I/A Series® HARDWARE
Product Specifications

invensys Foxboro®

PSS 21H-4U14 B4

V90 (Virtualization Server Host Hardware)

The I/A Series Model V90 Server Virtualization Host is a Hewlett-Packard® ProLiant DL380 rack mount server virtualization host utilizing Microsoft Hyper-V virtualization technology to host virtual machines with I/A Series software and Foxboro Control Software (FCS).

FEATURES

The I/A Series Model V90 Server Virtualization Host for Windows Server 2008 R2 Enterprise operating system features:

- A premium level system with high-end processor speed, up to 96 GB of memory, up to eight internal Redundant Array of Independent Disks (RAID5) with one hot swap drive, and redundant hot-swap power supplies
- The ability to host multiple virtual machines running Microsoft Windows Server® 2008 R2 Standard operating system
- Security protection provided by McAfee® VirusScan with AntiSpyware Enterprise
- Virtual machines on a V90:
  - Have the ability to host control processors and/or support data acquisition and monitoring functions as an I/A Series station
  - Can serve as an I/A Series or Foxboro Control System (FCS) application platform and a human interface station
  - Can function as Remote Desktop Services servers to support up to twenty remote clients

- Can support security enhanced I/A Series software with McAfee® software packages - ePolicy Orchestrator, Host Intrusion Prevention, and Data Loss Prevention (Device Control)
- Are required to use McAfee MOVE Antivirus for security protection instead of McAfee VirusScan with AntiSpyware Enterprise.

OVERVIEW

The Model V90 server virtualization host is a 2U rack-mount server running Microsoft Windows Server 2008 R2 Enterprise operating system. Through the use of Microsoft Hyper-V hypervisor virtualization technology, the V90 is capable of hosting virtual machines running Microsoft Windows Server 2008 R2 Standard operating system. Virtual machines that are supported include:

- On-Mesh I/A Series virtual machines; I/A Series 8.8 and later.
- On-Mesh Foxboro Control Software (FCS) virtual machines; FCS 4.0 and later.
- Off-Mesh virtual machines using the Invensys provided virtual machine operating system image.
- Any mix of the above three different virtual machine types.

The V90 server virtualization host using Microsoft Hyper-V hypervisor is the only server configuration supported by Invensys for hosting I/A Series and Foxboro Control Software virtual machines. The V90 is available as an user-configurable model code. CPU, RAM, and operating system selections are not offered because those hardware aspects of the V90 are derived based on the number of virtual machines selected.

V90 Physical Operating System Environment (POSE): Windows Server 2008 R2 Enterprise Operating System

The physical operating system environment (POSE) on the V90 server virtualization host is Windows Server 2008 R2 Enterprise operating system. The pre-installed Windows Server 2008 R2 Enterprise operating system image on the V90 provides the foundation necessary to support hosting of virtual machines. The image includes:

- Microsoft Hyper-V hypervisor virtualization technology, which is required for creating, hosting, and managing virtual machines.
- Windows Server Backup feature, which is required for performing back-ups of an entire V90 server virtualization host (including all of the hosted virtual machines). Please note that a backup can be done live, without rebooting the V90 or any of the individual virtual machines.
- McAfee VirusScan with AntiSpyware Enterprise, which is required for protecting the V90's physical operating system against software security threats.
- Operating system hardening:
  - Unnecessary services, software, and programs removed,
  - Unneeded software ports disabled,
  - Documentation on how to re-enable services and ports where required by special circumstances,
  - Secure BIOS changes.

Since the V90's POSE Windows Server 2008 R2 Enterprise operating system's entire role is to support virtual machines, the only software permitted to be installed on it is software directly related to the health and support of virtual machines.

Therefore, I/A Series, FCS, or third-party applications cannot be installed on the Windows Server 2008 R2 Enterprise operating system image shipped with the V90 server virtualization host.

The V90 server virtualization host's POSE Windows Server 2008 R2 Enterprise operating system supports the following peripherals: mouse, alphanumeric keyboard, 23-inch flat panel LCD monitor (purchased separately), optional USB touchscreen (purchased separately with the monitor), and 1GB copper network interface cards (three NICs are included but additional NICs may be purchased separately). The V90 server virtualization host does not support the use of serial GCIO annunciator keyboards, USB annunciator keyboards, remote graphics units, GPS time synch cards, or local printers.

V90 Virtual Operating System Environment (VOSE): Virtual Machines

The V90 Server virtualization host is shipped with an Invensys-created virtual machine operating system image. By using the supplied virtual machine operating system image with the Microsoft HyperV hypervisor technology, V90's virtual operating system environments (VOSE) can be created. Each virtual machine created with the Invensys supplied image has its own self-contained virtual operating system environment (VOSE) which includes the followings:

- 64-bit Windows Server 2008 R2 Standard operating system; which is required for loading software applications onto the virtual machine.
- Latest version of Symantec System Recovery (SSR) software; which is required for performing individual virtual machine back-ups. Please note the procedure to do a back-up of a virtual machine using Symantec System Recovery is very similar to performing the procedure on a regular physical machine.
- Operating system hardening:
  - Unnecessary services, software, and programs removed,
  - Unneeded software ports disabled,
  - Documentation on how to re-enable services and ports where required by special circumstances,
  - Secure BIOS changes.

McAfee VirusScan with AntiSpyware Enterprise software is not included on the virtual machine operating system image. Instead antivirus protection is provided by McAfee MOVE Antivirus software which is a managed from McAfee's ePolicy Orchestrator (ePO).

Virtual machines can be used as I/A Series (V8.8 and later) or FCS (V4.0 and later) stations, and can also provide a platform for Invensys Foxboro, third-party, and user-written applications.

A virtual machine can:

- Host I/A Series control stations,
- Serve as an application platform,
- Run Remote Desktop Services (formally known as Terminal Services),
- Connect to a thin client over the DCS Auxiliary Communications Network to provide human to machine interface (HMI) station functionality,
- Function on Ethernet control systems,
- Act as a McAfee MOVE AntiVirus Offload Scan Server,
- Use security enhancements provided by the following McAfee software packages:
  - ePolicy Orchestrator
  - Host Intrusion Prevent
  - Data Loss Prevention (Device Control).

The virtual machines hosted by the V90 server virtualization host connect to the network through internal virtual switches that map virtual machines to the V90's physical 1GB copper Ethernet ports. The virtual switch network can be configured to map network connectivity to:

- The Mesh control network.
- The DCS Auxiliary Communications Network (ACN).
    - The DCS Auxiliary Communications Network (ACN) is a 1GB off-Mesh network comprised of managed Ethernet switches that must not share any of the same network hardware (switches) with The Mesh control network.
- Other auxiliary networks.
- Any mix of the above three different network types.

A virtual machine's network connectivity is configured independently from other virtual machines hosted by the same V90 server virtualization host. Each network utilizes a dedicated physical 1GB copper Ethernet port – The Mesh control network has two dedicated 1GB Ethernet ports while the DCS Auxiliary Communications Network (ACN) has one dedicated 1GB Ethernet port.

With the exception of the Ethernet network ports, virtual machines are not allowed direct access to the V90's physical ports (serial, USB, etc.) Therefore, virtual machines only support peripherals that are connected through the network, such as thin clients and network printers. Virtual machines do not support the use of serial GCIO annunciator keyboards, USB annunciator keyboards, remote graphics units, GPS time synch cards, or local printers

Virtual Machine Configurations

A V90 server virtualization host can host virtual machines with the following configurations:

- Single processor virtual machines.
- Multi-processor virtual machines.
    - Multi-processor virtual machines are only supported for Off-Mesh virtual machines.
- A mix of single processor virtual machines and multi-processor virtual machines.

Sizing

- A V90 server virtualization host can support up to 10 single processor virtual machines.
- A virtual machine running Microsoft Remote Desktop Services can support up to 20 simultaneous remote sessions.
    - There is a limit to the number of remote sessions that can be supported simultaneously by a V90 server virtualization host – though each individual virtual machine can support up to 20 simultaneous remote sessions, collectively the V90 server virtualization host cannot support more than 40 simultaneous remote sessions due to bandwidth constraints of the V90's physical Ethernet ports.

Licensing

There are no I/A Series or FCS licenses associated with the V90 server virtualization host itself, however each virtual machine must have the proper I/A Series or FCS platform license. Virtual machine I/A Series and FCS platform licenses are identical to physical machine I/A Series and FCS licenses.

- For example, a single V90 server virtualization host could have ten I/A Series virtual machines. No S10 license is required for the V90 itself, however ten S10 licenses would be required (one S10 per I/A Series virtual machine).

MODEL V90 SERVER VIRTUALIZATION HOST

V90 BASE CONFIGURATION

The Model V90 server virtualization host base configuration includes:

- Microsoft Hyper-V R1 virtualization technology via pre-configured and installed Microsoft Windows Server 2008 R2 Enterprise Edition physical operating system environment (POSE)
- Virtualization hosting support for four virtual machines with Microsoft Windows Server 2008 R2 Standard Edition operating system, 64-bit package (virtual operating system environment (VOSE))
- Intel Xeon Processor
- Dual head graphics card (digital support only), up to 1600x1200 pixel resolution
- 48GB registered memory
- Two 300GB internal SAS hard drives in a RAID 1 configuration with four 600GB SAS hard drives in a RAID 5 (with one hot spare) configuration
    - Provides 1200 GB total available disk space for virtual machines
- Two 1 GB copper network interface PCIe cards for 1 GB connections to The Mesh control network
- Four integrated 10/100/1000Base-TX Ethernet ports; with one utilized for 1GB connection to the DCS Auxiliary Communications Network (ACN)
- Internal SATA CD-RW/DVD drive
- Two rear USB ports
- Two front USB ports.
- Redundant hot-swap power supplies
- Redundant hot-swap fans
- USB Keyboard
- USB Mouse

V90 Options

The Model V90 server virtualization host offers the following options:

- Expandable virtualization hosting support for up to ten Virtual Machines running Microsoft Windows Server 2008 R2 Standard operating system, 64 bit package
    - Dual CPU
    - 96GB registered memory
    - Two 300GB internal SAS hard drives in a RAID 1 configuration with five 600GB SAS hard drives in a RAID 5 (with one hot spare) configuration.

  - Provides 1800 GB total available disk space for virtual machines
- Up to six internal 600 GB hard drives in a RAID 5 (with one hot spare) configuration
  - Provides 2400 GB total available disk space for virtual machines
- Quad monitor graphics card (digital support only)
- 23" widescreen monitors with optional USB touchscreen
- Up to three additional Ethernet adapter cards (copper or fiber)
- Mounting rail kit.

Mounting Options

The V90 is a 2U high, rack mount server virtualization host which offers rail mounting as standard equipment. It can be placed in commercially available enclosures that have provisions for adequate ventilation and cooling to ensure the ambient temperature inside the enclosure does not exceed 95°F.

NOTE

Enclosures must accommodate a depth of at least 39.4 in (1000 mm) to allow space for air flow at the front and back of the unit plus cables at the back of the unit. Because of their depth, the V90 cannot be mounted in the standard Invensys enclosures, such as the Industrial Enclosure 32, Metal Enclosure 32, and Modular Industrial Workstations.

With dual or quad PCIe video cards, the V90s can be located up to 15 ft from the monitor using direct connect and other human interface cables available from Invensys.

As indicated by the CE logo, the V90 conforms to the applicable European Union Directives.

FUNCTIONAL SPECIFICATIONS (V90)

Processor Type
Intel Xeon

Memory
48 GB registered memory (default)

Devices Served

SAS PERIPHERALS
Two 300 GB internal system disk drives with four 600 GB system disk drives, with up to six optional 600 GB internal system disk drives

CONTROLLER PERIPHERALS
One SATA CD-RW/DVD drive

VIDEO DISPLAYS (UP TO 4)
23-inch LCD USB Touchscreen Monitor
23-inch LCD Monitor
40-inch LCD Overview Monitor.

INTERFACES TO EXTERNAL DEVICES
USB
Mouse
Alphanumeric Keyboard
Up to four optional touchscreen monitors
Audio speakers

Internal Diagnostics
Self-checking performed at power-up.

Video

OUTPUT TYPE
Dual head DisplayPort/DVI PCIe video card (default) (up to 1600 x 1200 resolution)
Quad-head, digital, PCIe video card assembly

SCREEN PRESENTATION
Refresh Rate
Up to 85 Hz
Colors
32 bit
Resolution
Widescreen (16:9) (Supported by 23-Inch LCD Monitor)
Up to 1920x1080 pixels

Ethernet Interface Communications
Two PCIe Ethernet network interface cards providing Ethernet ports (10/100/1000Base-TX) for 1 GB connection to The Mesh control network.
Four Integrated Ethernet ports (10/100/1000Base-T) for one 1 GB connection to DCS Auxiliary Communications Network (ACN).
Up to three additional PCIe Ethernet network interface cards providing connection to Ethernet data bus (10/100/1000 Base-TX or 100Base FX).

Power Supplies
Two redundant, hot-swap, 750 W auto-switching input power supplies, each with a separate power cord.

Power Requirements

INPUT POWER
100-240 V ac, 50 to 60 Hz, auto ranging

POWER PARAMETERS
100-120 V ac, 13.32A maximum
200-240 V ac, 6.65A maximum

INRUSH CURRENT
30 A power supply for 20 ms

HEAT DISSIPATION
2925 BTU/hr (at 100 V ac),
2812 BTU/hr (at 200 V ac)

Cooling
Hot swappable, redundant I/O and processor fans. Each redundant power supply contains a fan.

ENVIRONMENTAL SPECIFICATIONS (V90)

Processor Operating

TEMPERATURE
10° to 35°C (50° to 95°F) at sea level with an altitude derating of 1.0°C per every 305 m (1.8°F per every 1000 ft) above sea level to a maximum of 3050 m (10,000 ft); no direct sustained sunlight. Maximum rate of change is 10°C/hr (18°F/hr). The upper limit may be limited by the type and number of options installed.
System performance may be reduced if operating with a fan fault or above 30°C (86°F).

RELATIVE HUMIDITY
10 to 90% relative humidity (Rh), 28°C (82.4°F) maximum wet bulb temperature, non-condensing.

MAXIMUM VIBRATION
0.26 G at 5 to 350 Hz in operational orientations

SHOCK
Half sine shock in all operational orientations of 31 G +/-5% with a pulse duration of 2.6 ms +/-10%

ALTITUDE
3050 m (10,000 ft). This value may be limited by the type and number of options installed. Maximum allowable altitude change rate is 457 m/min (1500 ft/min).

Processor Storage

TEMPERATURE
-30° to 60°C (-22° to 140°F). Maximum rate of change is 20°C/hr (36°F/hr).

RELATIVE HUMIDITY
5 to 95% relative humidity (Rh), 38.7°C (101.7°F) maximum wet bulb temperature, noncondensing.

MAXIMUM VIBRATION
1.54 G rms at 10 Hz to 250 Hz in all orientations

SHOCK
Half sine shock on all six sides of 71 G +/-5% with a pulse duration of 2 ms +/-10%. Square wave shock on all six sides of 27 G with velocity change @ 235 in/sec. or greater.

ALTITUDE
-16 to 10,600 m (-50 ft to 35,000 ft)

Processor Environmental

LOCATION
UL/UL-C listed as suitable for use in ordinary locations and meets ordinary safety standards for fire and shock hazards.

CONTAMINATION
Class G1 (Mild) as defined in ISA Standard S71.04

REGULATORY COMPLIANCE (V90)

Safety Certifications

USA
UL® (UL Std 1950)

CANADA
CSA® (CSA C22.2 No. 60950-1)

EUROPE
TUV (CENELEC EN60950-1)

EMC

CANADA
ICES Class A

EUROPE
CE EN55022 CLASS A, EN55024, EN61000-3-2, EN61000-3-3

PHYSICAL SPECIFICATIONS (V90)

Dimensions and Mass

KEYBOARD

Height
35 mm (1.4 in)
Width
445 mm (17.5 in)
Depth
150 mm (5.9 in)
Mass
1.8 kg (4.0 lbs)

CHASSIS

Maximum outside dimensions with bezel and feet

Height
86.4 mm (3.38 in) with bezel
Width
444 mm (17.5 in)
Depth
680.7 mm (26.8 in)
Rack Weight
26.1 kg (57.5 lbs) maximum configuration

REFERENCE DOCUMENTS

For more information regarding the thin client product offering, please refer to the following documents. The latest revisions are available through the Invensys Operations Management Global Customer Support Center at *http://support.ips.invensys.com*.

Topic	Document Part No.	Document Title
V90 Server Virtualization Host	PSS 21H-4U14 B4	*I/A Series V90 (Virtualization Server Host Hardware)*
	B0700VA	*Hardware and Software Specific Instructions for I/A Series Model V90 Server Virtualization Host (DL380) (Windows Server 2008 R2 Enterprise Operating System)* Row 7: Supported Monitors
Virtualization	PSS 21S-8A9 B3	*Overview of Hypervisor Technology – Microsoft Hyper-V Hypervisor*
	B0700VM	*Virtualization User's Guide*
DCS Auxiliary Communications Network (ACN) Configuration	B0700CA Rev P or Later	*The MESH Control Network Operation, and Switch Installation and Configuration Guide*
Thin Client Hardware and Configuration	PSS 21H-4U13 B4	*Thin Clients*
	B0700VN	*Thin Client User's Guide*
Remote Server Connections and Required Microsoft Licenses	B0700VM	*Virtualization User's Guide,* see "Site Planning"
Virtual Machine Antivirus Security	B0700EV	*McAfee MOVE Antivirus Product Installation and Configuration Guide*

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