE Mark
  - EN55032 Class A
  - EN55024 (Immunity) for Information Technology Equipment
  - EN 61000-3-3
  - EN 61000-3-2
- FCC Title 47, Part 15, Subpart B Class A
- VCCI Class A
- CNS 13438 (BSMI)
- CCC (GB9254-2008)

## Environmental

- Low-Temperature Exposure and Thermal Shock (packaged) : NEBS GR63-CORE ISSUE 4 , Section 4.1.1.1
- High Relative Humidity Exposure (Packaged) : NEBS GR63-CORE ISSUE 4 , Section 4.1.1.2
- High-Temperature Exposure and Thermal Shock (Packaged) : NEBS GR63-CORE ISSUE 4 , Section 4.1.1.3
- Operating Temperature and Relative Humidity : NEBS GR63-CORE ISSUE 4 , Section 4.1.2
- Altitude : NEBS GR63-CORE ISSUE 4 , Section 4.1.3
- Handling Drop Tests -Packaged Equipment : NEBS GR63-CORE ISSUE 4 , Section 4.3.1.1
- Unpackaged Equipment -Drop Tests (All Equipment) : NEBS GR63-CORE ISSUE 4 , Section

4.3.2

- Earthquake (10U Rack) : NEBS GR63-CORE ISSUE 4 , Section 4.4.1 (Zone4)
- Office Vibration Test Procedure; 90 minutes/axis (Stand & 42U Rack) : NEBS GR63-CORE ISSUE 4 , section 4.4.4
- Transportation Vibration-Packaged Equipment : NEBS GR63-CORE ISSUE 4 , section 4.4.5
- Acoustic noise : NEBS GR63-CORE ISSUE 4 , section 4.6
- Bump : IEC60068-2-29- packaged
- Shock : ETSI EN 300 019-2-3 -Operational Tests, Class T3.2 op