

Intel® Industrial Solutions System Consolidation Series

Speed development of virtualized, real-time systems supporting multiple industrial workloads on a single device

The Intel® Industrial Solutions System Consolidation Series streamlines the path to using virtualization technology to combine multiple previously discrete subsystems into a single computing platform. Pre-integrated, validated, and tested, the development kit includes development tools, a hypervisor, and operating systems,¹ helping reduce cost and complexity for workloads such as motion control, PLC, HMI, machine vision, data acquisition, and more.

The solution contains an industrial computer with a power-efficient, quad-core Intel® Core™ i7 processor with Intel® Virtualization Technology (Intel® VT)² and supports common I/O for industrial applications such as USB 2.0 and 3.0, Ethernet, VGA+DVI dual-display output by DVI-I connector, and mini-PCI Express* sockets. The platform is fanless and ruggedized for use in industrial environments and includes a minimum 120GB solid-state drive and 16GB DDR3 memory. The solution integrates a production-ready virtualization software stack with three preconfigured virtual machines (VMs) running a combination of real-time and embedded operating systems.

Two instances of Wind River VxWorks* RTOS support applications with real-time performance requirements, while Wind River Linux* 5.0 enables embedded and/or general-purpose applications to run simultaneously on the same system. To help port applications to the multi-OS environment, the development kit provides the Wind River Workbench* development environment.

Consolidating Industrial Systems through Virtualization

Multicore Intel Core processors with virtualization technology allow systems to simultaneously run multiple RTOSs and embedded OSs, each on dedicated processor cores. This configuration enables the deterministic behavior of time-critical applications, allowing them to run unencumbered by non-real-time tasks that would otherwise compete for CPU resources on a nonvirtualized system.

Hardware-Assisted Virtualization Technology

Intel has added hardware-assisted technology to its processors. Called Intel VT, it performs various virtualization tasks in hardware, like memory address translation, to improve the performance, security, and reliability of the virtualization.

Learn more at www.intel.com/content/www/us/en/virtualization/virtualization-technology/hardware-assist-virtualization-technology.html.

Production Target (Included)

HARDWARE	
Description	Fanless industrial computer
Manufacturer	ADLink
Model	MXE-5301
Processor	i7-2710QE
Chipset	Q67
AMT support	No
Wireless	Optional
USB 2.0 ports	4
USB 3.0 ports	2
DIO ³	4 DI + 4 DO w/1.5 kV isolation
Ethernet	Gigabit x4: 2 Realtek 8111C + 1 Intel® 82574IT + 1 82579LM PHY
External cFAST ³	1
RS-232 ^{3,4}	2, dedicated
RS-232/422/485 ^{3,4}	2, software programmable
Video ⁵	VGA+DVI dual display output by DVI-I connector Analog CRT, supports QXGA (2048 x 1536) resolution DVI output, supports up to 1920 x 1080 resolution
Memory	16GB 1066 SODIMM
Audio ³	1 mic in, 1 line out
Keyboard / mouse ³	PS2 keyboard/mouse combo
mPCIe	2 internal
Watchdog timer ³	Yes
DC Power	9V to 32V DC, or use AC
AC Power	160 watt external AC/DC adapter for AC Input
USIM ³	1 USIM socket for 3G communications
SATA	128GB SSD
eSATA ³	1 on back of chassis
Dimensions	230 mm (W) x 205 mm (D) x 75 mm (H) (9" x 8" x 2.9")
Weight	3.8 kg (8.39 lbs)
Mounting	Wall mount kit included
Operating temp	Standard: 0°C to 50°C (32°F to 122°F)
Extended temp ⁶	Available up to -20°C to 60°C (-4°F to 140°F)
Storage temp	-40°C to 85°C (-40°F to 185°F)
Humidity	~95% @ 40°C (104°F) (non-condensing)
Vibration	Operating, 5 Grms, 5-500 Hz, 3 axes
ESD	Contact +/-4 KV and air +/-8 KV
Shock	Operating, 50 G, half sine 11 ms duration
EMC	CE and FCC Class A

SOFTWARE

Target OS (non-RTOS)	Wind River Linux* 5
Target RTOS	VxWorks* 6.9.2.2 kernel 2.13 BSP 2.9/2
Hypervisor	Wind River Hypervisor* version 2.0.1

1. Intel® Virtualization Technology requires a computer system with an enabled Intel® processor, BIOS, and virtual machine monitor (VMM). Functionality, performance or other benefits will vary depending on hardware and software configurations. Software applications may not be compatible with all operating systems. Consult your PC manufacturer. For more information, visit <http://www.intel.com/go/virtualization>.

2. Source: <http://www.wurldtech.com/data/content/file/Certified%20Products/WindRiver%20VxWorks%20OS.pdf>.

3. Hardware only; the current version of software does not support this feature.

4. The RS-232 port is dedicated to the host computer and not configurable. No serial (RS-232/485) communications are available unless the user supplies their own via USB converter or mPCIe add-in. Not available for other end-user use.

5. Supported in console mode (no graphics) only under Wind River Linux 5.0

6. If you require the extended temp version, work with your sales associate for special accommodations

Software Elements Included

Wind River Hypervisor*—
Embedded Virtualization

Wind River Hypervisor is an embedded hypervisor that consolidates multiple applications and operating systems onto a single multicore platform. Learn more: www.windriver.com/products/hypervisor/.

Wind River VxWorks* RTOS—
Real-Time Performance

Wind River VxWorks RTOS provides scalability, reliability, and real-time performance, with comprehensive multicore processor support. Learn more: www.windriver.com/products/vxworks/.

Wind River Linux* 5.0—
Embedded Linux

Wind River Linux 5.0 is a commercial-grade Linux solution for embedded device development. Learn more: www.windriver.com/products/product-overviews/Wind-River-Linux-5_Product-Overview.pdf.

Development Host

Intel Industrial Solutions does not include a development host; users must provide this hardware. The development host platform may be a desktop, laptop, or tablet PC.

When selecting a development host PC, make certain that it meets or exceeds the specifications defined below:

HARDWARE (Not Included—To Be Provided by Customer)	
Processor	Intel® Core™ i3 processor
Storage	200GB storage disk space
Memory	4GB RAM
USB	One unused USB 2.0 port, USB 3.0 preferred
Keyboard and mouse	If using a desktop PC
Monitor resolution	Monitor capable of displaying 1024 x 768 @ 16 bpp or better
Ethernet	A network interface card (NIC), for debugging the target platform over Ethernet
Connectivity	Internet connection

SOFTWARE (Included)	
Live USB stick	Wind River Systems (WRS) Workbench* 3.3 on Linux* 3.3.7 kernel
Features	SMP, built for i686

Preconfigured Physical Device Allocations

System consolidation kits come with preconfigured physical device allocations.

Figure 1—Target Platform Devices 1

Item #	Device Type	Assigned to VM	Comment
1	USB 3.0	Linux	Denoted by blue connector color
2	USB 2.0	VxWorks 1	Denoted by black connector color
3	Video	Linux	Basic (non-graphical) command-line style video only supported at this time
4	Ethernet	VxWorks 1	This device is driven by an Intel driver
5	Ethernet	Linux	This device is driven by an Intel driver
6	PS2	N/A	Not supported by this implementation of SCS

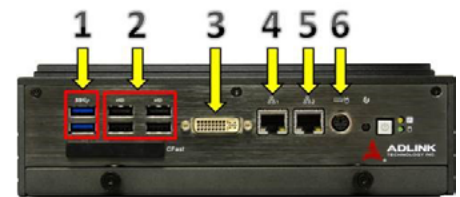
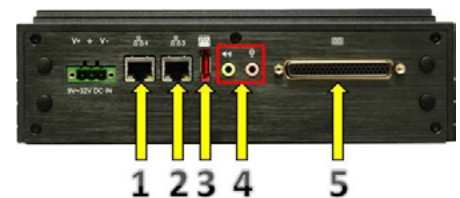


Figure 2—Target Platform Devices 2

Item #	Device Type	Assigned to VM	Comment
1	Ethernet	VxWorks 2	This device is driven by a Realtek driver
2	Ethernet	Linux	This device is driven by a Realtek driver
3	eSATA	N/A	Not supported by this implementation of SCS
4	Audio	N/A	Not supported by this implementation of SCS
5	RS-232/422/485 Serial	N/A	Non-modifiable device preconfigured to support serial connection between development host and target platform via AMIO console



Two Kit Types Available

At this time, the system consolidation series comprises two types of kits:

Development kit: provides hardware, software, documentation, and a Wind River Workbench development environment to accelerate and simplify system development.

Production kit: contains prevalidated hardware and key software ingredients essential for manufacturing consolidated industrial computing devices.

Future products in this family are planned to feature varying software and hardware configurations.

Find more information

Explore additional details about Intel® Industrial Solutions for automation at www.intel.com/industrialconsolidation.

Solution Provided By:



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