



# Building Intelligent e-Board by Using Intel® OPS and iAMT

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## INTRODUCTION: CONNECTING TO THE FUTURE

Connecting your audience to the future: What technology can help students and corporate staffs in learning? Education and learning are the most important things for everyone nowadays. The education policy makers are adopting the technology to support the teachers in teaching and the students in learning. It is an obvious trend and going to happen around. More and more countries bring internet and interactive display in the classroom and buildings. They believe these new rooms with favorite e-Board will become an essential element in the near future. Teachers are taking new types of communication to bridge the gap between them and their students and/or parents – Google and Wiki and e-Board.

Axiomtek has been committing in digital signage applications for years. We developed a comprehensive product line of up-to-date Intel® OPS modules: 3rd Generation Intel® Core (Ivy Bridge), 2nd Generation Intel® Core (Sandy Bridge), Intel® Atom Cedarview with low power consumption as the most advanced Intel® Haswell platform. Axiomtek's clients include not only the professional education equipment suppliers which provide 46" to 104" e-Board system to enterprises and schools, but also the largest transit advertising light box vendor who provides the heavy duty vehicle/bus digital signage systems.

## EMERGING DEMAND FOR e-Board

Education equipments continuously make a leap to keep pace with the modern world. Properly implemented educational technology can substantially improve student / corporate staff's achievement. From the notebook PC to the iPad like products, more and more school equipments has gone forward to internet ready. More and more e-Boards are replacing the projector, the traditional white board and the black board in school or meeting room. Interactive e-Board system brings new life to the teachers and presenters by greatly enhancing the vision and collaboration between students and teachers. As this e-Board education platform provides "14 hours / day" service, when it is down, many students stop learning. Axiomtek knows the importance of a reliable system and we deliver the most reliable Intel® OPS platform.

## Build intelligent e-Board by Intel® Ivy Bridge OPS

What is the most useful e-Board in the world? This e-Board should be equipped with large size LCD and the highest performance CPU. Powered by the 3rd Generation Intel® Core processor, Axiomtek's OPS digital signage player, OPS870, combines 31.5-inch OPS interactive touch screen LCD: Axiomtek OFP321; the complete system supports industrial grade LCD with high sensibility touch technology as well as excellent computing power. This intelligent e-Board system can maximize students' learning experience and also it is great for corporate staffs' collaborative meeting.



**Figure 1:** Intelligent e-Board system with Axiomtek OPS870 digital signage player

When it comes to infrastructure, we realize that it can be challenging to build an efficient but adaptable environment given the accelerated pace of new devices, new usage models, increasing security risks, and expanding requirements for staff and support. The OPS system can help users getting the right fit based on the total cost of ownership (TCO) and best value for their education and corporate training.

### ➤ Reliable OPS Design and High Performance

OPS870 is a leading Open Pluggable Specification (OPS) compliant signage player powered by 3rd Generation Intel® Core™ processors (Ivy Bridge). The high performance **OPS870** is based on Mobile Intel® QM77 Express chipset and features 3rd Generation Intel Core processor based on the leading edge 22nm process technology. Axiomtek's **OPS870** is engineered to be installed into any OPS-compliant digital signage platform to enable faster and easier installation, and straightforward upgrading and maintenance. It

significantly provides superb graphics performance, full HD content playback, and dual display presentations. Equipped with the OPS870, users can apply a variety of DOOH (Digital Out Of Home) applications with ease! The OPS870, is connected to displays via a standardized JAE TX-25 plug connector, and includes HDMI, Display Port, UART, and USB 3.0 signals. Pluggable HDD tray and DRAM are for quick and easy installation. The OPS870 digital signage player also supports one 10/100/1000Mbps Ethernet and USB 3.0 port to enable fast and efficient data computation and communication. One PCI Express Mini Card slot is equipped for graphics-enhanced video card, wireless LAN card for 802.11 b/g/n and 3G/GPRS, and tuner/AV capture card.



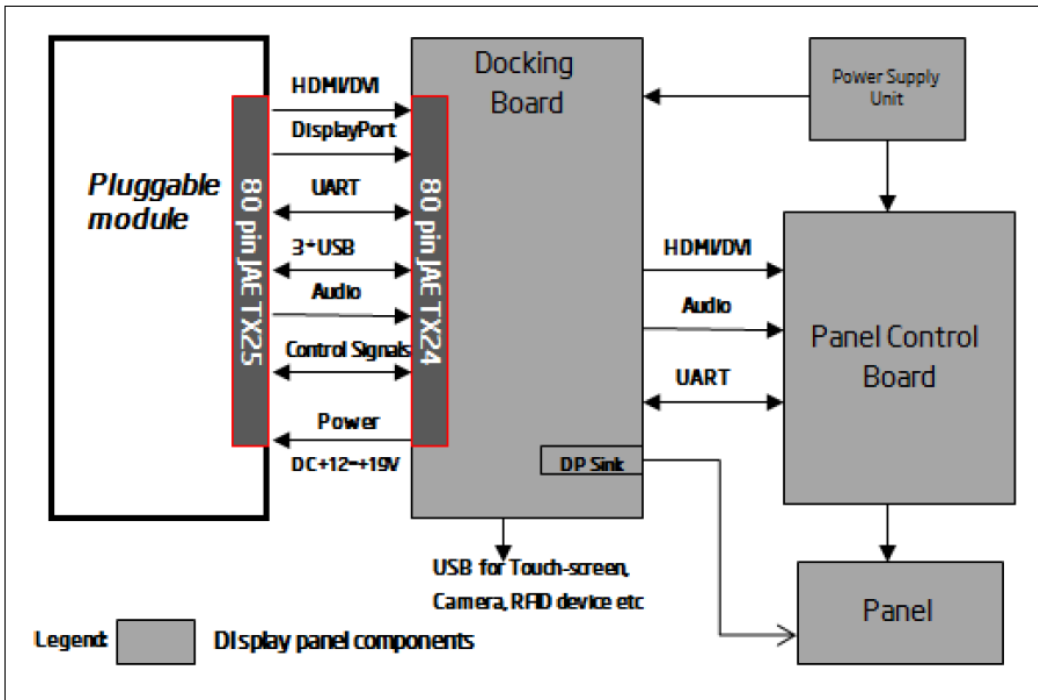
**Figure 2:** Axiomtek's comprehensive OPS digital signage products (OPS870, OPS860, OPS830 series)

➤ **Advanced Intel® AMT 8.0 (Active Management Technology) / Intel® vPro™**

Axiomtek's OPS870 platform provides the novel Intel® AMT (Active Management Technology) 8.0. It allows users to execute remote booting in a local site to control, diagnose and collect non-volatile asset inventory of networking devices in remote sites. Intel® AMT 8.0 functions better remote control management. Using it to remotely manage, monitor, and upgrade system 24 x 7, operator can work far more efficiently while reducing operating costs. Intel® AMT provides remote management and maintenance capabilities that enable IT professionals to query, fix and protect networked embedded devices, even when they're powered

off, not responding or have software issues. What's more, Intel vPro technology helps perform remote asset tracking and checks the presence of management agents virtually anytime. The technology provides the means to remotely turn devices on/off to reduce energy consumption during non-peak operating times.

## Integrating the OPS870 with an interactive touch screen



**Figure 3: OPS block diagram**

e-Board system consists of 6 parts:

- **OPS CPU board: : Intel® 3rd Generation Ivy Bridge processor**
- **Touch screen: IR (46" to 65") or Optical (65" to 104")**
- **LCD Screen: from 46" to 104" LCD**
- **Docking board**
- **Wide range temperature facilitator**
- **Power supply**

The OPS pluggable module docked at a display panel system. In this design, the module is docked and undocked in horizontal direction. There are two system fans that drive room temperature air to enter the system through the vent holes at the back cover. For some applications, the operating environment is below

zero degree, the heater will be equipped to warm up the system to start up. After the system starts, the heater will be stopped.

Just like the accompanied figure below, for the e-Board system, the power supplier unit provides the power both to LCD and OPS. The Pluggable Module relies on a pair of guide rails for docking and undocking so that the plug connector at the back of the module can mate seamlessly with the receptacle on the docking board. And the OPS will take input from the touch screen and output to the LCD display.

The signals between the pluggable module and docking board interconnections are: power, display interface (DVI-D/TMDs and DisplayPort), USB, UART and control signals. There are two ways to connect the OPS to the LCD panel. For the legacy design system, the OPS' HDMI output will be connected to the AD board which outputs the video to LCD panel in the right resolution. For new OPS centric display, the OPS' HDMI output will be connected to the video board directly. The docking board gets the USB signals from pin 65 and 66 (See table 1) of OPS JAE connector and the Touch sensor screen can communicate with the OPS system through the docking board (Show in pink color of Fig. 4).

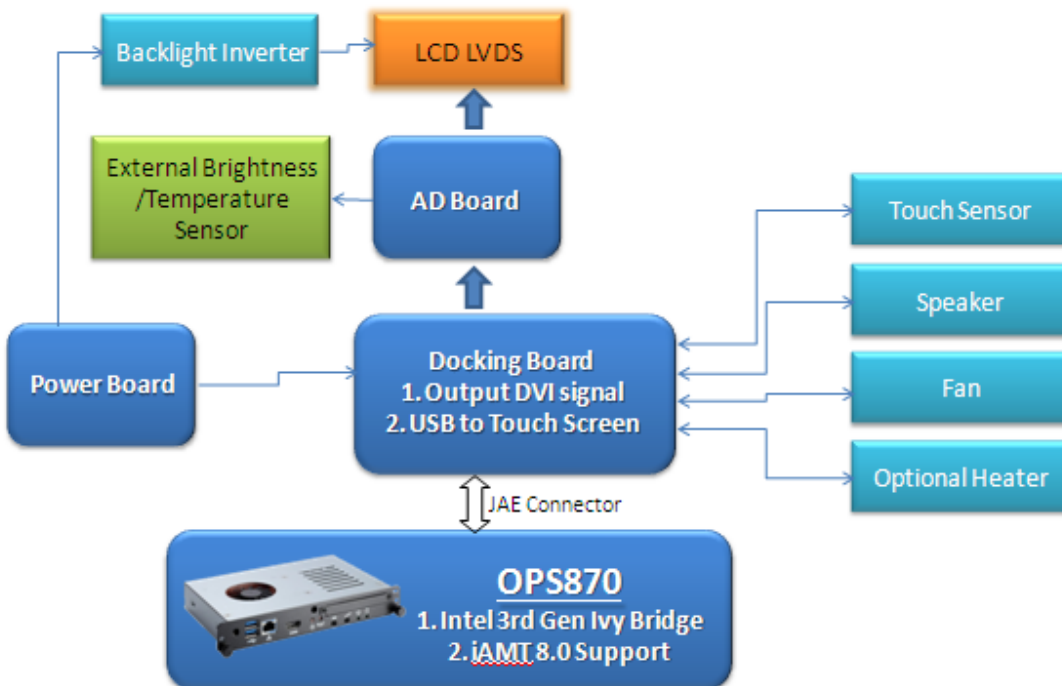


Figure 4: e-Board system with OPS and touch screen



Most of applications are with Microsoft Windows operating system or Linux operation system. And most of us have ever suffered from the difficult situation – computer screen went “blue screen” or “system fault”. For the OPS870, it is with worldwide most advanced remote management tool – Intel® AMT 8.0. With Intel® AMT, the MIS center can detect the system fault and use remote tool to recover this system automatically without spending time in traveling to the machine to repair this system. Even the system does not respond, the AMT 8.0 can provides hardware power reset function which is exactly the same like “pull the power cord out and restart the system”. It is very useful for the blue screen or process hang problems.

With interactive touch screen, the worldwide most powerful Intel® Ivy Bridge CPU board and large size LCD screen, the e-Board system equips the presenter and teacher with the best weapon leading the mind of the audience to the future.



## About Axiomtek Co., Ltd

Axiomtek Co., Ltd. is one of the world's leading designers/manufacturers of PC-based industrial computer products. From its roots as a turnkey systems integrator specializing in data acquisition and control systems, Axiomtek has mirrored the PC evolution in various industries by shifting its focus toward the design and manufacture of PC-based industrial automation solutions.

Axiomtek was established since 1990. It has over 400 employees in headquarters and over 150 employees in subsidiaries including USA, China, and Europe. More than 60 distributor partners around the globe have appointed. Axiomtek offers IPC, Embedded Boards and SoM, Rugged Embedded System and Platforms, Touch Panel Computers, Medical Panel Computers, Digital Signage & Displays, Industrial Networking & Converters, and Network Appliance product lines with more than 400 items.

# Appendix 1

## OPS JAE connectors

Pin No	Signal	Description	I/O
40	+12V~+19V	Power	-
39	+12V~+19V	Power	-
38	+12V~+19V	Power	-
37	+12V~+19V	Power	-
36	+12V~+19V	Power	-
35	+12V~+19V	Power	-
34	+12V~+19V	Power	-
33	+12V~+19V	Power	-
32	GND	Ground	-
31	HDMI_HPD	DVI/HDMI	IN
30	HDMI_DDC_CLK	DVI/HDMI	I/O
29	HDMI_DDC_DATA	DVI/HDMI	I/O
28	GND	Ground	-
27	TMDS2+	DVI/HDMI	OUT
26	TMDS2-	DVI/HDMI	OUT
25	GND	Ground	-
24	TMDS1+	DVI/HDMI	OUT
23	TMDS1-	DVI/HDMI	OUT
22	GND	Ground	-
21	TMDS0+	DVI/HDMI	OUT
20	TMDS0-	DVI/HDMI	OUT
19	GND	Ground	-
18	TMDS_CLK+	DVI/HDMI	
17	TMDS_CLK-	DVI/HDMI	
16	GND	Ground	
15	DDP_HPD	DisplayPort	
14	DDP_AUXP	DisplayPort	
13	DDP_AUXN	DisplayPort	

Pin No	Signal	Description	I/O
80	GND	Ground	-
79	GND	Ground	-
78	GND	Ground	-
77	GND	Ground	-
76	GND	Ground	-
75	GND	Ground	-
74	PWR_STATUS	PowerGood	OUT (OC)
73	PS_ON#	Pluggable Signal ON	IN
72	PB_DET	Pluggable Board Detect	OUT
71	HDMI_CEC	HDMI CEC	I/O
70	AZ_UNEOUT_R	Audio-Rch	OUT
69	AZ_UNEOUT_L	Audio-Lch	OUT
68	GND	Ground	-
67	USB_PP0	USB	I/O
66	USB_PN0	USB	I/O
65	GND	Ground	-
64	USB_PP1	USB	I/O
63	USB_PN1	USB	I/O
62	GND	Ground	-
61	USB_PP2	USB	I/O
60	USB_PN2	USB	I/O
59	GND	Ground	-
58	StdA_SSTX+	USB 3.0	OUT
57	StdA_SSTX-	USB 3.0	OUT
56	GND	Ground	-
55	StdA_SSRX+	USB 3.0	IN
54	StdA_SSRX-	USB 3.0	IN
53	GND	Ground	-

12	GND	Ground	
11	DDP_0P	DisplayPort	
10	DDP_ON	DisplayPort	
9	GND	Ground	
8	DDP_1P	DisplayPort	
7	DDP_1N	DisplayPort	
6	GND	Ground	
5	DDP_2P	DisplayPort	
4	DDP_2N	DisplayPort	
3	GND	Ground	
2	DDP_3P	DisplayPort	
1	DDP_3N	DisplayPort	

52	UART_TXD	UART 3.3V	OUT
51	UART_RXD	UART 3.3V	IN
50	SYS_FAN	System Fan Control	OUT
49	RSVD	Reserved Pins	-
48	RSVD	Reserved Pins	-
47	RSVD	Reserved Pins	-
46	RSVD	Reserved Pins	-
45	RSVD	Reserved Pins	-
44	RSVD	Reserved Pins	-
43	RSVD	Reserved Pins	-
42	RSVD	Reserved Pins	-
41	RSVD	Reserved Pins	-

Table 1: Pin Definition of OPS module