

# HP ProLiant WS460c Gen8 Graphics Server Blade



Hardware accelerated graphics for desktop virtualization



The HP ProLiant WS460c Graphics Server Blade has been at the cutting edge of virtualized high-performance graphics for years. It centralizes workstations in the data center where they can be more securely, easily, and economically managed. The result is improved end-user productivity, uptime and business continuity, enhanced data center security, and reduced IT costs.

## Meet user demands for high-performance graphics

### HP ProLiant WS460c Gen8 Graphics Server Blade

- Delivers the industry's most comprehensive graphics acceleration capabilities for VDI in a blade form factor
- Now with Intel Xeon E5-2600 v2 12-core processors and 1866 MHz DDR3 memory
- Provides up to 60 percent cost reduction per seat, when compared to previous generation dedicated workstation blades<sup>1</sup>
- Furnishes savings in power, space, and management
- Achieves up to 4X improvement in user density<sup>2</sup>

The consumerization of IT and bring-your-own-device (BYOD) expectations, along with the explosion of video and multimedia has accelerated the demand for performance-driven remote graphics capabilities. Organizations that rely on high-performance graphics acceleration applications—including financial trading, computer-aided design (CAD), Web design, digital content creation, education, public sector, oil and gas, and healthcare—are asking themselves one question:

**“How do we enable anywhere, anytime application and information delivery, while also ensuring the protection of corporate information and minimizing management?”**

The HP ProLiant WS460c Gen8 Graphics Server Blade now delivers even more performance with new Intel® Xeon® Processor E5-2600 v2 processors and 1866 MHz DDR3 memory. It is the industry's first bladed technology to support up to eight GPUs per blade, lowering the cost per user while enabling remote users to easily complete large model visualizations.

### New NVIDIA GRID K1 and K2 boards

With this latest update, HP is expanding our comprehensive set of graphics offerings with NVIDIA GRID solutions that, for the first time, support hardware GPU virtualization and multiple GPUs on a single adapter card, providing an excellent end-user experience.

NVIDIA GRID GPU adaptors have an optimized multi-GPU design that helps to maximize user density. GRID K1 boards, which include four Kepler-based GPUs and 16 GB of memory, are designed to host the maximum number of concurrent users. GRID K2 boards, which include two higher end Kepler GPUs and 8 GB of memory, deliver maximum density for users of workstation-class graphics applications.

With GRID, users benefit from the best of both software virtualized and pass-through GPU technologies, because the virtual machine (VM) shares the resource of a GPU, but has direct access to the dedicated resources of the GPU.

<sup>1</sup> HP internal study based on proposed pricing as of January 2013.

<sup>2</sup> Outfits 3X more NVIDIA Quadro 3000M or up to 4X more NVIDIA Quadro 1000M graphics in the same HP c-Class enclosure space vs. using WS460c Gen8 without expansion blade.

### **Pass-through GPU**

The HP ProLiant WS460c Gen8 Graphics Server Blade delivers the industry's first support for bladed graphics with up to eight GPUs per blade plus enhanced memory footprint and speeds and full PCIe Gen3 x16 GPU support—all on the proven HP ProLiant Gen8 architecture.

This solution enables a lower cost per seat through multitenancy in a virtualized environment while keeping a dedicated GPU per user for performance, and taking full advantage of NVIDIA driver. This is beneficial to users who utilize high-performance graphics applications in multiple industries.

The HP ProLiant WS460c Gen8 Graphics Server Blade provides a local workstation for a high-performance PC experience to end users over the network using one of the industry-standard remoting protocols such as Citrix HDX 3D, VMware PCoIP, and Microsoft® RemoteFX. Initially, the server blade was introduced as a bare metal 1:1 solution, meaning that a client operating system was loaded on the blade for a single user. The HP WS460c G6 systems made a giant leap forward with its industry-first ability to virtualize the server blade by connecting a GPU directly to a virtual machine (first supported by XenServer 6). This allowed multiple graphics accelerated VMs to support a range of needs from media-rich PCs to high-performance 3D workstations. Now with the Gen8 version, the new graphics offering and GPU density has taken another giant leap forward.

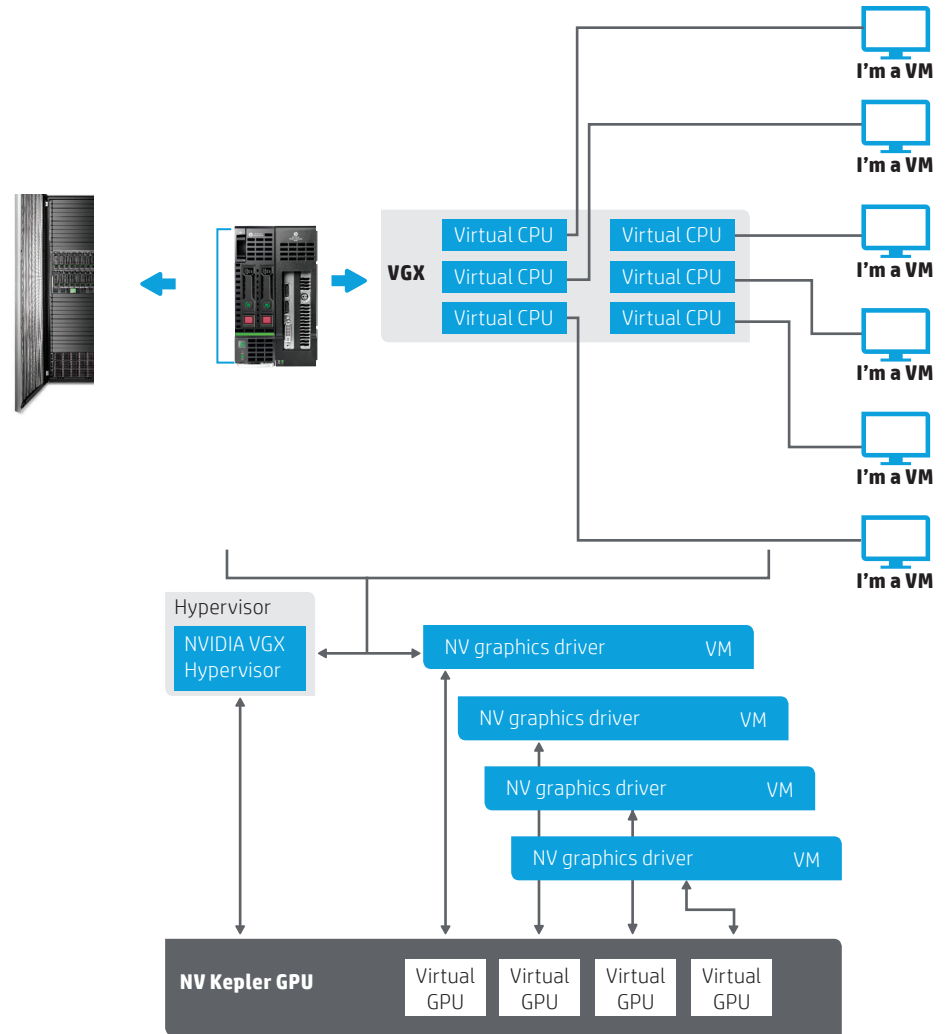
## **High-performance graphics acceleration—from media-rich PCs to 3D accelerated graphics users**

### **True Virtual GPU**

Also known as “NVIDIA GRID vGPU” is the NVIDIA/Citrix implementation of the technology, True Virtual GPU offers the benefit of GPU scaling like the software-virtualized GPU (API intercept) and provides the performance of a native NVIDIA graphics driver like the pass-through models (see figure 1).

This technology is currently implemented by the NVIDIA GRID K1 and K2 products. The GRID GPU is shared between multiple VMs similar to API intercept. However, in this model each VM has direct access to the GPU via dedicated channels managed by the NVIDIA GRID vGPU Manager. Unlike the software virtualized GPU (API intercept) model, the NVIDIA vGPU Manager within the host hypervisor manages the VM to GPU channels, guaranteeing that each VM has a dedicated amount of vRAM per user and direct access to the GPU. Administrators will have ability to assign 1 to 8 users per physical GPU depending on their workload needs.

**Figure 1.** HP ProLiant WS460c Gen8 Graphics Server Blade with NVIDIA GRID configurations



### Multi-GPU configurations

The HP ProLiant WS460c Gen8 Graphics Server Blade has two options for the base blade configuration (see figure 2): the single-width base blade or double-width blade with graphics expansion. The base blade supports up to two MXM style graphics cards installed on the blade mezzanine slots, while the expansion blade allows full size high-end graphics cards to be installed.

The HP WS460c Gen8 HP Multi-GPU Carrier card allows for up to 8 GPUs (MXM Style) to be installed in the blade, creating three to four times more GPU density than previous generations.

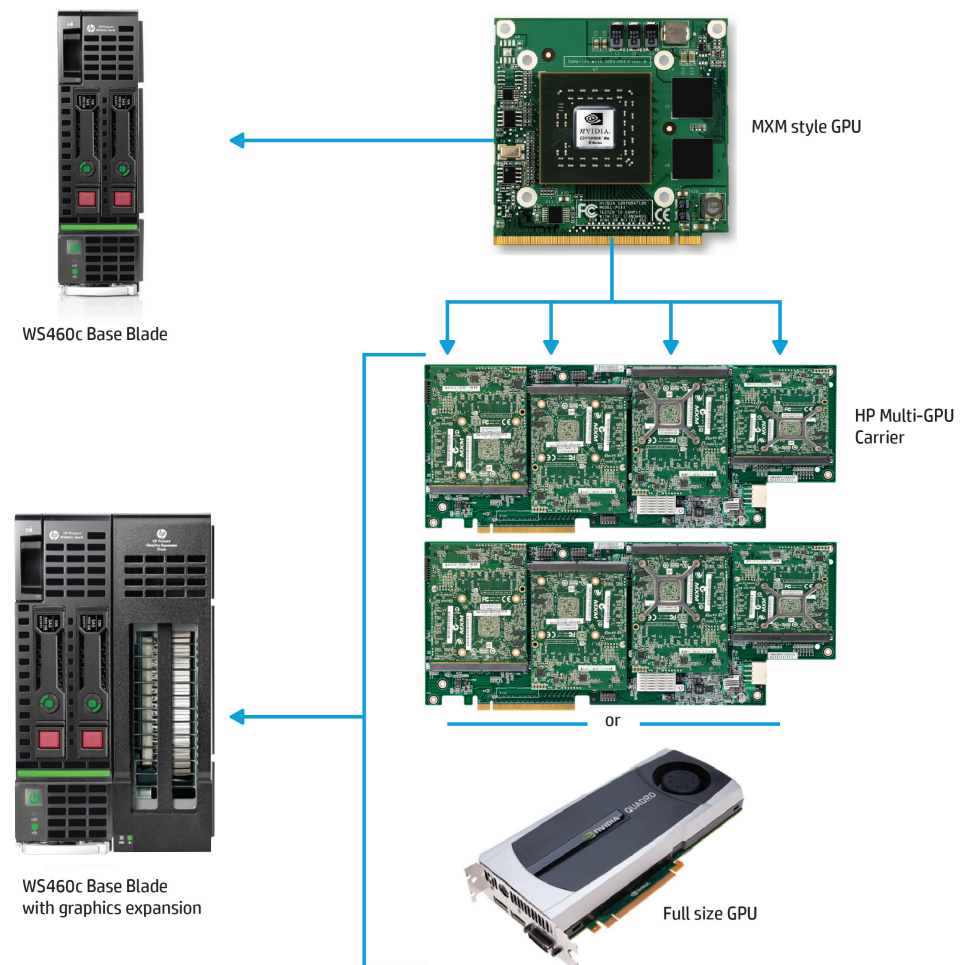
### High-performance desk-side graphics experience

The HP ProLiant WS460c Gen8 Graphics Server Blade delivers an outstanding performance experience across all media-rich PC and workstation-class users.

- Share advanced media-rich workstation or PC graphics remotely, with 2D and 3D multidisplay, and full-motion video capabilities
- Drive up to four displays per client device and run multiple computing sessions from each, so professionals have access to the compute and graphics performance they need, on demand
- Meet a full range of graphics users' demands for flexible high-end graphics solutions on client and Server OS on both, bare metal and in virtualized environment
- Benefit from PCIe Gen3 technologies, which offer improved latency, and up to 400 percent more bandwidth per I/O expansion slot<sup>3</sup>
- See substantial graphics performance gain—from simple Microsoft Office documents to full-blown solid modeling applications—on HP Thin Clients with new graphics pass-through capabilities and new hardware-based graphics on HP servers

<sup>3</sup> Per HP internal testing, compared to a G6 x8 PCIe Gen2 expansion slot. Actual results will depend on application, system configuration, tuning, and etc.

**Figure 2.** HP ProLiant WS460c Gen8 Graphics Server Blade and Expansion Blade with MXM and Multi-GPU Carrier configurations



### Remote access for greater productivity and flexibility

HP ProLiant WS460c Graphics Server Blade customers report that their users not only love the ability to access their workstation or media-rich PC remotely from home or on the road; but also have increased the number of hours they are able to work. The HP ProLiant WS460c Gen8 Graphics Server Blade paves the way for new business models by removing distance barriers. It accomplishes this with reliable network-enabled access and Integrated Lights-Out management.

- Access resources easily from thin clients, workstations, PCs, and notebooks and most any mobile device
- Provide segregated graphics and applications access for remote contractors
- Experience faster load and save times for large data sets or media files sitting in the data center and connected to your high bandwidth data stores
- Increase the ability to maintain a single working data set
- Deliver not only flexible, on-demand high configuration resources (processor, memory, graphics) for time-sensitive tasks, but also significant hardware utilization levels by using the server as a pooled resource in the data center
- Enable high-performance levels through the ability of partner (Citrix, Microsoft, VMware) protocols to take advantage of the graphics processors delivering a robust user experience

### **Data center security and control**

The HP ProLiant WS460c Gen8 Graphics Server Blade lowers risk by ensuring all data remains in the data center, reducing exposure to your business.

- Benefit from mission-critical security and low-latency data access across the workstation environment
- Reduce the risk of company data exposure from loss or theft of local hard drives, removable media drives, data interfaces such as USB and systems
- Maintain better control over the IT environment by eliminating unauthorized software loads or data removal
- Enable contractors to work on projects without providing access to sensitive data

### **Business continuity**

- Configure redundant N+1 or N+N Power supplies, redundant fans, redundant interconnects, redundant On-Board Administrator management units
- Optimize the use of your existing data center power infrastructure with HP ProLiant Server Dynamic Power management; measure power utilization and set power caps that enable an overloaded data center to add additional servers without the cost of bring in additional power
- Dramatically improve business continuity with multiblade and multisite capabilities
- Run multiple HP ProLiant WS460c Gen8 Graphics Server Blade sessions from a single client and connect to any data center to intelligently balance and shift compute resources in the event of a problem
- Be prepared for incidents such as power loss and catastrophic disasters, with data center computing environments that can be accessed more securely from any location

### **Common client virtualization platform**

Whether your client virtualization strategy is based on VMware, Citrix, or Microsoft, you can resource and manage all your desktop compute needs from a common graphics-enabled virtualization solution—no matter if they are task workers, productivity users, knowledge workers, power or media-rich PC users or high-performance 3D workstation users.

### **Easy management**

The HP ProLiant WS460c Gen8 Graphics Server Blade helps consolidate IT management in one location, improves efficiency, and reduces the time needed to troubleshoot and perform maintenance tasks.

- Get access to improved management capabilities through the HP iLO 4 Management Engine, which enables a lifecycle approach to deploying and managing the server, and automatically regulates power consumption and server performance
- Navigate and manage systems through a single, browser-based interface, and deploy software easily using the HP ProLiant Essentials Rapid Deployment Pack
- Remotely control and troubleshoot from a central location or outside the office, on the network using the HP ProLiant Onboard Administrator

## Technical specifications



### HP ProLiant WS460c Gen8 Graphics Server Blade

Built on HP ProActive Insight Architecture

<b>Compute</b>	Intel Xeon Processor E5-2600 v2, 2/6/8/12 cores   PCIe Gen3 on host, PCIe Gen2 on Expansion Slot (2)
HP Smart Socket Guide	Yes
<b>Memory</b>	(16) DDR3, up to 1866 MHz (512 GB max)
HP SmartMemory	Yes
<b>Graphics cards</b>	NVIDIA Quadro 3000M, 1000M, 500M, GRID K2, K1, Quadro 6000, K5000, K4000
<b>Storage</b>	HP Smart Array P220i Controller with 512 MB FBWC 2 SFF 2.0 TB max—HDD/SSD
HP SmartDrive	Yes
FBWC	Yes
<b>Networking</b>	2x10GbE Flex-10
HP FlexibleLOM	Yes
<b>Embedded management</b>	HP iLO Management Engine (iLO 4)
Intelligent provisioning	Yes
HP Active Health System	Yes
Agentless management	Yes
<b>Cloud-based management</b>	HP Insight Management 7
HP Insight Control (agentless)	Yes
HP Insight Online	Yes
<b>Power and cooling</b>	Enclosure based (94 percent Platinum)
3D Sea of Sensors	Yes



## Technical specifications (Continued)

### Processor and memory

Processor type	Intel Xeon E5-2600 v2 and E5-2600 product family
HP processor	<p><b>Twelve-core processors</b> Intel Xeon E5-2697 v2 (2.7 GHz/12-core/30 MB/130 W) Processor Kit Intel Xeon E5-2695 v2 (2.4 GHz/12-core/30 MB/115 W) Processor Kit</p> <p><b>Ten-core processors</b> Intel Xeon E5-2690 v2 (3.0 GHz/10-core/25 MB/130 W) Processor Kit Intel Xeon E5-2680 v2 (2.8 GHz/10-core/25 MB/115 W) Processor Kit Intel Xeon E5-2670 v2 (2.5 GHz/10-core/25 MB/115 W) Processor Kit Intel Xeon E5-2660 v2 (2.2 GHz/10-core/25 MB/95 W) Processor Kit Intel Xeon E5-2650L v2 (1.7 GHz/10-core/25 MB/70 W) Processor Kit</p> <p><b>Eight-core processors</b> Intel Xeon E5-2667 v2 (3.3 GHz/8-core/25 MB/130 W) Processor Kit Intel Xeon E5-2650 v2 (2.6 GHz/8-core/20 MB/95 W) Processor Kit Intel Xeon E5-2640 v2 (2.0 GHz/8-core/20 MB/95 W) Processor Kit</p> <p><b>Six-core processors</b> Intel Xeon E5-2643 v2 (3.5 GHz/6-core/25 MB/130 W) Processor Kit Intel Xeon E5-2630 v2 (2.6 GHz/6-core/15 MB/80 W) Processor Kit Intel Xeon E5-2630L v2 (2.4 GHz/6-core/15 MB/60 W) Processor Kit Intel Xeon E5-2620 v2 (2.1 GHz/6-core/15 MB/80 W) Processor Kit</p> <p><b>Four-core processors</b> Intel Xeon E5-2637 v2 (3.5 GHz/4-core/15 MB/130 W) Processor Kit Intel Xeon E5-2609 v2 (2.5 GHz/4-core/10 MB/80 W) Processor Kit Intel Xeon E5-2603 v2 (1.8 GHz/4-core/10 MB/80 W) Processor Kit</p> <p><b>Eight-core processors</b> Intel Xeon E5-2690 (2.9 GHz/8-core/20 MB/135 W) Processor Kit Intel Xeon E5-2680 (2.7 GHz/8-core/20 MB/130 W) Processor Kit Intel Xeon E5-2670 (2.6 GHz/8-core/20 MB/115 W) Processor Kit Intel Xeon E5-2665 (2.4 GHz/8-core/20 MB/115 W) Processor Kit Intel Xeon E5-2660 (2.2 GHz/8-core/20 MB/95 W) Processor Kit Intel Xeon E5-2650 (2.0 GHz/8-core/20 MB/95 W) Processor Kit Intel Xeon E5-2650L (1.8 GHz/8-core/20 MB/70 W) Processor Kit</p> <p><b>Six-core processors</b> Intel Xeon E5-2667 (2.9 GHz/6-core/15 MB/130 W) Processor Kit Intel Xeon E5-2640 (2.5 GHz/6-core/15 MB/95 W) Processor Kit Intel Xeon E5-2630 (2.3 GHz/6-core/15 MB/95 W) Processor Kit Intel Xeon E5-2630L (2.0 GHz/6-core/15 MB/60 W) Processor Kit Intel Xeon E5-2620 (2.0 GHz/6-core/15 MB/95 W) Processor Kit</p> <p><b>Quad-core processors</b> Intel Xeon E5-2643 (3.3 GHz/4-core/10 MB/130 W) Processor Kit Intel Xeon E5-2609 (2.4 GHz/4-core/10 MB/80 W) Processor Kit Intel Xeon E5-2603 (1.8 GHz/4-core/10 MB/80 W) Processor Kit</p> <p><b>Dual-core processors</b> Intel Xeon E5-2637 (3.0 GHz/2-core/5 MB/80 W) Processor Kit</p>
Processor core	2, 6, 8, and 12
Maximum processor speed	3.5 GHz
Processors per 42U enclosure	128
Cache memory	30 MB (1 x 30 MB) shared L3 cache 25 MB (1 x 25 MB) shared L3 cache 20 MB (1 x 20 MB) shared L3 cache 15 MB (1 x 15 MB) shared L3 cache 10 MB (1 x 10 MB) shared L3 cache 5 MB (1 x 5 MB) shared L3 cache



## Technical specifications (Continued)

Memory type	HP SmartMemory DDR3 Load Reduced DIMMs (LRDIMMs), Registered DIMMs (RDIMMs), or unbuffered with ECC DIMMs (UDIMMs)
Standard memory (preconfigured models)	32 GB (4 x 8 GB) DDR3 1600 MHz RDIMMs at 1.5 V
Maximum memory	512 GB (16 x 32 GB) up to 1333 MHz at 1.35 V (LRDIMM) 384 GB (16 x 24 GB) up to 1333 MHz at 1.35 V (RDIMM) 256 GB (16 x 16 GB) up to 1600 MHz at 1.5 V 256 GB (16 x 16 GB) up to 1333 MHz at 1.35 V (RDIMM) 128 GB (16 x 8 GB) up to 1333 MHz at 1.35 V (UDIMM)
<b>Storage</b>	
Maximum internal storage	Hot Plug SFF SAS 2.4 TB (2 x 1.2 TB drives) Hot Plug SFF SATA 2.0 TB (2 x 1.0 TB drives) Hot Plug SFF SAS SSD 1.6 TB (2 x 800 GB drives) Hot Plug SFF SATA SSD 1.6 TB (2 x 800 GB drives)
Number of hard drives	Supports up to two (2) HP Hot Plug SFF SAS/SATA/SSD drives
Storage controller	One (1) HP Smart Array P220i Controller with 512 MB of flash backed write cache (FBWC), RAID 0 and 1 support, and upgradeable firmware with recovery ROM
<b>Graphics</b>	
Graphics adapter	<b>Mezzanine cards</b> NVIDIA Quadro 3000M, 1000M, 500M  <b>Graphics expansion blades</b> NVIDIA GRID K2, K1, Quadro 6000, K5000, K4000, HP Multi-GPU with NVIDIA Quadro 3000M, 1000M
<b>Deployment</b>	
Form factor	Half-height blade (single and double width)
Rack height	10U: up to 16 ProLiant WS460c Blades 6U: up to 8 ProLiant WS460c Blades
Networking	Embedded 10 Gb 530FLB Flex-10 Adapter; two ports
On System Management Processor	HP iLO (Firmware: HP iLO 4)
Operating systems	<b>Client Operating Systems</b> Windows® 7 Professional/Enterprise (64-bit) Red Hat Enterprise Linux 5.8+ (64-bit only); HP Supported, partner certification pending Red Hat Enterprise Linux 6.2+ (64-bit only); HP Supported, partner certification pending  <b>Server Operating Systems</b> Citrix XenDesktop 5.6 FP1, XenServer 6+ Enterprise and Platinum editions VMware Horizon View 5.2, vSphere 5.1 or later Windows Server 2008 R2 SP1 (64-bit) Standard, Enterprise and data center editions Windows Server 2012
Warranty	3-year parts, 3-year labor, 3-year onsite support
QuickSpecs URL	<a href="http://h18000.www1.hp.com/products/quickspecs/14409_div/14409_div.pdf">h18000.www1.hp.com/products/quickspecs/14409_div/14409_div.pdf</a>



**Check out the new HP t820—HP's most powerful thin client solution**

- Experience superfast performance, robust security protection, simple management, and monitor flexibility
- Eliminate efficiency barriers with Intel® Core™ i7-4770S 2.9 GHz quad-core CPU
- Keep your business data safe—lock down sensitive information and meet compliance standards with robust encryption and security options including fiber NIC, TPM, and Intel vPro technology
- Multitask seamlessly with multiple open applications on up to seven full HD monitors using optional AMD Radeon HD 7650A MXM Graphics Card and HP Multi-Stream DisplayPort 1.2 Hubs

## HP Thin Clients

The flexible performance and easy ownership of industry-leading thin client solutions from HP deliver rich user connectivity to client virtualization or cloud computing environments while meeting the most rigorous environmental requirements. Designed with the latest, standards-based operating systems and hardware, leading client virtualization software, and a robust set of manageability tools, HP Thin Client solutions help simplify IT while providing outstanding connectivity and flexibility.

The HP t610 Flexible Thin Client Series models deliver PC-like multimedia experience, investment-protecting legacy port connectivity, and expandability. HP t610 and HP t610 PLUS Thin Clients feature DirectX 11 graphics support, DDR3-1600 RAM (dual slots) with up to 4 GB of capacity, AMD G-Series dual-core CPU and AMD A55E Chipset with DVI-I and DisplayPort connectors for exceptional thin client performance.

HP t610 PLUS also adds optional support for up to four, simultaneous full HD monitors. The preinstalled Infineon Trusted Platform Module (TPM) chip provides security and encryption capabilities for customers who need it now, or in the future. The BIOS designed with a view of NIST BIOS security recommendations helps assure network integrity. The optional Broadcom 802.11 a/b/g/n Wi-Fi module with dual internal antennas provides enterprise-class performance in an elegantly simple case design. HP t610 Flexible Series Thin Clients provide security features usually found only on PCs.

And for an even more powerful thin client, see the information in the left sidebar to learn more about the new HP t820 with quad-core Intel® processors and the ability to drive up to seven monitors.



## HP Technology Services

### When technology works, business works

HP offers a very comprehensive suite covering the entire services lifecycle with predefined, fixed price and custom consulting services.

### Recommended HP Care Pack Services

- 3-year, HP 24x7, 4-hour response, hardware support, onsite service
- 3-year, HP 24x7, 4-hour response HP Collaborative Support
- HP ProLiant Server Hardware Installation Service

### Related HP Care Pack Services

3-year, HP 24x7, 4-hour response Proactive Care or 3-year, HP 6-hour, onsite, call-to-repair HP Collaborative Support HP Proactive Select Service.

All support services come with HP Insight Remote Support, providing 24x7 remote monitoring, proactive notifications, and problem resolution.

### Coverage

For HP ProLiant servers, care pack services provide coverage for HP-branded hardware options qualified for the server, purchased at the same time or afterward, internal to the enclosure, as well as external monitors up to 22 and tower UPS products; these items will be covered at the same service level, and for the same coverage period as the server unless the highest supported lifetime and/or the highest usage limitation has been exceeded. Coverage of UPS battery is not included; standard warranty terms and conditions apply.

### Learn more at

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