



Purchasing Division
 2019 Washington Street East
 Post Office Box 50130
 Charleston, WV 25305-0130

**State of West Virginia
 Solicitation Response**

Proc Folder : 373108

Solicitation Description : (1) Dell Precision Tower PC or equivalent 6318B0028

Proc Type : Agency Purchase Order

Date issued	Solicitation Closes	Solicitation Response	Version
	2017-10-17 13:00:00	SR 0803 ESR10161700000001592	1

VENDOR
000000231044 HP INC

Solicitation Number: ARFQ 0803 DOT1800000014

Total Bid : \$13,333.00 **Response Date:** 2017-10-16 **Response Time:** 16:38:13

Comments:

FOR INFORMATION CONTACT THE BUYER
 Dusty J Smith
 (304) 558-9398
 dusty.j.smith@wv.gov

Signature on File	FEIN #	DATE
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All offers subject to all terms and conditions contained in this solicitation

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
1	(1) Dell Precision Tower PC or equivalent	1.00000	EA	\$13,333.000000	\$13,333.00

Comm Code	Manufacturer	Specification	Model #
43211502			

Extended Description :	(1) Dell Precision Tower 7000 Series workstation or equivalent
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Comments: Delivery is approximately 14 business days from HP Inc.'s acceptance of the purchase order. Alternate Specs have been included.

****For detailed information in response to the ARFQ, please refer to the HP Inc. Attachments included at the end of this document.****

**INSTRUCTIONS TO VENDORS SUBMITTING BIDS
(Agency Delegated Procurements Only)**

1. REVIEW DOCUMENTS THOROUGHLY: The attached documents contain a solicitation for bids. Please read these instructions and all documents attached in their entirety. These instructions provide critical information about requirements that if overlooked could lead to disqualification of a Vendor's bid. All bids must be submitted in accordance with the provisions contained in these instructions and the Solicitation. Failure to do so may result in disqualification of Vendor's bid.

2. MANDATORY TERMS: The Solicitation may contain mandatory provisions identified by the use of the words "must," "will," and "shall." Failure to comply with a mandatory term in the Solicitation will result in bid disqualification.

2A. PREBID MEETING: The item identified below shall apply to this Solicitation.

A pre-bid meeting will not be held prior to bid opening

A NON-MANDATORY PRE-BID meeting will be held at the following place and time:

A MANDATORY PRE-BID meeting will be held at the following place and time:

All Vendors submitting a bid must attend the mandatory pre-bid meeting. Failure to attend the mandatory pre-bid meeting shall result in disqualification of the Vendor's bid. No one person attending the pre-bid meeting may represent more than one Vendor.

An attendance sheet provided at the pre-bid meeting shall serve as the official document verifying attendance. The State will not accept any other form of proof or documentation to verify attendance. Any person attending the pre-bid meeting on behalf of a Vendor must list on the attendance sheet his or her name and the name of the Vendor he or she is representing.

Additionally, the person attending the pre-bid meeting should include the Vendor's E-Mail address, phone number, and Fax number on the attendance sheet. It is the Vendor's responsibility to locate the attendance sheet and provide the required information. Failure to complete the attendance sheet as required may result in disqualification of Vendor's bid.

All Vendors should arrive prior to the starting time for the pre-bid. Vendors who arrive after the starting time but prior to the end of the pre-bid will be permitted to sign in, but are charged with knowing all matters discussed at the pre-bid.

Questions submitted at least five business days prior to a scheduled pre-bid will be discussed at the pre-bid meeting if possible. Any discussions or answers to questions at the pre-bid meeting are preliminary in nature and are non-binding. Official and binding answers to questions will be published in a written addendum to the Solicitation prior to bid opening.

3. BID SUBMISSION: All bids must be submitted electronically through wvOASIS or signed and delivered by the Vendor to the Agency on or before the date and time of the bid opening. Any bid received by the Agency staff is considered to be in the possession of the Agency and will not be returned for any reason.

3A. BID SUBMISSION

A bid that is not submitted electronically through wvOASIS should contain the information listed below on the face of the envelope or the bid may be rejected by the Agency.

SEALED BID:

BUYER: DUSTY SMITH

SOLICITATION NO.: ARFQ DOT1800000014

BID OPENING DATE: 10/17/17

BID OPENING TIME: 1PM EASTERN TIME

FAX NUMBER: N/A

4. ADDENDUM ACKNOWLEDGEMENT: Changes or revisions to this Solicitation will be made by an official addendum issued by the Agency. Vendor should acknowledge receipt of all addenda issued with this Solicitation by completing an Addendum Acknowledgment Form, a copy of which is included herewith. Failure to acknowledge addenda may result in bid disqualification. The addendum acknowledgement should be submitted with the bid to expedite document processing.

5. BID FORMATTING: Vendor should type or electronically enter the information onto its bid to prevent errors in the evaluation. Failure to type or electronically enter the information may result in bid disqualification.

6. ALTERNATES: Any model, brand, or specification listed in this Solicitation establishes the acceptable level of quality only and is not intended to reflect a preference for, or in any way favor, a particular brand or vendor. Vendors may bid alternates to a listed model or brand provided that the alternate is at least equal to the model or brand and complies with the required specifications. The equality of any alternate being bid shall be determined by the State at its sole discretion. Any Vendor bidding an alternate model or brand should clearly identify the alternate items in its bid and should include manufacturer's specifications, industry literature, and/or any other relevant documentation demonstrating the equality of the alternate items. Failure to provide information for alternate items may be grounds for rejection of a Vendor's bid.

7. EXCEPTIONS AND CLARIFICATIONS: The Solicitation contains the specifications that shall form the basis of a contractual agreement. Vendor shall clearly mark any exceptions, clarifications, or other proposed modifications in its bid. Exceptions to, clarifications of, or modifications of a requirement or term and condition of the Solicitation may result in bid disqualification.

8. REGISTRATION: Prior to Contract award, the apparent successful Vendor must be properly registered with the West Virginia Purchasing Division and must have paid the \$125 fee, if applicable.

9. UNIT PRICE: Unit prices shall prevail in cases of a discrepancy in the Vendor's bid.

10. PREFERENCE: Vendor Preference may only be granted upon written request and only in accordance with the West Virginia Code § 5A-3-37 and the West Virginia Code of State Rules. A Vendor Preference Certificate form has been attached hereto to allow Vendor to apply for the preference. Vendor's failure to submit the Vendor Preference Certificate form with its bid will result in denial of Vendor Preference. Vendor Preference does not apply to construction projects.

11. SMALL, WOMEN-OWNED, OR MINORITY-OWNED BUSINESSES: For any solicitations publicly advertised for bid, in accordance with West Virginia Code §5A-3-37(a)(7) and W. Va. CSR § 148-22-9, any non-resident vendor certified as a small, women-owned, or minority-owned business under W. Va. CSR § 148-22-9 shall be provided the same preference made available to any resident vendor. Any non-resident small, women-owned, or minority-owned business must identify itself as such in writing, must submit that writing to the Purchasing Division with its bid, and must be properly certified under W. Va. CSR § 148-22-9 prior to contract award to receive the preferences made available to resident vendors. Preference for a non-resident small, women-owned, or minority owned business shall be applied in accordance with W. Va. CSR § 148-22-9.

12. ELECTRONIC FILE ACCESS RESTRICTIONS: Vendor must ensure that its submission in wvOASIS can be accessed and viewed by the Agency staff immediately upon bid opening. The Agency will consider any file that cannot be immediately access and viewed at the time of the bid opening (such as, encrypted files, password protected files, or incompatible files) to be blank or incomplete as context requires, and therefore unacceptable. A vendor will not be permitted to unencrypt files, remove password protections, or resubmit documents after bid opening to make a file viewable if those documents are required with the bid. A Vendor may be required to provide document passwords or removed access restrictions to allow the Agency to print or electronically save documents provided that those documents are viewable by the Agency prior to obtaining the password or removing the access restriction.

13. NON-RESPONSIBLE: The Purchasing Division Director reserves the right to reject the bid of any vendor as Non-Responsible in accordance with W. Va. Code of State Rules § 148-1-5.3, when the Director determines that the vendor submitting the bid does not have the capability to fully perform, or lacks the integrity and reliability to assure good-faith performance.”

14. ACCEPTANCE/REJECTION: The State may accept or reject any bid in whole, or in part in accordance with W. Va. Code of State Rules § 148-1-4.5. and § 148-1-6.4.b.”

15. YOUR SUBMISSION IS A PUBLIC DOCUMENT: Vendor’s entire response to the Solicitation and the resulting Contract are public documents. As public documents, they will be disclosed to the public following the bid/proposal opening or award of the contract, as required by the competitive bidding laws of West Virginia Code §§ 5A-3-1 et seq., 5-22-1 et seq., 5G-1-1 et seq. and the Freedom of Information Act in West Virginia Code §§ 29B-1-1 et seq.

DO NOT SUBMIT MATERIAL YOU CONSIDER TO BE CONFIDENTIAL, A TRADE SECRET, OR OTHERWISE NOT SUBJECT TO PUBLIC DISCLOSURE.

Submission of any bid, proposal, or other document to the Purchasing Division constitutes your explicit consent to the subsequent public disclosure of the bid, proposal, or document. The Purchasing Division will disclose any document labeled “confidential,” “proprietary,” “trade secret,” “private,” or labeled with any other claim against public disclosure of the documents, to include any “trade secrets” as defined by West Virginia Code § 47-22-1 et seq. All submissions are subject to public disclosure without notice.

**GENERAL TERMS AND CONDITIONS:
(Agency Delegated Procurements Only)**

1. CONTRACTUAL AGREEMENT: Issuance of a Award Document signed by the Agency and approved as to form by the Attorney General's office, if required, constitutes acceptance of this Contract made by and between the State of West Virginia and the Vendor. Vendor's signature on its bid signifies Vendor's agreement to be bound by and accept the terms and conditions contained in this Contract.

2. DEFINITIONS: As used in this Solicitation/Contract, the following terms shall have the meanings attributed to them below. Additional definitions may be found in the specifications included with this Solicitation/Contract.

2.1. "Agency" or "Agencies" means the agency, board, commission, or other entity of the State of West Virginia that is identified on the first page of the Solicitation or any other public entity seeking to procure goods or services under this Contract.

2.2. "Bid" or "Proposal" means the vendors submitted response to this solicitation.

2.3. "Contract" means the binding agreement that is entered into between the State and the Vendor to provide the goods or services requested in the Solicitation.

2.4. "Director" means the Director of the West Virginia Department of Administration, Purchasing Division.

2.5. "Purchasing Division" means the West Virginia Department of Administration, Purchasing Division.

2.6. "Award Document" means the document signed by the Agency that identifies the Vendor as the contract holder.

2.7. "Solicitation" means the official notice of an opportunity to supply the State with goods or services.

2.8. "State" means the State of West Virginia and/or any of its agencies, commissions, boards, etc. as context requires.

2.9. "Vendor" or "Vendors" means any entity submitting a bid in response to the Solicitation, the entity that has been selected as the lowest responsible bidder, or the entity that has been awarded the Contract as context requires.

3. CONTRACT TERM; RENEWAL; EXTENSION: The term of this Contract shall be determined in accordance with the category that has been identified as applicable to this Contract below:

Term Contract

Initial Contract Term: This Contract becomes effective on _____ and extends for a period of _____ year(s).

Renewal Term: This Contract may be renewed upon the mutual written consent of the Agency, and the Vendor. Any request for renewal should be submitted to the Agency thirty (30) days prior to the expiration date of the initial contract term or appropriate renewal term. A Contract renewal shall be in accordance with the terms and conditions of the original contract. Renewal of this Contract is limited to _____ successive one (1) year periods or multiple renewal periods of less than one year, provided that the multiple renewal periods do not exceed _____ months in total. Automatic renewal of this Contract is prohibited.

Delivery Order Limitations: In the event that this contract permits delivery orders, a delivery order may only be issued during the time this Contract is in effect. Any delivery order issued within one year of the expiration of this Contract shall be effective for one year from the date the delivery order is issued. No delivery order may be extended beyond one year after this Contract has expired.

Fixed Period Contract: This Contract becomes effective upon Vendor's receipt of the notice to proceed and must be completed within _____ days.

Fixed Period Contract with Renewals: This Contract becomes effective upon Vendor's receipt of the notice to proceed and part of the Contract more fully described in the attached specifications must be completed within _____ days. Upon completion, the vendor agrees that maintenance, monitoring, or warranty services will be provided for _____ successive one year periods or multiple periods of less than one year provided that the multiple renewal periods do not exceed _____ months in total.

One Time Purchase: The term of this Contract shall run from the issuance of the Award Document until all of the goods contracted for have been delivered, but in no event will this Contract extend for more than one fiscal year.

Other: See attached.

4. NOTICE TO PROCEED: Vendor shall begin performance of this Contract immediately upon receiving notice to proceed unless otherwise instructed by the Agency. Unless otherwise specified, the fully executed Award Document will be considered notice to proceed.

5. QUANTITIES: The quantities required under this Contract shall be determined in accordance with the category that has been identified as applicable to this Contract below.

Open End Contract: Quantities listed in this Solicitation are approximations only, based on estimates supplied by the Agency. It is understood and agreed that the Contract shall cover the quantities actually ordered for delivery during the term of the Contract, whether more or less than the quantities shown.

Service: The scope of the service to be provided will be more clearly defined in the specifications included herewith.

Combined Service and Goods: The scope of the service and deliverable goods to be provided will be more clearly defined in the specifications included herewith.

One Time Purchase: This Contract is for the purchase of a set quantity of goods that are identified in the specifications included herewith. Once those items have been delivered, no additional goods may be procured under this Contract without an appropriate change order approved by the Vendor, Agency, Purchasing Division, and Attorney General's office.

6. EMERGENCY PURCHASES: The Purchasing Division Director may authorize the Agency to purchase goods or services in the open market that Vendor would otherwise provide under this Contract if those goods or services are for immediate or expedited delivery in an emergency. Emergencies shall include, but are not limited to, delays in transportation or an unanticipated increase in the volume of work. An emergency purchase in the open market, approved by the Purchasing Division Director, shall not constitute of breach of this Contract and shall not entitle the Vendor to any form of compensation or damages. This provision does not excuse the State from fulfilling its obligations under a One Time Purchase contract.

7. REQUIRED DOCUMENTS: All of the items checked below must be provided to the Agency by the Vendor as specified below.

PERFORMANCE BOND: The apparent successful Vendor shall provide a performance bond in the amount of _____. The performance bond must be received by the Agency prior to Contract award. On construction contracts, the performance bond must be 100% of the Contract value.

LABOR/MATERIAL PAYMENT BOND: The apparent successful Vendor shall provide a labor/material payment bond in the amount of 100% of the Contract value. The labor/material payment bond must be delivered to the Purchasing Division prior to Contract award.

In lieu of the Bid Bond, Performance Bond, and Labor/Material Payment Bond, the Vendor may provide certified checks, cashier's checks, or irrevocable letters of credit. Any certified check, cashier's check, or irrevocable letter of credit provided in lieu of a bond must be of the same amount and delivered on the same schedule as the bond it replaces. A letter of credit submitted in lieu of a performance and labor/material payment bond will only be allowed for projects under \$100,000. Personal or business checks are not acceptable. Notwithstanding the foregoing, West Virginia Code § 5-22-1(d) mandates that a vendor provide a performance and labor/material payment bond for construction projects. Accordingly, substitutions for the performance and labor/material payment bonds for construction projects is not permitted.

MAINTENANCE BOND: The apparent successful Vendor shall provide a two (2) year maintenance bond covering the roofing system. The maintenance bond must be issued and delivered to the Agency prior to Contract award.

LICENSE(S) / CERTIFICATIONS / PERMITS: In addition to anything required under the Section entitled Licensing, of the General Terms and Conditions, the apparent successful Vendor shall furnish proof of the following licenses, certifications, and/or permits prior to Contract award, in a form acceptable to the Agency.

The apparent successful Vendor shall also furnish proof of any additional licenses or certifications contained in the specifications prior to Contract award regardless of whether or not that requirement is listed above.

8. INSURANCE: The apparent successful Vendor shall furnish proof of the insurance identified by a checkmark below prior to Contract award. Subsequent to contract award, and prior to the insurance expiration date, Vendor shall provide the Agency with proof that the insurance mandated herein has been continued. Vendor must also provide Agency with immediate notice of any changes in its insurance policies mandated herein, including but not limited to, policy cancelation, policy reduction, or change in insurers. The insurance coverages identified below must be maintained throughout the life of this contract. The apparent successful Vendor shall also furnish proof of any additional insurance requirements contained in the specifications prior to Contract award regardless of whether or not that insurance requirement is listed in this section.

Vendor must maintain:

Commercial General Liability Insurance in at least an amount of:

Automobile Liability Insurance in at least an amount of: _____

Professional/Malpractice/Errors and Omission Insurance in at least an amount of:

Commercial Crime and Third Party Fidelity Insurance in an amount of:

Cyber Liability Insurance in an amount of: _____

Builders Risk Insurance in an amount equal to 100% of the amount of the Contract.

9. WORKERS' COMPENSATION INSURANCE: The apparent successful Vendor shall comply with laws relating to workers compensation, shall maintain workers' compensation insurance when required, and shall furnish proof of workers' compensation insurance upon request.

10. LIQUIDATED DAMAGES: Vendor shall pay liquidated damages in the amount of _____ for _____ . This clause shall in no way be considered exclusive and shall not limit the State or Agency's right to pursue any other available remedy.

11. ACCEPTANCE: Vendor's signature on its bid, or on the certification and signature page, constitutes an offer to the State that cannot be unilaterally withdrawn, signifies that the product or service proposed by vendor meets the mandatory requirements contained in the Solicitation for that product or service, unless otherwise indicated, and signifies acceptance of the terms and conditions contained in the Solicitation unless otherwise indicated.

12. PRICING: The pricing set forth herein is firm for the life of the Contract, unless specified elsewhere within this Solicitation/Contract by the State. A Vendor's inclusion of price adjustment provisions in its bid, without an express authorization from the State in the Solicitation to do so, may result in bid disqualification.

13. PAYMENT: Payment in advance is prohibited under this Contract. Payment may only be made after the delivery and acceptance of goods or services. The Vendor shall submit invoices, in arrears.

14. PURCHASING CARD ACCEPTANCE: The State of West Virginia currently utilizes a Purchasing Card program, administered under contract by a banking institution, to process payment for goods and services. The Vendor must accept the State of West Virginia's Purchasing Card for payment of all orders under this Contract unless the box below is checked.

Vendor is not required to accept the State of West Virginia's Purchasing Card as payment for all goods and services.

15. ADDITIONAL FEES: Vendor is not permitted to charge additional fees or assess additional charges that were not either expressly provided for in the solicitation published by the State of West Virginia or included in the unit price or lump sum bid amount that Vendor is required by the solicitation to provide. Including such fees or charges as notes to the solicitation may result in rejection of vendor's bid. Requesting such fees or charges be paid after the contract has been awarded may result in cancellation of the contract.

16. TAXES: The Vendor shall pay any applicable sales, use, personal property or any other taxes arising out of this Contract and the transactions contemplated thereby. The State of West Virginia is exempt from federal and state taxes and will not pay or reimburse such taxes.

17. FUNDING: This Contract shall continue for the term stated herein, contingent upon funds being appropriated by the Legislature or otherwise being made available. In the event funds are not appropriated or otherwise made available, this Contract becomes void and of no effect beginning on July 1 of the fiscal year for which funding has not been appropriated or otherwise made available.

18. CANCELLATION: The State reserves the right to cancel this Contract immediately upon written notice to the vendor if the materials or workmanship supplied do not conform to the specifications contained in the Contract. The Agency may also cancel any purchase or Contract upon 30 days written notice to the Vendor in accordance with West Virginia Code of State Rules § 148-1-5.2.b.

19. TIME: Time is of the essence with regard to all matters of time and performance in this Contract.

20. APPLICABLE LAW: This Contract is governed by and interpreted under West Virginia law without giving effect to its choice of law principles. Any information provided in specification manuals, or any other source, verbal or written, which contradicts or violates the West Virginia Constitution, West Virginia Code or West Virginia Code of State Rules is void and of no effect.

21. COMPLIANCE WITH LAWS: Vendor shall comply with all applicable federal, state, and local laws, regulations and ordinances. By submitting a bid, Vendor acknowledges that it has reviewed, understands, and will comply with all applicable laws, regulations, and ordinances.

22. ARBITRATION: Any references made to arbitration contained in this Contract, Vendor's bid, or in any American Institute of Architects documents pertaining to this Contract are hereby deleted, void, and of no effect.

23. MODIFICATIONS: This writing is the parties' final expression of intent. Notwithstanding anything contained in this Contract to the contrary, no modification of this Contract shall be binding without mutual written consent of the Agency, and the Vendor.

24. WAIVER: The failure of either party to insist upon a strict performance of any of the terms or provision of this Contract, or to exercise any option, right, or remedy herein contained, shall not be construed as a waiver or a relinquishment for the future of such term, provision, option, right, or remedy, but the same shall continue in full force and effect. Any waiver must be expressly stated in writing and signed by the waiving party.

25. SUBSEQUENT FORMS: The terms and conditions contained in this Contract shall supersede any and all subsequent terms and conditions which may appear on any form documents submitted by Vendor to the Agency or Purchasing Division such as price lists, order forms, invoices, sales agreements, or maintenance agreements, and includes internet websites or other electronic documents. Acceptance or use of Vendor's forms does not constitute acceptance of the terms and conditions contained thereon.

26. ASSIGNMENT: Neither this Contract nor any monies due, or to become due hereunder, may be assigned by the Vendor without the express written consent of the Agency and any other government agency or office that may be required to approve such assignments.

27. WARRANTY: The Vendor expressly warrants that the goods and/or services covered by this Contract will: (a) conform to the specifications, drawings, samples, or other description furnished or specified by the Agency; (b) be merchantable and fit for the purpose intended; and (c) be free from defect in material and workmanship.

28. STATE EMPLOYEES: State employees are not permitted to utilize this Contract for personal use and the Vendor is prohibited from permitting or facilitating the same.

29. BANKRUPTCY: In the event the Vendor files for bankruptcy protection, the State of West Virginia may deem this Contract null and void, and terminate this Contract without notice.

30. PRIVACY, SECURITY, AND CONFIDENTIALITY: The Vendor agrees that it will not disclose to anyone, directly or indirectly, any such personally identifiable information or other confidential information gained from the Agency, unless the individual who is the subject of the information consents to the disclosure in writing or the disclosure is made pursuant to the Agency's policies, procedures, and rules. Vendor further agrees to comply with the Confidentiality Policies and Information Security Accountability Requirements, set forth in <http://www.state.wv.us/admin/purchase/privacy/default.html>

31. YOUR SUBMISSION IS A PUBLIC DOCUMENT: Vendor's entire response to the Solicitation and the resulting Contract are public documents. As public documents, they will be disclosed to the public following the bid/proposal opening or award of the contract, as required by the competitive bidding laws of West Virginia Code §§ 5A-3-1 et seq., 5-22-1 et seq., and 5G-1-1 et seq. and the Freedom of Information Act West Virginia Code §§ 29B-1-1 et seq.

DO NOT SUBMIT MATERIAL YOU CONSIDER TO BE CONFIDENTIAL, A TRADE SECRET, OR OTHERWISE NOT SUBJECT TO PUBLIC DISCLOSURE.

Submission of any bid, proposal, or other document to the Purchasing Division constitutes your explicit consent to the subsequent public disclosure of the bid, proposal, or document. The Purchasing Division will disclose any document labeled "confidential," "proprietary," "trade secret," "private," or labeled with any other claim against public disclosure of the documents, to include any "trade secrets" as defined by West Virginia Code § 47-22-1 et seq. All submissions are subject to public disclosure without notice.

32. LICENSING: In accordance with West Virginia Code of State Rules § 148-1-6.1.e, Vendor must be licensed and in good standing in accordance with any and all state and local laws and requirements by any state or local agency of West Virginia, including, but not limited to, the West Virginia Secretary of State's Office, the West Virginia Tax Department, West Virginia Insurance Commission, or any other state agency or political subdivision. Upon request, the Vendor must provide all necessary releases to obtain information to enable the Agency to verify that the Vendor is licensed and in good standing with the above entities.

33. ANTITRUST: In submitting a bid to, signing a contract with, or accepting an Award Document from any agency of the State of West Virginia, the Vendor agrees to convey, sell, assign, or transfer to the State of West Virginia all rights, title, and interest in and to all causes of action it may now or hereafter acquire under the antitrust laws of the United States and the State of West Virginia for price fixing and/or unreasonable restraints of trade relating to the particular commodities or services purchased or acquired by the State of West Virginia. Such assignment shall be made and become effective at the time the purchasing agency tenders the initial payment to Vendor.

34. VENDOR CERTIFICATIONS: By signing its bid or entering into this Contract, Vendor certifies (1) that its bid or offer was made without prior understanding, agreement, or connection with any corporation, firm, limited liability company, partnership, person or entity submitting a bid or offer for the same material, supplies, equipment or services; (2) that its bid or offer is in all respects fair and without collusion or fraud; (3) that this Contract is accepted or entered into without any prior understanding, agreement, or connection to any other entity that could be considered a violation of law; and (4) that it has reviewed this Solicitation in its entirety; understands the requirements, terms and conditions, and other information contained herein. Vendor's signature on its bid or offer also affirms that neither it nor its representatives have any interest, nor shall acquire any interest, direct or indirect, which would compromise the performance of its services hereunder. Any such interests shall be promptly presented in detail to the Agency. The individual signing this bid or offer on behalf of Vendor certifies that he or she is authorized by the Vendor to execute this bid or offer or any documents related thereto on

Vendor's behalf; that he or she is authorized to bind the Vendor in a contractual relationship; and that, to the best of his or her knowledge, the Vendor has properly registered with any State agency that may require registration.

35. VENDOR RELATIONSHIP: The relationship of the Vendor to the State shall be that of an independent contractor and no principal-agent relationship or employer-employee relationship is contemplated or created by this Contract. The Vendor as an independent contractor is solely liable for the acts and omissions of its employees and agents. Vendor shall be responsible for selecting, supervising, and compensating any and all individuals employed pursuant to the terms of this Solicitation and resulting contract. Neither the Vendor, nor any employees or subcontractors of the Vendor, shall be deemed to be employees of the State for any purpose whatsoever. Vendor shall be exclusively responsible for payment of employees and contractors for all wages and salaries, taxes, withholding payments, penalties, fees, fringe benefits, professional liability insurance premiums, contributions to insurance and pension, or other deferred compensation plans, including but not limited to, Workers' Compensation and Social Security obligations, licensing fees, etc. and the filing of all necessary documents, forms, and returns pertinent to all of the foregoing. Vendor shall hold harmless the State, and shall provide the State and Agency with a defense against any and all claims including, but not limited to, the foregoing payments, withholdings, contributions, taxes, Social Security taxes, and employer income tax returns.

36. INDEMNIFICATION: The Vendor agrees to indemnify, defend, and hold harmless the State and the Agency, their officers, and employees from and against: (1) Any claims or losses for services rendered by any subcontractor, person, or firm performing or supplying services, materials, or supplies in connection with the performance of the Contract; (2) Any claims or losses resulting to any person or entity injured or damaged by the Vendor, its officers, employees, or subcontractors by the publication, translation, reproduction, delivery, performance, use, or disposition of any data used under the Contract in a manner not authorized by the Contract, or by Federal or State statutes or regulations; and (3) Any failure of the Vendor, its officers, employees, or subcontractors to observe State and Federal laws including, but not limited to, labor and wage and hour laws.

37. PURCHASING AFFIDAVIT: In accordance with West Virginia Code § 5-22-1(i), the contracting public entity shall not award a contract for a construction project to any bidder that is known to be in default on any monetary obligation owed to the state or a political subdivision of the state, including, but not limited to, obligations related to payroll taxes, property taxes, sales and use taxes, fire service fees, or other fines or fees. Accordingly, prior to contract award, Vendors are required to sign, notarize, and submit the Purchasing Affidavit to the Purchasing Division affirming under oath that it is not in default on any monetary obligation owed to the state or a political subdivision of the state.

38. CONFLICT OF INTEREST: Vendor, its officers or members or employees, shall not presently have or acquire an interest, direct or indirect, which would conflict with or compromise the performance of its obligations hereunder. Vendor shall periodically inquire of its officers, members and employees to ensure that a conflict of interest does not arise. Any conflict of interest discovered shall be promptly presented in detail to the Agency.

39. REPORTS: Vendor shall provide the Agency and/or the Purchasing Division with the following reports identified by a checked box below:

Such reports as the Agency and/or the Purchasing Division may request. Requested reports may include, but are not limited to, quantities purchased, agencies utilizing the contract, total contract expenditures by agency, etc.

Quarterly reports detailing the total quantity of purchases in units and dollars, along with a listing of purchases by agency. Quarterly reports should be delivered to the Purchasing Division via email at purchasing.requisitions@wv.gov.

40. BACKGROUND CHECK: In accordance with W. Va. Code § 15-2D-3, the Director of the Division of Protective Services shall require any service provider whose employees are regularly employed on the grounds or in the buildings of the Capitol complex or who have access to sensitive or critical information to submit to a fingerprint-based state and federal background inquiry through the state repository. The service provider is responsible for any costs associated with the fingerprint-based state and federal background inquiry. After the contract for such services has been approved, but before any such employees are permitted to be on the grounds or in the buildings of the Capitol complex or have access to sensitive or critical information, the service provider shall submit a list of all persons who will be physically present and working at the Capitol complex to the Director of the Division of Protective Services for purposes of verifying compliance with this provision. The State reserves the right to prohibit a service provider's employees from accessing sensitive or critical information or to be present at the Capitol complex based upon results addressed from a criminal background check.

Service providers should contact the West Virginia Division of Protective Services by phone at (304) 558-9911 for more information.

41. PREFERENCE FOR USE OF DOMESTIC STEEL PRODUCTS: Except when authorized by the Director of the Purchasing Division pursuant to W. Va. Code § 5A-3-56, no contractor may use or supply steel products for a State Contract Project other than those steel products made in the United States. A contractor who uses steel products in violation of this section may be subject to civil penalties pursuant to W. Va. Code § 5A-3-56. As used in this section:

a. "State Contract Project" means any erection or construction of, or any addition to, alteration of or other improvement to any building or structure, including, but not limited to, roads or highways, or the installation of any heating or cooling or ventilating plants or other equipment, or the supply of and materials for such projects, pursuant to a contract with the State of West Virginia for which bids were solicited on or after June 6, 2001.

b. "Steel Products" means products rolled, formed, shaped, drawn, extruded, forged, cast, fabricated or otherwise similarly processed, or processed by a combination of two or more or such operations, from steel made by the open heath, basic oxygen, electric furnace, Bessemer or other steel making process. The Purchasing Division Director may, in writing, authorize the use of foreign steel products if:

c. The cost for each contract item used does not exceed one tenth of one percent (.1%) of the total contract cost or two thousand five hundred dollars (\$2,500.00), whichever is greater. For the purposes of this section, the cost is the value of the steel product as delivered to the project; or

d. The Director of the Purchasing Division determines that specified steel materials are not produced in the United States in sufficient quantity or otherwise are not reasonably available to meet contract requirements.

42. PREFERENCE FOR USE OF DOMESTIC ALUMINUM, GLASS, AND STEEL: In Accordance with W. Va. Code § 5-19-1 et seq., and W. Va. CSR § 148-10-1 et seq., for every contract or subcontract, subject to the limitations contained herein, for the construction, reconstruction, alteration, repair, improvement or maintenance of public works or for the purchase of any item of machinery or equipment to be used at sites of public works, only domestic aluminum, glass or steel products shall be supplied unless the spending officer determines, in writing, after the receipt of offers or bids, (1) that the cost of domestic aluminum, glass or steel products is unreasonable or inconsistent with the public interest of the State of West Virginia, (2) that domestic aluminum, glass or steel products are not produced in sufficient quantities to meet the contract requirements, or (3) the available domestic aluminum, glass, or steel do not meet the contract specifications. This provision only applies to public works contracts awarded in an amount more than fifty thousand dollars (\$50,000) or public works contracts that require more than ten thousand pounds of steel products.

The cost of domestic aluminum, glass, or steel products may be unreasonable if the cost is more than twenty percent (20%) of the bid or offered price for foreign made aluminum, glass, or steel products. If the domestic aluminum, glass or steel products to be supplied or produced in a “substantial labor surplus area”, as defined by the United States Department of Labor, the cost of domestic aluminum, glass, or steel products may be unreasonable if the cost is more than thirty percent (30%) of the bid or offered price for foreign made aluminum, glass, or steel products. This preference shall be applied to an item of machinery or equipment, as indicated above, when the item is a single unit of equipment or machinery manufactured primarily of aluminum, glass or steel, is part of a public works contract and has the sole purpose or of being a permanent part of a single public works project. This provision does not apply to equipment or machinery purchased by a spending unit for use by that spending unit and not as part of a single public works project.

All bids and offers including domestic aluminum, glass or steel products that exceed bid or offer prices including foreign aluminum, glass or steel products after application of the preferences provided in this provision may be reduced to a price equal to or lower than the lowest bid or offer price for foreign aluminum, glass or steel products plus the applicable preference. If the reduced bid or offer prices are made in writing and supersede the prior bid or offer prices, all bids or offers, including the reduced bid or offer prices, will be reevaluated in accordance with this rule.

ADDITIONAL TERMS AND CONDITIONS (Construction Contracts Only)

1. CONTRACTOR'S LICENSE: West Virginia Code § 21-11-2 requires that all persons desiring to perform contracting work in this state be licensed. The West Virginia Contractors Licensing Board is empowered to issue the contractor's license. Applications for a contractor's license may be made by contacting the West Virginia Division of Labor. West Virginia Code § 21-11-11 requires any prospective Vendor to include the contractor's license number on its bid. If an apparent low bidder fails to submit a license number in accordance with this section, the Purchasing Division will promptly request by telephone and electronic mail that the low bidder and the second low bidder provide the license number within one business day of the request. Failure of the bidder to provide the license number within one business day of receiving the request shall result in disqualification of the bid. Vendors should include a contractor's license number in the space provided below.

Contractor's Name: _____

Contractor's License No.: WV-_____

The apparent successful Vendor must furnish a copy of its contractor's license prior to the issuance of a contract award document

2. AIA DOCUMENTS: All construction contracts that will be completed in conjunction with architectural services procured under Chapter 5G of the West Virginia Code will be governed by the AIA A101-2007 and A201-2007 or the A107-2007 documents, as amended by the Supplementary Conditions for the State of West Virginia, in addition to the terms and conditions contained herein.

2A. PROHIBITION AGAINST GENERAL CONDITIONS: Notwithstanding anything contained in the AIA Documents or the Supplementary Conditions, the State of West Virginia will not pay for general conditions, or winter conditions, or any other condition representing a delay in the contract. The Vendor is expected to mitigate delay costs to the greatest extent possible and any costs associated with Delays must be specifically and concretely identified. The state will not consider an average daily rate multiplied by the number of days extended to be an acceptable charge.

3. GREEN BUILDINGS MINIMUM ENERGY STANDARDS: In accordance with § 22-29-4, all new building construction projects of public agencies that have not entered the schematic design phase prior to July 1, 2012, or any building construction project receiving state grant funds and appropriations, including public schools, that have not entered the schematic design phase prior to July 1, 2012, shall be designed and constructed complying with the ICC International Energy Conservation Code, adopted by the State Fire Commission, and the ANSI/ASHRAE/IESNA Standard 90.1-2007: Provided, That if any construction project has a commitment of federal funds to pay for a portion of such project, this provision shall only apply to the extent such standards are consistent with the federal standards.

**ADDITIONAL TERMS AND CONDITIONS
(Architectural and Engineering Contracts Only)**

1. PLAN AND DRAWING DISTRIBUTION: All plans and drawings must be completed and available for distribution at least five business days prior to a scheduled pre-bid meeting for the construction or other work related to the plans and drawings.

2. PROJECT ADDENDA REQUIREMENTS: The Architect/Engineer and/or Agency shall be required to abide by the following schedule in issuing construction project addenda. The Architect/Engineer shall prepare any addendum materials for which it is responsible, and a list of all vendors that have obtained drawings and specifications for the project. The Architect/Engineer shall then send a copy of the addendum materials and the list of vendors to the State Agency for which the contract is issued to allow the Agency to make any necessary modifications. The addendum and list shall then be forwarded to the Purchasing Division buyer by the Agency. The Purchasing Division buyer shall send the addendum to all interested vendors and, if necessary, extend the bid opening date. Any addendum should be received by the Purchasing Division at least fourteen (14) days prior to the bid opening date.

3. PRE-BID MEETING RESPONSIBILITIES: The Architect/Engineer shall be available to attend any pre-bid meeting for the construction or other work resulting from the plans, drawings, or specifications prepared by the Architect/Engineer.

4. AIA DOCUMENTS: Contracts for architectural and engineering services will be governed by the AIA document B101-2007, as amended by the Supplementary Conditions for the State of West Virginia, in addition to the terms and conditions contained herein when procured under Chapter 5G of the West Virginia Code.

4A. PROHIBITION AGAINST GENERAL CONDITIONS: Notwithstanding anything contained in the AIA Documents or the Supplementary Conditions, the State of West Virginia will not pay for general conditions, or winter conditions, or any other condition representing a delay in the contract. The Vendor is expected to mitigate delay costs to the greatest extent possible and any costs associated with Delays must be specifically and concretely identified. The state will not consider an average daily rate multiplied by the number of days extended to be an acceptable charge.

5. GREEN BUILDINGS MINIMUM ENERGY STANDARDS: In accordance with West Virginia Code § 22-29-4, all new building construction projects of public agencies that have not entered the schematic design phase prior to July 1, 2012, or any building construction project receiving state grant funds and appropriations, including public schools, that have not entered the schematic design phase prior to July 1, 2012, shall be designed and constructed complying with the ICC International Energy Conservation Code, adopted by the State Fire Commission, and the ANSI/ASHRAE/IESNA Standard 90.1-2007: Provided, That if any construction project has a commitment of federal funds to pay for a portion of such project, this provision shall only apply to the extent such standards are consistent with the federal standards.

DESIGNATED CONTACT: Vendor appoints the individual identified in this Section as the Contract Administrator and the initial point of contact for matters relating to this Contract.

Jerome Gabryszewski, Account Manager, KY & WV

(Name, Title)

Jerome Gabryszewski, Account Manager, KY & WV

(Printed Name and Title)

2351 HP Way NE, Rio Rancho, NM 87144

(Address)

(505)-415-7120

(Phone Number) / (Fax Number)

jerome.gabryszewski@hp.com

(E-mail address)

CERTIFICATION AND SIGNATURE: By signing below, or submitting documentation through wvOASIS, I certify that I have reviewed this Solicitation in its entirety; that I understand the requirements, terms and conditions, and other information contained herein; that this bid, offer or proposal constitutes an offer to the State that cannot be unilaterally withdrawn; that the product or service proposed meets the mandatory requirements contained in the Solicitation for that product or service, unless otherwise stated herein; that the Vendor accepts the terms and conditions contained in the Solicitation, unless otherwise stated herein; that I am submitting this bid, offer or proposal for review and consideration; that I am authorized by the vendor to execute and submit this bid, offer, or proposal, or any documents related thereto on vendor's behalf; that I am authorized to bind the vendor in a contractual relationship; and that to the best of my knowledge, the vendor has properly registered with any State agency that may require registration.

HP Inc.

(Company)



(Authorized Signature) (Representative Name, Title)

Judith M. Alexander, Senior Counsel

(Printed Name and Title of Authorized Representative)

October 16, 2017

(Date)

954.272.0855; 954.343.2210 (fax)

(Phone Number) (Fax Number)

ADDENDUM ACKNOWLEDGEMENT FORM

SOLICITATION NO.: ARFQ DOT1800000014

Instructions: Please acknowledge receipt of all addenda issued with this solicitation by completing this addendum acknowledgment form. Check the box next to each addendum received and sign below. Failure to acknowledge addenda may result in bid disqualification. Acknowledgment: I hereby acknowledge receipt of the following addenda and have made the necessary revisions to my proposal, plans and/or specification, etc.

Addendum Numbers Received:

(Check the box next to each addendum received)

None received

- | | |
|---|--|
| <input type="checkbox"/> Addendum No. 1 | <input type="checkbox"/> Addendum No. 6 |
| <input type="checkbox"/> Addendum No. 2 | <input type="checkbox"/> Addendum No. 7 |
| <input type="checkbox"/> Addendum No. 3 | <input type="checkbox"/> Addendum No. 8 |
| <input type="checkbox"/> Addendum No. 4 | <input type="checkbox"/> Addendum No. 9 |
| <input type="checkbox"/> Addendum No. 5 | <input type="checkbox"/> Addendum No. 10 |

I understand that failure to confirm the receipt of addenda may be cause for rejection of this bid. I further understand that any verbal representation made or assumed to be made during any oral discussion held between Vendor’s representatives and any state personnel is not binding. Only the information issued in writing and added to the specifications by an official addendum is binding.

HP Inc.

Company



Authorized Signature

October 16, 2017

Date

NOTE: This addendum acknowledgment should be submitted with the bid to expedite document processing.

REQUEST FOR QUOTATION
GIS Power Workstation

SPECIFICATIONS

1. **PURPOSE AND SCOPE:** The West Virginia Department of Transportation is soliciting bids to establish a contract for the one time purchase of a Precision Tower 7000 Series (7910) or equivalent tower.

2. **DEFINITIONS:** The terms listed below shall have the meanings assigned to them below. Additional definitions can be found in section 2 of the General Terms and Conditions.
 - 2.1 **“Contract Item”** means components provided by a qualified manufacturer that is authorized to sell the equipment as more fully described by these specifications.

 - 2.2 **“Pricing Page”** means the pages, contained in wvOASIS or attached as Exhibit A, upon which Vendor should list its proposed price for the Contract Items.

 - 2.3 **“Solicitation”** means the official notice of an opportunity to supply the State with goods or services that is published by the Department of Transportation.

 - 2.4 **“CAS”** stands for column access strobe.

 - 2.5 **“MB”** stands for megabyte.

 - 2.6 **“GB”** stands for gigabyte.

 - 2.7 **“HW”** stands for hardware.

 - 2.8 **“DDR”** stands for distributed data structure.

 - 2.9 **“TB”** stands for terabyte.

 - 2.10 **“FIO”** stands for factory installed option.

 - 2.11 **“FBWC”** stands for flash based write cache.

 - 2.12 **“W”** stands for watt.

 - 2.13 **“GHZ”** stands for gigahertz.

 - 2.14 **“RAID”** stands for redundant array of independent disks.

REQUEST FOR QUOTATION
GIS Power Workstation

2.15 “RPM” stands for rotations per minute.

2.16 “SAS” stands for serial attached small computer serial interface.

2.17 “SATA” stands for serial advanced technology attachment.

3. GENERAL REQUIREMENTS:

3.1 Mandatory Contract Item Requirements: Contract Item must meet or exceed the mandatory requirements listed below.

3.1.1 Dell Precision Tower 7000 Series (7910) or equivalent hardware. Tower must include factory installed components listed below:

- Dual Intel Xeon Processor E5-2697 v4 (18C, 2.3GHz Turbo, 2400MHz, 45mb, 145w) or equivalent.
- Windows 10 Pro 64bit English, French, Spanish.
- No Office Productivity Software.
- Dell Precision T7910 1300W Chassis v2, BW or equivalent.
- Dua SLI NVIDIA Quadro P5000 16GB (4 DP, DL-DVI-D) for T7910 or equivalent.
- 192GB (8x8GB+8x16GB) 2400MHz DDR4 RDIMM ECC or equivalent
- Dual Processor Air Heat Pipe for T7910
- No Out-of-Band System Management.
- 2.5” 1TB SATA Class 20 Solid State Drive
- 2.5” 1TB SATA Class 20 Solid State Drive (Additional)
- 2.5” 1TB SATA Class 20 Solid State Drive (Additional)
- 2.5” 1TB SATA Class 20 Solid State Drive (Additional)
- 2.5” 1TB SATA Class 20 Solid State Drive (Additional)
- 2.5” 1TB SATA Class 20 Solid State Drive (Additional)
- C3 SATA/SSD 2.5 Inch, 5.8 Hard Drives
- MegaRAID SAS 9361-8i12Gb/s PCIe SATA/SAS HW Raid controller (1GB cache) – HW RAID 0,1,5,10 or equivalent.
- 8x DVD ROM Slimline Optical Drive
- Keyboard
- Mouse
- Integrated network interface card

REQUEST FOR QUOTATION
GIS Power Workstation

- Five Year Pro Support Plus with Next Business Day Onsite Service or equivalent.
- All hardware components and warranty/support must be provided directly by hardware manufacturer.

Alternate bids that are equal to, meet, or exceed the specifications and requirements listed are invited. In order to receive full consideration, such alternate bids must be accompanied by sufficient descriptive literature and/or samples to clearly identify the offer and allow for a complete evaluation.

The use of brand name or equal specifications is for describing the minimum standard of quality, technical performance and installation characteristics required and are not intended to limit or restrict competition.

Vendor must provide technical specifications with bid documentation.

4. CONTRACT AWARD:

4.1 Contract Award: The Contract is intended to provide Agencies with a purchase price for the Contract Items. The Contract shall be awarded to the Vendor that provides the Contract Items meeting the required specifications for the lowest overall total cost as shown on the Pricing Pages.

4.2 Pricing Page: Vendor should complete the Pricing Page by providing a total cost for the hardware being requested. Vendor should complete the Pricing Page in full as failure to complete the Pricing Page in its entirety may result in Vendor's bid being disqualified.

Vendor should type or electronically enter the information into the Pricing Page to prevent errors in the evaluation.

5. PAYMENT:

5.1 Payment: Vendor shall accept payment in accordance with the payment procedures of the State of West Virginia.

REQUEST FOR QUOTATION
GIS Power Workstation

6. DELIVERY AND RETURN:

6.1 Shipment and Delivery: Vendor shall ship the Contract Items immediately after being awarded this Contract and receiving a purchase order or notice to proceed. Vendor shall deliver the Contract Items within (20) twenty work days after receiving a purchase order or notice to proceed. Final cost shall include shipping charges, delivery charges. Contract Items must be delivered to Department of Transportation/Highways Information Services, Building 5, Room 920. All server components must be installed in the server at time of delivery.

6.2 Late Delivery: The Agency placing the order under this Contract must be notified in writing if the shipment of the Contract Items will be delayed for any reason. Any delay in delivery that could cause harm to an Agency will be grounds for cancellation of the Contract, and/or obtaining the Contract Items from a third party.

Any Agency seeking to obtain the Contract Items from a third party under this provision must first obtain approval of the Purchasing Division.

6.3 Delivery Payment/Risk of Loss: Vendor shall deliver the Contract Items F.O.B. destination to the Agency's location.

6.4 Return of Unacceptable Items: If the Agency deems the Contract Items to be unacceptable, the Contract Items shall be returned to Vendor at Vendor's expense and with no restocking charge. Vendor shall either make arrangements for the return within five (5) days of being notified that items are unacceptable, or permit the Agency to arrange for the return and reimburse Agency for delivery expenses. If the original packaging cannot be utilized for the return, Vendor will supply the Agency with appropriate return packaging upon request. All returns of unacceptable items shall be F.O.B. the Agency's location. The returned product shall either be replaced, or the Agency shall receive a full credit or refund for the purchase price, at the Agency's discretion.

6.5 Return Due to Agency Error: Items ordered in error by the Agency will be returned for credit within 30 days of receipt, F.O.B. Vendor's location. Vendor shall not charge a restocking fee if returned products are in a resalable condition. Items shall be deemed to be in a resalable condition if they are unused and in the original packaging. Any restocking fee for items not in a resalable condition shall be the lower of the Vendor's customary restocking fee or 5% of the total invoiced value of the returned items.

7 VENDOR DEFAULT:

REQUEST FOR QUOTATION
GIS Power Workstation

7.1 The following shall be considered a vendor default under this Contract.

- 7.1.1 Failure to provide Contract Items in accordance with the requirements contained herein.
- 7.1.2 Failure to comply with other specifications and requirements contained herein.
- 7.1.3 Failure to comply with any laws, rules, and ordinances applicable to the Contract Services provided under this Contract.
- 7.1.4 Failure to remedy deficient performance upon request.

7.2 The following remedies shall be available to Agency upon default.

- 7.2.1 Immediate cancellation of the Contract.
- 7.2.2 Immediate cancellation of one or more release orders issued under this Contract.
- 7.2.3 Any other remedies available in law or equity.

EXHIBIT A - PRICING PAGE

TOTAL INSTALLATION & DELIVERY COST			
LOCATION - BUILDING 5, ROOM 920 CHARLESTON, WV 25305			
Item Number	Description	Unit Price	TOTAL
1	(1) Dell Percision Tower 7000 Series 7910 or equivalent - must be configured as described in General Requirement Section 3 of the attached RFQ **	\$13,333.00	\$13,333.00
Total			\$13,333.00

**The proposed HP Z840 Microsoft Windows Workstation F5G73AV is configured as described in the General Requirements, Section 3 of the RFQ. Please refer to HP's Quote and Data Sheet, which are included.

HP ATTACHMENTS



Attachment 1 – ARFQ 0803 DOT180000014 1 ARFQ FORM





**State of West Virginia
Request For Quotation**

Procurement Folder : 373108

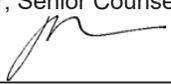
Document Description : (1) Dell Precision Tower PC or equivalent 6318B0028

Procurement Type : Agency Purchase Order

Date Issued	Solicitation Closes	Solicitation No	Version	Phase
2017-10-04	2017-10-17 13:00:00	ARFQ 0803 DOT1800000014	1	Final

SUBMIT RESPONSES TO:	VENDOR
FINANCE & ADMINISTRATION DIVISION OF HIGHWAYS BLDG 5, RM A-220 1900 KANAWHA BLVD E CHARLESTON WV 25302 US	Vendor Name, Address and Telephone HP Inc. 1501 Page Mill Road Palo Alto, CA 94304 ARFQ Contact: Jerome Gabryszewski, (505) 415-7120

FOR INFORMATION CONTACT THE
 Dusty J Smith
 (304) 558-9398
 dusty.j.smith@wv.gov

Judith M. Alexander, Senior Counsel

Signature X **FEIN #** 94-1081436 **DATE** October 16, 2017

ADDITIONAL INFORMATION:

10/10/2017 - TECHNICAL QUESTIONS ARE DUE BY NOON EASTERN

10/17/17-BID CLOSES AT NOON.

INVOICE TO		SHIP TO	
DIVISION OF HIGHWAYS INFORMATION SERVICE DIVISION 1900 KANAWHA BLVD E, BLDG 5 RM 920 CHARLESTON WV25305-0430 US		DIVISION OF HIGHWAYS INFORMATION SERVICE DIVISION 1900 KANAWHA BLVD E, BLDG 5 RM 920 CHARLESTON WV 25305-0430 US	

Line	Commodity Line Description	Qty	Unit Issue	Unit Price	Total Price
1	(1) Dell Precision Tower PC or equivalent	1.00000	EA	Please refer to HP price page and quote	

Commodity Code	Manufacturer	Model #	Specification
43211502	HP Inc.	HP Z840 Microsoft Windows Workstation F5G73AV	Please see attached Data Sheet for specifications

Extended Description

(1) Dell Precision Tower 7000 Series workstation or equivalent

SCHEDULE OF EVENTS		
Line	Event	Event Date
1	TECHNICAL QUESTIONS DUE AT NOON	2017-10-10

DOT1800000014	Document Phase Final	Document Description (1) Dell Precision Tower PC or equivalent 6318B0028	Page 3 of 3
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ADDITIONAL TERMS AND CONDITIONS

See attached document(s) for additional Terms and Conditions

Attachment 2 – Vendor Preference Certificate



State of West Virginia

VENDOR PREFERENCE CERTIFICATE

Certification and application is hereby made for Preference in accordance with **West Virginia Code**, §5A-3-37. (Does not apply to construction contracts). **West Virginia Code**, §5A-3-37, provides an opportunity for qualifying vendors to request (at the time of bid) preference for their residency status. Such preference is an evaluation method only and will be applied only to the cost bid in accordance with the **West Virginia Code**. This certificate for application is to be used to request such preference. The Purchasing Division will make the determination of the Vendor Preference, if applicable.

1. Application is made for 2.5% vendor preference for the reason checked:

- Bidder is an individual resident vendor and has resided continuously in West Virginia for four (4) years immediately preceding the date of this certification; **or**,
- Bidder is a partnership, association or corporation resident vendor and has maintained its headquarters or principal place of business continuously in West Virginia for four (4) years immediately preceding the date of this certification;
- Bidder is a resident vendor partnership, association, or corporation with at least eighty percent of ownership interest of bidder held by another entity that meets the applicable four year residency requirement; **or**,
- Bidder is a nonresident vendor which has an affiliate or subsidiary which employs a minimum of one hundred state residents and which has maintained its headquarters or principal place of business within West Virginia continuously for the four (4) years immediately preceding the date of this certification; **or**,

2. Application is made for 2.5% vendor preference for the reason checked:

- Bidder is a resident vendor who certifies that, during the life of the contract, on average at least 75% of the employees working on the project being bid are residents of West Virginia who have resided in the state continuously for the two years immediately preceding submission of this bid; **or**,

3. Application is made for 2.5% vendor preference for the reason checked:

- Bidder is a nonresident vendor that employs a minimum of one hundred state residents, or a nonresident vendor which has an affiliate or subsidiary which maintains its headquarters or principal place of business within West Virginia and employs a minimum of one hundred state residents, and for purposes of producing or distributing the commodities or completing the project which is the subject of the bidder's bid and continuously over the entire term of the project, on average at least seventy-five percent of the bidder's employees or the bidder's affiliate's or subsidiary's employees are residents of West Virginia who have resided in the state continuously for the two immediately preceding years and the vendor's bid; **or**,

4. Application is made for 5% vendor preference for the reason checked:

- Bidder meets either the requirement of both subdivisions (1) and (2) or subdivision (1) and (3) as stated above; **or**,

5. Application is made for 3.5% vendor preference who is a veteran for the reason checked:

- Bidder is an individual resident vendor who is a veteran of the United States armed forces, the reserves or the National Guard and has resided in West Virginia continuously for the four years immediately preceding the date on which the bid is submitted; **or**,

6. Application is made for 3.5% vendor preference who is a veteran for the reason checked:

- Bidder is a resident vendor who is a veteran of the United States armed forces, the reserves or the National Guard, if, for purposes of producing or distributing the commodities or completing the project which is the subject of the vendor's bid and continuously over the entire term of the project, on average at least seventy-five percent of the vendor's employees are residents of West Virginia who have resided in the state continuously for the two immediately preceding years.

7. Application is made for preference as a non-resident small, women- and minority-owned business, in accordance with West Virginia Code §5A-3-59 and West Virginia Code of State Rules.

- Bidder has been or expects to be approved prior to contract award by the Purchasing Division as a certified small, women- and minority-owned business.

Bidder understands if the Secretary of Revenue determines that a Bidder receiving preference has failed to continue to meet the requirements for such preference, the Secretary may order the Director of Purchasing to: (a) rescind the contract or purchase order; or (b) assess a penalty against such Bidder in an amount not to exceed 5% of the bid amount and that such penalty will be paid to the contracting agency or deducted from any unpaid balance on the contract or purchase order.

By submission of this certificate, Bidder agrees to disclose any reasonably requested information to the Purchasing Division and authorizes the Department of Revenue to disclose to the Director of Purchasing appropriate information verifying that Bidder has paid the required business taxes, provided that such information does not contain the amounts of taxes paid nor any other information deemed by the Tax Commissioner to be confidential.

Bidder hereby certifies that this certificate is true and accurate in all respects; and that if a contract is issued to Bidder and if anything contained within this certificate changes during the term of the contract, Bidder will notify the Purchasing Division in writing immediately.

Bidder: HP Inc. _____

Signed: _____ 

Date: October 16, 2017 _____

Title: Senior Counsel _____

*Check any combination of preference consideration(s) indicated above, which you are entitled to receive.

Attachment 3 – Purchasing Affidavit



STATE OF WEST VIRGINIA
Purchasing Division

PURCHASING AFFIDAVIT

CONSTRUCTION CONTRACTS: Under W. Va. Code § 5-22-1(i), the contracting public entity shall not award a construction contract to any bidder that is known to be in default on any monetary obligation owed to the state or a political subdivision of the state, including, but not limited to, obligations related to payroll taxes, property taxes, sales and use taxes, fire service fees, or other fines or fees.

ALL OTHER CONTRACTS: Under W. Va. Code §5A-3-10a, no contract or renewal of any contract may be awarded by the state or any of its political subdivisions to any vendor or prospective vendor when the vendor or prospective vendor or a related party to the vendor or prospective vendor is a debtor and: (1) the debt owed is an amount greater than one thousand dollars in the aggregate; or (2) the debtor is in employer default.

EXCEPTION: The prohibition listed above does not apply where a vendor has contested any tax administered pursuant to chapter eleven of the W. Va. Code, workers' compensation premium, permit fee or environmental fee or assessment and the matter has not become final or where the vendor has entered into a payment plan or agreement and the vendor is not in default of any of the provisions of such plan or agreement.

DEFINITIONS:

"Debt" means any assessment, premium, penalty, fine, tax or other amount of money owed to the state or any of its political subdivisions because of a judgment, fine, permit violation, license assessment, defaulted workers' compensation premium, penalty or other assessment presently delinquent or due and required to be paid to the state or any of its political subdivisions, including any interest or additional penalties accrued thereon.

"Employer default" means having an outstanding balance or liability to the old fund or to the uninsured-employers' fund or being in policy default, as defined in W. Va. Code § 23-2c-2, failure to maintain mandatory workers' compensation coverage, or failure to fully meet its obligations as a workers' compensation self-insured employer. An employer is not in employer default if it has entered into a repayment agreement with the Insurance Commissioner and remains in compliance with the obligations under the repayment agreement.

"Related party" means a party, whether an individual, corporation, partnership, association, limited liability company or any other form or business association or other entity whatsoever, related to any vendor by blood, marriage, ownership or contract through which the party has a relationship of ownership or other interest with the vendor so that the party will actually or by effect receive or control a portion of the benefit, profit or other consideration from performance of a vendor contract with the party receiving an amount that meets or exceeds five percent of the total contract amount.

AFFIRMATION: By signing this form, the vendor's authorized signer affirms and acknowledges under penalty of law for false swearing (W. Va. Code §61-5-3) that: (1) for construction contracts, the vendor is not in default on any monetary obligation owed to the state or a political subdivision of the state, and (2) for all other contracts, that neither vendor nor any related party owe a debt as defined above and that neither vendor nor any related party are in employer default as defined above, unless the debt or employer default is permitted under the exception above.

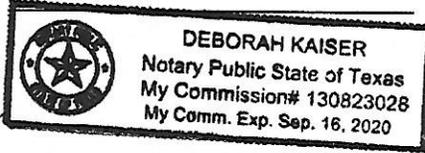
WITNESS THE FOLLOWING SIGNATURE:

Vendor's Name: HP Inc.

Authorized Signature: Calleen F. Lively Date: 10/10/2017

State of TEXAS

County of HARRIS, to-wit:



Taken, subscribed, and sworn to before me this 10th day of October, 2017.

My Commission expires 9/16/2020, 20 .

AFFIX SEAL HERE

NOTARY PUBLIC [Signature]

Attachment 4 – HP Quote





Public Sector Sales

October 16, 2017

WV PURCHASING DIVISION
WV Division of Highways
1900 Kanawha blvd E. #5 RM 920
CHARLESTON WV 25305-0430

RE : HP Public Sector Quote - 11896177-3

Dear dusty.j.smith@wv.gov,

Thank you for your recent interest in HP Public Sector Sales. Award-winning HP products are designed to deliver high-performance technology, powerful networking and legendary HP quality - all at a value that your budget demands. From Notebook PCs to Printers, HP provides a single resource for complete solutions that meet all your computing needs. You can rely on HP for the performance, uptime, and efficiency you need to keep your agency running smoothly and hassle-free. Every HP product is designed and tested to provide industry-standard compatibility and investment protection. And, with special maintenance services, easy ordering and flexible financing, HP makes buying the right solution for your organization easier and more convenient than ever.

Attached is the price quotation you requested. When submitting a purchase order directly to HP, please be certain to include the requested information on the Ordering Information page attached to this quotation. Including the necessary information will ensure the accurate and timely processing of your order through HP Public Sector.

You may [click here to view this quote and place an order online](#) or fax in your purchase order at 800-825-2329.

- Please reference these terms: HP Standard Single Order terms and conditions.
- Unless the customer has another valid agreement with HP Inc, this quotation is governed by HP Inc's Standard Single Order Terms and Conditions. A copy of these terms can be found on-line or can be requested from your Customer Service or Sales Representatives. All orders must reference this HP Inc. quotation for acceptance. No other terms or conditions shall apply.
- Third party items that may be included in this quote are covered under the terms of the manufacturer warranty, not the HP Inc. warranty.

If you should have questions regarding this quotation or need any other assistance, please contact your Public Sector sales representative.

Sincerely,

Jerome Gabryszewski

Inside Sales Representative



Ordering Information

It's never been easier to place your direct orders with HP. Now you can have fast, accurate service with special options designed to personalize, process and expedite your shipments with higher levels of accuracy. Ordering HP products is as simple as picking up the phone, using the fax machine, or logging onto the HP Public Sector website at http://welcome.hp.com/country/us/eng/solutions/pub_sector.html

Online ordering

With the HP Online Store, you can create quotes with real-time pricing; place an order using a credit card or purchase order, keep up-to-date on the latest product promotions and pricing available on your contract, inquire about order status and view product/price information - all from your desktop PC.

[Click here to view this quote and place an order online.](#)

Faxing Option

Faxing your order is convenient, too. Simply fill out your request on the customer purchase order and send to 1-800-825-2329. Your order will be promptly handled, and you can call a Customer Service Representative to confirm your order.

Personalized Telesales

To provide more personal service to you, our telephone sales and order administration representatives are assigned by territory. This means you can reach a dedicated government, education, or medical sales team every time you call - giving you added value by letting you grow personal relationships with representatives who know your product as well as your special terms and delivery requirements. To request a quote, check product availability, and other related questions, call your Telesales Representative.

Order Accuracy

To ensure the accurate and timely processing of your order, please verify that your purchase order includes the following information:

- o Bill-to address,
- o Ship-to address,
- o Purchase order number,
- o Part number, description, and price,
- o Contract # and name
- o Reseller of choice
- o Contact name, phone number, and email address,
- o Special delivery requirements
- o Requested delivery date
- o Signature of authorized purchaser
- o Please note that HP Inc. must be listed as the vendor.
- o Sample/Editable PDF Purchase Order forms are available at these links -
 - o Standard PO (STL / K12 / Hi Ed / Fed) - http://gem.compaq.com/gemstore/sites/downloads/SLED_PO_Template.pdf
 - o Federal Form 1449 - http://gem.compaq.com/gemstore/sites/downloads/FED_PO_Template_Form_1449.pdf

Tax-Exempt Certificate Requirements

All tax-exempt accounts should have a tax-exempt certificate on file with HP to avoid having sales tax added to their invoice. This certificate needs to be provided only once. If you are ordering for the first time, please include with your order or account application.

HP Credit

HP's financing programs can help your agency purchase or lease HP solutions. To inquire more about a customized financial solution proposal call your Telesales Representative.

Order Tracking and Status

All orders are entered within 24 hours of receipt and are scheduled to ship on a first in first out basis. Orders are shipped within seven days of receipt provided all items are in stock and all necessary information has been properly included on your purchase order. (Remember that ship complete orders can be delayed if a particular item is not currently in stock.) To inquire about the status of your order, you may either call your corresponding Customer Service Representative or [check your order status online](#)

Returned Merchandise

A return material authorization number (RMA) is required for all returns to be processed. Returns may be requested within 30 days of shipment. Please call your Public Sector Customer Service Representative in order to have an RMA assigned. Please have a copy of the packing slip available when you call.

Customer Relationship and Sales For Public Sector Sales

Fax: 800-825-2329

K-12 Education: 800-888-3224

Higher Ed: 877-480-4433

State & Local: 888-202-4682



PRICE QUOTATION

Quote Number: 11896177-3

Quote Date : October 16, 2017

Revised Date : October 16, 2017

Expires: October 31, 2017

Provided by: Jerome Gabryszewsk

dusty.j.smith@wv.gov

WV PURCHASING DIVISION

Big Deal Number: 40803965

(Contract Expiration)

Contract: STANDARD TERMS STATE & LOCAL CUSTOMER (STD TERMS STATE&LOCAL CUS)

Product availability and product discontinuation is subject to change without notice. The prices in this quotation are valid for 30 days from quote date above. Please include the quote number and contract from this quote on the corresponding purchase order. HP INC. PROPRIETARY INFORMATION FOR CUSTOMER USE ONLY. DO NOT SHARE.

Item	Part No.	Description	Qty.	Unit Price	Extended
Group: A					
1.		Configurable- HP Z840 Microsoft Windows Workstation F5G73AV	1	\$13,121.00	\$13,121.00
	F5G73AV	Product - HP Z840 Microsoft Windows Workstation			
	G8X50AV	Chassis - HP Z840 1125W (1450W/200V) 90 Percent Efficient Chassis			
	F5G74AV#ABA	Country kit - HP Z840 Country Kit			
	2KW75AV#ABA	Operating systems - Win 10 Pro 64 for Workstations Plus			
	T9V18AV	Processor - Intel Xeon E5-2697v4 2.3 2400 18C 1stCPU (Requires DDR4-2400 system memory. Not allowed with Windows 8.1 or Windows 8.1 DG)			
	T9V36AV	2nd processor - Intel Xeon E5-2697v4 2.3 2400 18C 2ndCPU (Processors must match)			
	Z0B03AV	Graphics - NVIDIA Quadro P5000 16GB			
	T9W27AV	4xDP+DL-DVI(D) 1st No cable included Graphics Memory - 192GB DDR4-2400 (12x16GB) 2CPU RegRAM (Supported only with Dual Processor)			
	G8X90AV	Cooling Options - HP Single Processor Air Cooling Kit (Supported with single processor Only. Not supported with 3D Vapor Cooler 1CPU (N3R52AV)			
	J8J27AV	Optical Drive Bay - HP 2.5in SSD 2-in-1 Optical Bay Carrier (Required when INSTOR5 SATA-SFF or SATA-SSD is selected and HP High Density 8-bay Storage Kit is not selected. Not supported with 5th SAS Drive. Not supported with High Density Storage)			
	J9N96AV	Internal OS Load Storage Options - Operating System Load to SATA/SAS (Internal Storage Required)			
	J3K81AV	Internal storage - 1TB SATA 1st SSD			
	J3L02AV	Internal Storage 2 - 1TB SATA 2nd SSD			
	J3L22AV	Internal Storage 3 - 1TB SATA 3rd SSD			
	J3L45AV	Internal Storage 4 - 1TB SATA 4th SSD			
	J3L63AV	Internal Storage 5 - 1TB SATA 5th SSD			
	J3L71AV	Internal Storage 6 - 1TB SATA 6th SSD (5th HDD must be SATA and must be same capacity/speed)			

Note: For detailed warranty information, please link to "URL" for more information www.hp.com/go/specificwarrantyinfo. Sales taxes added where applicable. Freight is FOB Destination.



PRICE QUOTATION

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Item	Part No.	Description	Qty.	Unit Price	Extended
	J4Y57AV	Internal Storage Options - RAID 5 Parity Array Configuration (All HDDs must be the same drive (size/speed/type/speed of bus interface/functional capability). Must have 4,6, 8 HDDs. Not supported with INSTOR SATA-SED. Not supported with PCIE storage)			
	G8U76AV#ABA	Keyboard - HP USB Keyboard			
	G8U87AV	Mouse - HP USB Optical Mouse			
	1HH61AV	Optical drive - 9.5mm Slim DVD-Writer 1st ODD Cable Options - N/A			
	G8U92AV	Packaging - HP Single Unit Packaging			
	V8B19AV	Application Software 1 - HP Remote Graphics Software (RGS) for Z			
	F5G83AV#ABA	Warranty - HP 3/3/3 Warranty			
SUB TOTAL :					\$13,121.00
Group: B					
2.		Desc OFF PRICE LIST PRODUCT --SEE COMMENTS <i>SKU W9G28AA. HP Inside Delivery Service for Workstations</i>	1	\$35.00	\$35.00
3.		Desc OFF PRICE LIST PRODUCT --SEE COMMENTS <i>SKU W9G29AA. HP Unpack & Waste Removal</i>	1	\$28.00	\$28.00
4.		Desc OFF PRICE LIST PRODUCT --SEE COMMENTS <i>SKU W9F89AA. HP Workstation Installation Service (1-10) units</i>	1	\$149.00	\$149.00
SUB TOTAL :					\$212.00

TOTAL PRICE : \$13,333.00

To ensure the accurate and timely processing of your order, please include quote # 11896177-3 on your Purchase Order.

GET MORE FOR YOUR MONEY

Make the most of your budget and protect against technology obsolescence. Lease these HP products with a purchase price of \$13,333.00 for 36 months for as little as \$431.86 per month. At the end of the lease, send the equipment back to HP Financial Services and upgrade to new technology or purchase the equipment at its fair market value.*

Note: For detailed warranty information, please link to "URL" for more information www.hp.com/go/specificwarrantyinfo. Sales taxes added where applicable. Freight is FOB Destination.



PRICE QUOTATION

Quote Number: 11896177-3

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Item	Part No.	Description	Qty.	Unit Price	Extended
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GET MORE WITH HP FINANCIAL SERVICES

For more information, call Hewlett-Packard Financial Services Company at 1-888-277-5942 and talk to a financial services representative who specializes in supporting government and education entities.

* The monthly payment amount is for a lease commencing on or before 11/15/2017 with a term of 36 months and a fair market value purchase option at the end of the lease term. This and other leasing and financing options are available through Hewlett-Packard Financial Service Company (HPFSC) or one of its affiliates to qualified education and state and local customers in the U.S. and subject to credit approval and execution of standard HPFSC documentation. Fees and other restrictions may apply. This is not a commitment to lease. Rates and payments are subject to change at any time without notice. Leasing and financing options for Federal governmental agencies (subject to a \$50,000 minimum) are available from Hewlett-Packard Company.

Comments:

Attachment 5 – HP Z840 Workstation Datasheet





HP Z840 Workstation

Push your computing boundaries with the HP Z840 Workstation that helps you keep up with your biggest projects. Built for high-end computing and visualization, it delivers outstanding performance in one of the industry's most expandable chassis.

HP recommends Windows 10 Pro.

- Windows 10 Pro¹
- Intel® Xeon™ processors²



Prepare to be spectacular

The HP Z840 Workstation, HP's highest performing workstation gets the best of HP Z DNA with incredible processing power, professional graphics, maximized memory, and internal storage capacity that helps you create work that makes a statement.

Get going

Experience expansion like you never dreamed possible with 7 PCIe slots, up to 10 internal drive bays, and 16 memory slots supporting up to 1 TB of memory the HP Z840 can do it all. Ready to get going?

Keep going

Reach your goals with the HP Z840 Workstation featuring uncompromised reliability, a tool-less chassis to facilitate upgrades, a rackable option³ in addition to a desk side system, a lockable side panel, and handles to move the system around.

Featuring:

- Achieve the performance you need with the ability to support two next generation Intel® Xeon® processors for up to 44 total processor cores in one system.²
- Take productivity up a notch with the ability to do more thanks to NVIDIA® professional graphics cards in 2D or 3D.⁴
- Get serious about graphics and reach peak productivity with access to a breadth of AMD professional graphics from entry to high-end 3D.⁴
- Maximize your time and increase your capabilities with USB and SATA ports, plus lightning-fast data transfers using optional Thunderbolt™ 2 technology.⁵
- A new tool-free chassis boasts low acoustics, dual integrated Gb Ethernet, aluminum side panels, handles for lifting, and is 5U rack mountable—all in an elegant industrial design.
- Reduce boot up, calculation, and graphics response and revolutionize how your HP Z840 handles large files with the HP Z Turbo Drive, a remarkably fast and innovative storage solution.
- Take multitasking to a new level with support for up to eight displays.⁶
- Optimize performance automatically with the with the most current settings and drivers.⁷
- Each HP Z840 Workstation works with HP Client Management Solutions.⁸

HP Z840 Workstation Specifications Table



Form Factor	Tower
Operating System	Windows 10 Pro 64 – HP recommends Windows 10 Pro. ¹ Windows 10 Home 64 ¹ Windows 7 Professional 64 (available through downgrade rights from Windows 10 Pro) ² Windows 8.1 Pro 64 ³ HP Installer Kit for Linux [®] (HP Linux Installer Kit includes drivers for 64-bit versions of Red Hat [®] Enterprise Linux 6.7 and 7, SUSE Linux Enterprise Desktop 11 and Ubuntu 14.04. Red Hat Enterprise Linux (1-year paper license only) is available as a second operating system.)
Processor Family	Intel [®] Xeon [®] E5-2600 v4 processor; Intel [®] Xeon [®] E5-2600 v3 processor
Processors^{5,6}	Intel [®] Xeon [®] E5-2699 v4 (2.2 GHz, 55 MB cache, 22 cores, Intel [®] vPro™) Intel [®] Xeon [®] E5-2697 v4 (2.3 GHz, 45 MB cache, 18 cores, Intel [®] vPro™) Intel [®] Xeon [®] E5-2695 v4 (2.1 GHz, 45 MB cache, 18 cores, Intel [®] vPro™) Intel [®] Xeon [®] E5-2690 v4 (2.6 GHz, 35 MB cache, 14 cores, Intel [®] vPro™) Intel [®] Xeon [®] E5-2687W v4 (3 GHz, 30 MB cache, 12 cores, Intel [®] vPro™) Intel [®] Xeon [®] E5-2683 v4 (2.1 GHz, 40 MB cache, 16 cores, Intel [®] vPro™) Intel [®] Xeon [®] E5-2680 v4 (2.4 GHz, 35 MB cache, 14 cores, Intel [®] vPro™) Intel [®] Xeon [®] E5-2667 v4 (3.2 GHz, 25 MB cache, 8 cores, Intel [®] vPro™) Intel [®] Xeon [®] E5-2660 v4 (2 GHz, 35 MB cache, 14 cores, Intel [®] vPro™) Intel [®] Xeon [®] E5-2650 v4 (2.2 GHz, 30 MB cache, 12 cores, Intel [®] vPro™) Intel [®] Xeon [®] E5-2643 v4 (3.4 GHz, 20 MB cache, 6 cores, Intel [®] vPro™) Intel [®] Xeon [®] E5-2640 v4 (2.4 GHz, 25 MB cache, 10 cores, Intel [®] vPro™) Intel [®] Xeon [®] E5-2637 v4 (3.5 GHz, 15 MB cache, 4 cores, Intel [®] vPro™) Intel [®] Xeon [®] E5-2630 v4 (2.2 GHz, 25 MB cache, 10 cores, Intel [®] vPro™) Intel [®] Xeon [®] E5-2623 v4 (2.6 GHz, 10 MB cache, 4 cores, Intel [®] vPro™) Intel [®] Xeon [®] E5-2620 v4 (2.1 GHz, 20 MB cache, 8 cores, Intel [®] vPro™) Intel [®] Xeon [®] E5-2609 v4 (1.7 GHz, 20 MB cache, 8 cores, Intel [®] vPro™) Intel [®] Xeon [®] E5-2603 v4 (1.7 GHz, 15 MB cache, 6 cores, Intel [®] vPro™) Intel [®] Xeon [®] E5-2699 v3 (2.3 GHz, 45 MB cache, 18 cores, Intel [®] vPro™) Intel [®] Xeon [®] E5-2697 v3 (2.6 GHz, 35 MB cache, 14 cores, Intel [®] vPro™) Intel [®] Xeon [®] E5-2695 v3 (2.3 GHz, 35 MB cache, 14 cores, Intel [®] vPro™) Intel [®] Xeon [®] E5-2690 v3 (2.6 GHz, 30 MB cache, 12 cores, Intel [®] vPro™) Intel [®] Xeon [®] E5-2687W v3 (3.1 GHz, 25 MB cache, 10 cores, Intel [®] vPro™) Intel [®] Xeon [®] E5-2680 v3 (2.5 GHz, 30 MB cache, 12 cores, Intel [®] vPro™) Intel [®] Xeon [®] E5-2670 v3 (2.3 GHz, 30 MB cache, 12 cores, Intel [®] vPro™) Intel [®] Xeon [®] E5-2667 v3 (3.2 GHz, 20 MB cache, 8 cores, Intel [®] vPro™) Intel [®] Xeon [®] E5-2660 v3 (2.6 GHz, 25 MB cache, 10 cores, Intel [®] vPro™) Intel [®] Xeon [®] E5-2650 v3 (2.3 GHz, 25 MB cache, 10 cores, Intel [®] vPro™) Intel [®] Xeon [®] E5-2643 v3 (3.4 GHz, 20 MB cache, 6 cores, Intel [®] vPro™) Intel [®] Xeon [®] E5-2640 v3 (2.6 GHz, 20 MB cache, 8 cores, Intel [®] vPro™) Intel [®] Xeon [®] E5-2637 v3 (3.5 GHz, 15 MB cache, 4 cores, Intel [®] vPro™) Intel [®] Xeon [®] E5-2630 v3 (2.4 GHz, 20 MB cache, 8 cores, Intel [®] vPro™) Intel [®] Xeon [®] E5-2620 v3 (2.4 GHz, 15 MB cache, 6 cores, Intel [®] vPro™) Intel [®] Xeon [®] E5-2609 v3 (1.9 GHz, 15 MB cache, 6 cores, Intel [®] vPro™) Intel [®] Xeon [®] E5-2603 v3 (1.6 GHz, 15 MB cache, 6 cores, Intel [®] vPro™)
Chipset	Intel [®] C612
Maximum Memory	1 TB DDR4-2400 ECC registered SDRAM ¹⁰ (Transfer rates up to 2400 MT/s. Only registered and load-reduced memory is supported.)
Memory Slots	8 DIMM (with 1 processor) and 16 DIMM (with 2 processors)

Drive Controllers	Integrated SATA 6.0 Gb/s; Integrated LSI SAS 2308 with RAID; LSI MegaRAID® 9270-8i SAS 6.0 Gb/s ROC RAID Card and iBBU09 Battery Backup Unit (optional); Factory integrated RAID available for SATA/SAS drives (RAID 0, 0 Data, 1, 5, and 10); Factory integrated RAID available for PCIe SSDs (RAID 0 Data)
Internal Storage	300 GB up to 1.2 TB SAS (10000 rpm) ⁷ 500 GB up to 4 TB SATA (7200 rpm) ⁷ 500 GB SATA SED (7200 rpm) ⁷ 128 GB up to 2 TB SATA SSD ⁷ 256 GB up to 512 GB SATA SED SSD ⁷ 1 TB (8 GB cache) SATA SSHD (7200 rpm) ⁷ 256 GB up to 1 TB HP Z Turbo Drive G2 (NVMe PCIe SSD) ⁷ 256 GB up to 512 GB HP Z Turbo Drive G2 (PCIe SED SSD) ⁷ 256 GB up to 1 TB HP Z Turbo Drive G2 PCIe® SSD ⁷ 256 GB up to 1 TB HP Z Turbo Drive Quad Pro (PCIe SSD) ⁷
Optical Storage	Slim SATA DVD-ROM; Slim SATA BDXL Blu-ray writer; Slim SATA DVD-Writer ^{6,9}
Additional Storage	15-in-1 media card reader (optional); HP DX115 Removable HDD Frame/Carrier (optional)
Available Graphics	Professional 2D: NVIDIA® NVS™ 510 (2 GB); NVIDIA® NVS™ 315 (1 GB); NVIDIA® NVS™ 310 (512 MB) Entry 3D: AMD FirePro™ W2100 (2 GB); NVIDIA® Quadro® P600 (2 GB GDDR5 dedicated); NVIDIA® Quadro® K420 (2 GB); NVIDIA® Quadro® K620 (2 GB) Mid-range 3D: AMD FirePro™ W5100 (4 GB); AMD FirePro™ W4300 (4 GB); NVIDIA® Quadro® P2000 (5 GB); NVIDIA® Quadro® M2000 (4 GB); NVIDIA® Quadro® K2200 (4 GB); NVIDIA® Quadro® K1200 (4 GB) High-end 3D: AMD Radeon™ Pro WX 7100 (8 GB); AMD FirePro™ W7100 (8 GB); AMD Radeon™ Pro WX 4100 (4 GB); NVIDIA® Quadro® P6000 (24 GB); NVIDIA® Quadro® P5000 (16 GB); NVIDIA® Quadro® P4000 (8 GB); NVIDIA® Quadro® M6000 (24 GB); NVIDIA® Quadro® M5000 (8 GB); NVIDIA® Quadro® M4000 (8 GB); NVIDIA® Quadro® GP100 (16 GB) ¹⁶
Audio	Integrated IDT 92HD94 audio
Networking	Integrated Intel I210AT PCIe GbE; Integrated Intel I218LM PCIe GbE; Intel Ethernet I210-T1 PCIe NIC (optional); HP X540-T2 10 GbE Dual Port Adapter (optional); HP X520 10 GbE Dual Port Adapter (optional); HP 10 GbE SFP+SR Transceiver (optional); HP 361T PCIe Dual Port Gigabit NIC (optional); Intel 7260 802.11a/b/g/n PCIe WLAN (optional) ¹¹
Expansion Slots	2 PCIe Gen3 x16; 1 PCIe Gen3 x16 (when 2nd CPU installed); 1 PCIe Gen2 x4 (when 1 CPU installed) OR PCIe Gen3 x8 (when 2nd CPU installed); 1 PCIe Gen3 x8; 1 PCIe Gen3 x4; 1 PCIe Gen2 x1 (1 PCIe Gen2 x4 when 1 CPU is installed. Transforms to PCIe Gen3 x8 when 2nd CPU installed. The PCIe x8 connectors are open ended, allowing a PCIe x16 card to be seated in the slot.)
Ports and Connectors	Front: 4 USB 3.0; 1 combo headset; 1 microphone Back: 4 USB 3.0; 2 USB 2.0; 1 serial; 2 PS/2; 2 RJ-45; 1 audio line in; 1 audio line out Internal: 2 USB 2.0; 1 USB 3.0 (Internal USB 2.0 available by the 2x5 header. Internal USB 3.0 available by a shrouded 9-pin connector.)
Drive Bays (Internal)	Four 3.5"
Drive Bays (External)	Two 5.25"; One slim ODD
Input Device	HP USB SmartCard Keyboard; HP 2.4 GHz Wireless Keyboard & Mouse; HP PS/2 Keyboard; HP USB Keyboard; HP Wireless Business Slim Keyboard; HP USB Business Slim Keyboard; HP PS/2 Business Slim Keyboard ¹² HP PS/2 Mouse; HP USB Optical Mouse; HP USB 1000 dpi Laser Mouse; HP SpaceExplorer 3D USB Controller; HP SpacePilot Pro 3D USB Intelligent Controller; 3Dconnexion CADMouse; HP USB Hardened Mouse ¹²
Software	HP Performance Advisor; Cyberlink Media Suite & PowerDVD; Foxit PhantomPDF Express; Buy Office; HP Remote Graphics Software (RGS) ¹⁵
Security	HP Chassis Intrusion Sensor; TPM 1.2 certified; HP Keyed Cable Lock (optional)
Power	850 W 88% efficient, wide-ranging, active PFC; 1125 W 90% efficient, wide-ranging, active PFC
Dimensions (W x D x H)	8 x 20.7 x 17.5 in 20.3 x 52.5 x 44.4 cm
Weight	46.7 lb 21.1 kg (Exact weight depends upon configuration.)
Energy Efficiency Compliance	ENERGY STAR® certified and EPEAT® registered configurations available ¹³
Environmental Certification	Low halogen ¹⁴
Compatible Displays	All HP Z Displays and HP DreamColor Displays are supported. For more information see www.hp.com/go/zdisplays .
Warranty	Protected by HP Services, including a 3 years parts, 3 years labor, and 3 years onsite service (3/3/3) standard limited warranty. Certain restrictions. 24/7 operation will not void the HP warranty.

HP Z840 Workstation

Recommended accessories and services (not included)

HP Z24n 24-inch Narrow Bezel IPS Display



Create a seamless 16:10 multi-display¹ setup with the HP Z24n Narrow Bezel IPS Display, which has a virtually borderless screen for maximum impact imagery, factory color calibration to ensure optimal color accuracy, and flexible connectivity for all of your devices.

Product number: K7B99A8

NVIDIA Quadro GP100 16GB Graphics



Validate designs, test ideas, simulate solutions, and realize results fast with the graphics and compute capabilities of the NVIDIA[®] Quadro[®] GP100 workstation graphics card, designed for the most demanding professional users and powered by the NVIDIA Pascal[™] GPU and higher-bandwidth memory.

Product number: 1ZE81AA

HP Z Turbo Drive 512GB PCIe Solid State Drive



Reduce boot up, calculation, and graphics response times (even with 4K video) and revolutionize how your HP Z Workstation handles large files with the HP Z Turbo Drive PCIe Solid State Drive, a remarkably affordable and innovative storage solution.

Product number: G3G89AA

HP 4TB SATA 7200 Hard Drive



Expand your workstation storage with the HP 4 TB SATA 7200 HDD,¹ an excellent solution for high capacity applications.

Product number: K4T76AA

HP Thunderbolt 2-Port AiO Module



Ultra-fast backup, editing, and file sharing, while reducing your time on tasks on select HP Z Workstations¹ with this 2-port module driven by Thunderbolt[™] 2 technology.² Power through projects with data transfer speeds nearly 4x that of USB 3.0.

Product number: E5Z73AA

HP 5 year Next Business Day Onsite with Defective Media Retention



Defective Media Retention (DMR) allows you to keep your hard drive if it is defective and requires replacement while under warranty. You maintain control of your sensitive data, and dispose of the defective media in a way that meets your security standards

Product number: UE344E

Messaging Footnotes

- ¹ Not all features are available in all editions or versions of Windows. Systems may require upgraded and/or separately purchased hardware, drivers, software or BIOS update to take full advantage of Windows functionality. Windows 10 is automatically updated, which is always enabled. ISP fees may apply and additional requirements may apply over time for updates. See <http://www.microsoft.com>.
- ² Multi-Core is designed to improve performance of certain software products. Not all customers or software applications will necessarily benefit from use of this technology. 64-bit computing system required. Performance will vary depending on your hardware and software configurations. Intel's numbering is not a measurement of higher performance.
- ³ Sold separately or as optional features.
- ⁵ Thunderbolt is an optional or add-on feature. Thunderbolt cable and Thunderbolt device (sold separately) must be compatible with Windows. To determine whether your device is Thunderbolt Certified for Windows, see <https://thunderbolttechnology.net/products>.
- ⁶ Support for up to eight displays requires purchase of two graphics cards that support up to 4 displays simultaneously. Displays sold separately.
- ⁷ HP Performance Advisor requires Windows and Internet access.
- ⁸ Requires Windows operating system.
- ⁹ Third party management software sold separately.

Technical Specifications Footnotes

- ¹ Not all features are available in all editions or versions of Windows. Systems may require upgraded and/or separately purchased hardware, drivers, software or BIOS update to take full advantage of Windows functionality. Windows 10 is automatically updated, which is always enabled. ISP fees may apply and additional requirements may apply over time for updates. See <http://www.microsoft.com>.
- ² This system is preinstalled with Windows 7 Professional software and also comes with a license and media for Windows 10 Pro software. You may only use one version of the Windows software at a time. Switching between versions will require you to uninstall one version and install the other version. You must back up all data (files, photos, etc.) before uninstalling and installing operating systems to avoid loss of your data.
- ³ Not all features are available in all editions or versions of Windows. Systems may require upgraded and/or separately purchased hardware, drivers, software or BIOS update to take full advantage of Windows functionality. See <http://www.microsoft.com>.
- ⁵ Multi-Core is designed to improve performance of certain software products. Not all customers or software applications will necessarily benefit from use of this technology. 64-bit computing system required. Performance will vary depending on your hardware and software configurations. Intel's numbering is not a measurement of higher performance.
- ⁶ Some vPro functionality of this technology, such as Intel® Active management technology and Intel Virtualization technology, requires additional 3rd party software in order to run. Availability of future "virtual appliances" applications for Intel vPro technology is dependent on 3rd party software providers. Microsoft Windows required.
- ⁷ For hard drives and solid state drives, 1 GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 30 GB of system disk is reserved for system recovery software.
- ⁸ Duplication of copyrighted material is strictly prohibited. Actual speeds may vary. Double Layer media compatibility will widely vary with some home DVD players and DVD-ROM drives. Note that DVD-RAM cannot read or write to 2.6GB Single Sided/5.2 Double Sided-Version 1.0 Media.
- ⁹ With Blu-Ray, certain disc, digital connection, compatibility and/or performance issues may arise, and do not constitute defects in the product. Flawless playback on all systems is not guaranteed. In order for some Blu-ray titles to play, they may require a DVI or HDMI digital connection and your display may require HDCP support. HD-DVD movies cannot be played on this Desktop PC.
- ¹⁰ For systems installed with Microsoft Windows 7 (Ultimate, Enterprise or Professional), the maximum accessible system memory is 192 GB. For systems installed with Microsoft Windows 8.x (Enterprise or Pro), the maximum accessible system memory is 512 GB.
- ¹¹ Wireless cards are optional or add-on features and requires separately purchased wireless access point and internet service. Availability of public wireless access points limited.
- ¹² Optional or add-on feature
- ¹³ EPEAT® registered where applicable. EPEAT registration varies by country. See www.epeat.net for registration status by country.
- ¹⁴ External power supplies, power cords, cables and peripherals are not low halogen. Service parts obtained after purchase may not be low halogen.
- ¹⁵ HP Performance Advisor and HP Remote Graphics Software requires Windows and an internet connection.
- ¹⁶ HP VR Ready Configurations available

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4AA6-4212ENUC September 2017



Attachment 6 – HP Z840 Workstation QuickSpecs



Overview

HP Z840 Workstation



- | | |
|-------------------------------|---|
| 1. Slimline Optical Drive Bay | 4. HDD Activity LED |
| 2. 2 External 5.25" Bays | 5. Front I/O: 4 USB 3.0 (Top Port has Charging Capability), 1 Headset, 1 Microphone |
| 3. Power Button | |

Overview



6. Choice of 850W, 88% or 1125W, 90% Efficient Power Supplies

7. 16 DIMM Slots for DDR4 ECC Memory

8. 2 External 5.25" Bays

9. 4 Internal 3.5" Bays

10. Rear I/O:

Rear Power Button

4 USB 3.0

2 USB 2.0

1 Serial

PS/2 keyboard and mouse

2 RJ-45 to integrated Gigabit LAN

1 Audio Line-In (can be retasked as microphone)

1 Audio Line-Out

11. 2 Intel Xeon Processors E5-2600 v3/v4 family

12.

- Slot 1: PCIe Gen3 x4
- Slot 2: PCIe Gen3 x16
- Slot 3: PCIe Gen3 x8 - Available ONLY when 2nd processor is installed
- Slot 4: PCIe Gen3 x16 - Available ONLY when 2nd processor is installed
- Slot 5: PCIe Gen2 x4 when 1 CPU is installed. Transforms to PCIe Gen3 x8 when 2nd CPU is installed
- Slot 6: PCIe Gen3 x16
- Slot 7: PCIe Gen2 x1

13. 6 SATA, 8 SAS Ports

14. 2 USB 2.0 Port, 1 USB 3.0 Port

Overview

Overview

Form Factor

Rackable Tower

Operating Systems

Preinstalled:

- Windows 10 Pro 64-bit
- Windows 10 Pro 64 to Windows 7 Professional 64-bit
- Windows 10 Home 64 High-end
- Windows 7 Professional 64-bit
- Windows 8.1 Pro 64-bit OS
- HP Installer Kit for Linux (includes drivers for 64-bit OS versions of RHEL 6 & 7, SUSE Linux Enterprise Desktop 11 and Ubuntu 14.04)
- Red Hat Enterprise Linux Desktop (RHEL) Workstation (Paper license with 1 year support; no preinstalled OS)

Supported:

- Windows 8/8.1 Enterprise 64-bit
- Windows 7 Enterprise 64-bit
- Ubuntu 14.04
- Red Hat Enterprise Linux Desktop 6, 7
- SUSE Linux Enterprise Desktop 11 SP3, 12

NOTES: For detailed OS/hardware support information for Linux, see:

http://www.hp.com/support/linux_hardware_matrix

Available Processors

Name	Clock Speed (GHz)	Cores	Cache (MB)	Memory Speed (MT/s)	QPI Speed (GT/s)	Hyper Threading	Featuring Intel® vPro™ Technology	Intel® Turbo Boost Technology ¹	TDP (W)
Intel® Xeon® E5-2643 v3 processor	3.4	6	20	2133	9.6	YES	YES	2/3	135
Intel® Xeon® E5-2630 v3 processor	2.4	8	20	1866	8.0	YES	YES	2/8	85
Intel® Xeon® E5-2620 v3 processor	2.4	6	15	1866	8.0	YES	YES	2/8	85
Intel® Xeon® E5-2699 v4 processor	2.2	22	55	2400	9.6	YES	YES	YES	145
Intel® Xeon® E5-2697 v4 processor	2.3	18	45	2400	9.6	YES	YES	YES	145
Intel® Xeon® E5-2695 v4 processor	2.1	18	45	2400	9.6	YES	YES	YES	120
Intel® Xeon® E5-2687W v4 processor	3.0	12	30	2400	9.6	YES	YES	YES	160
Intel® Xeon® E5-2690 v4 processor	2.6	14	35	2400	9.6	YES	YES	YES	135
Intel® Xeon® E5-2667 v4 processor	3.2	8	25	2400	9.6	YES	YES	YES	135
Intel® Xeon® E5-2683 v4 processor	2.1	16	40	2400	9.6	YES	YES	YES	120
Intel® Xeon® E5-2680 v4 processor	2.4	14	35	2400	9.6	YES	YES	YES	120
Intel® Xeon® E5-2643 v4 processor	3.4	6	20	2400	9.6	YES	YES	YES	135
Intel® Xeon® E5-2660 v4 processor	2.0	14	35	2400	9.6	YES	YES	YES	105
Intel® Xeon® E5-2650 v4 processor	2.2	12	30	2400	9.6	YES	YES	YES	105

Overview

Intel® Xeon® E5-2637 v4 processor	3.5	4	15	2400	9.6	YES	YES	YES	135
Intel® Xeon® E5-2640 v4 processor	2.4	10	25	2133	8.0	YES	YES	YES	90
Intel® Xeon® E5-2630 v4 processor	2.2	10	25	2133	8.0	YES	YES	YES	85
Intel® Xeon® E5-2623 v4 processor	2.6	4	10	2133	8.0	YES	YES	YES	85
Intel® Xeon® E5-2620 v4 processor	2.1	8	20	2133	8.0	YES	YES	YES	85
Intel® Xeon® E5-2609 v4 processor	1.7	8	20	1866	6.4	NO	YES	N/A	85
Intel® Xeon® E5-2603 v4 processor	1.7	6	15	1866	6.4	NO	YES	N/A	85

¹The specifications shown in this column represent the following: (all core maximum turbo steps, one core maximum turbo steps). Turbo boost stepping occurs in 100MHz increments. Processors that do not have turbo functionality are denoted as N/A. E5-2687Wv3, E5-2690v3, E5-2695v3, E5-2697v3 and E5-2699v3 REQUIRE the 1125W (1450W at 200V Input Voltage) Power Supply Option.

Disclaimers

When ordering two processors, the second processor must be the same as the first. Intel processor numbers are not a measurement of higher performance. Processor numbers differentiate features within each processor family, not across different processor families. See: http://www.intel.com/products/processor_number/ for details.

Quad-Core, Six-Core, Eight-Core, 10-Core, 12-Core, 14-Core, 16-Core, 18-core and 22-Core technologies are designed to improve performance of multithreaded software products and hardware-aware multitasking operating systems and may require appropriate operating system software for full benefits; check with software provider to determine suitability; Not all customers or software applications will necessarily benefit from use of these technologies.

64-bit computing on Intel® 64 architecture requires a computer system with a processor, chipset, BIOS, operating system, device drivers, and applications enabled for Intel® 64 architecture. Processors will not operate (including 32-bit operation) without an Intel® 64 architecture-enabled BIOS. Performance will vary depending on your hardware and software configurations. See: <http://www.intel.com/info/em64t> for more information.

Intel® Xeon® processors E5-2643v3 REQUIRES the 1125W (1450W at 200V Input Voltage) Power Supply Option.

Intel® Xeon® processors E5-2637v4, E5-2643v4, E5-2680v4, E5-2683v4, E5-2667v4, E5-2687Wv4, E5-2690v4, E5-2695v4, E5-2697v4 and E5-2699v4 REQUIRE the 1125W (1450W at 200V Input Voltage) Power Supply Option.

Form Factor

Tower

Color

Black /Hematite

I/O Slots (see system board section for more details)

Slot 1: PCIe Gen3 x4
 Slot 2: PCIe Gen3 x16
 Slot 3: Gen3 x8 - Available ONLY when 2nd processor is installed
 Slot 4: Gen3 x16 - Available ONLY when 2nd processor is installed
 Slot 5: PCIe Gen2 x4 when 1 CPU is installed. Transforms to PCIe Gen3 x8 when 2nd CPU is installed
 Slot 6: PCIe Gen3 x16
 Slot 7: PCIe Gen 2x1

The PCIe x8 connectors are open ended, allowing a PCIe x16 card to be seated in the slot.

Overview

Bays (see storage section for more details)	Total Bays = 7 4 Internal 3.5" storage bays 2 External 5.25" bays 1 External Slim-line Optical bay
Internal Bays	4 internal 3.5" bays (All 4 include acoustic dampening rail assemblies)
External Bays	2 external 5.25" bays <ul style="list-style-type: none">• Top bay device depth limit: 206mm• Bottom bay device depth limit: 206mm
Front I/O	<ul style="list-style-type: none">• 4 USB 3.0• 1 Combo Headset• 1 Microphone
Rear I/O	<ul style="list-style-type: none">• 4 USB 3.0• 2 USB 2.0• 1 Serial• PS/2 keyboard and mouse• 2 RJ-45 to integrated Gigabit LAN• 1 Audio Line-In (can be retasked as microphone)• 1 Audio Line-Out
Internal USB	<ul style="list-style-type: none">• 2 USB 2.0 ports available with a single 2x5 header.• 1 USB 3.0 port available with a shrouded 20-pin connector.

The 2x5 header can be converted to a standard (Type-A) USB connector through the use one HP Internal USB Port Kit (EM165AA). This port kit uses one half of the 2x5 header.

Chassis Dimensions (H x W x D)	Footprint Dimensions: H: 17.5" [444.5mm] W: 8.0" [203.2mm] D: 20.7" [525.8mm] (measured to the rear of service panel) Maximum Dimensions: H: 17.5" [444.5mm] W: 8.0" [203.2mm] D: 20.9" [530.9mm] (measured to the embossment for the rear chassis fans) Rack Dimensions: 5U
---------------------------------------	--

System Weight	Exact weights depend upon configuration. <ul style="list-style-type: none">• Minimum config: 21.1kg (46.7lbs.)• Typical config: 22.8kg (50.4lbs.)• Maximum config: 29.2kg (64.3lbs.)
----------------------	--

Temperature	Operating: 5° to 35°C (40° to 95°F) Non-operating: -40° to 70°C (-40° to 158°F)
--------------------	--

Humidity	Operating: 8% to 85% Non-operating: 8% to 90%
-----------------	--

Overview

Operating: 3,000 m; 10,000 feet
Non-operating: 9,100 m; 30,000 feet

Maximum Altitude (non-pressurized) Operating: 3,048m (10,000feet)
Non-operating: 9,100m (30,000feet)

Power Supply Choice of:

- 850W 88% Efficient wide-ranging, active Power Factor Correction
- 1125W 90% Efficient wide-ranging, active Power Factor Correction

Includes three 6-pin graphics power cables.

NOTE: The 1125W (1450W at 200V Input Voltage) power supply can also supply 1275W of output power when the input voltage is greater than 105V. If the input voltage is less than 105V, but greater than 90V for any reason, the maximum power that can be drawn is 1125W. An uninterruptible power supply (UPS) is highly recommended if 1275W output power is desired.

The 1125W Power Supply can also supply 1450W of output power when the input voltage is greater than 200V under all conditions.

The Z820 power supply efficiency reports can be found at these links:

850W - http://www.plugloadsolutions.com/psu_reports/HEWLETT%20PACKARD_719798-001_850W_ECOS%203882_Report.pdf

1125W - http://www.plugloadsolutions.com/psu_reports/HEWLETT%20PACKARD_719799-001_1125W_ECOS%203883_Report.pdf

Interfaces Supported

- 6 channel SATA 6.0 Gb/s interface
- 8-channel 6 Gb SAS interface
 - 8 SAS connectors on the motherboard, SAS ports can be ported externally by using the SAS Bulkhead and/or Back Panel connector Kits
- Factory integrated RAID available for SATA/SAS drives (RAID 0, 0 Data, 1, 5*, and 10)
- USB 3.0, USB 2.0

***NOTE:** Controller card required to support SAS RAID 5

Hard Drive Controller Supported SATA and SAS controllers

Workstation ISV Certifications See the latest list of certifications at <http://www.hp.com/united-states/campaigns/workstations/partnerships.html>

Supported Components

Processors*

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
Z840 Intel® Xeon® E5-2600 v3 Series CPU				
Xeon E5-2620 v3 2.4 1866 6C CPU	Y	Y	J9V75AA	
Xeon E5-2630 v3 2.4 1866 8C CPU	Y	Y	J9Q17AA	
Xeon E5-2643 v3 3.4 2133 6C CPU	Y	Y	J9Q12AA	
Z840 Intel® Xeon® E5-2600 v4 Series CPU				
Z840 Xeon E5-2623 v4 2.6 2133 4C 2ndCPU	Y	Y	T9U30AA	
Z840 Xeon E5-2620 v4 2.1 2133 8C 2ndCPU	Y	Y	T9U29AA	
Z840 Xeon E5-2637 v4 3.5 2400 4C 2ndCPU	Y	Y	T9U32AA	
Z840 Xeon E5-2699 v4 2.2 2400 22C 2ndCPU	Y	Y	T9U44AA	
Z840 Xeon E5-2697 v4 2.3 2400 18C 2ndCPU	Y	Y	T9U43AA	
Z840 Xeon E5-2683 v4 2.1 2400 16C 2ndCPU	Y	Y	T9U39AA	
Z840 Xeon E5-2680 v4 2.4 2400 14C 2ndCPU	Y	Y	T9U38AA	
Z840 Xeon E5-2643 v4 3.4 2400 6C 2ndCPU	Y	Y	T9U34AA	
Z840 Xeon E5-2640 v4 2.4 2133 10C 2ndCPU	Y	Y	T9U33AA	
Z840 Xeon E5-2609 v4 1.7 1866 8C 2ndCPU	Y	Y	T9U28AA	
Z840 Xeon E5-2603 v4 1.7 1866 6C 2ndCPU	Y	Y	T9U27AA	
Z840 Xeon E5-2690 v4 2.6 2400 14C 2ndCPU	Y	Y	T9U41AA	
Z840 Xeon E5-2650 v4 2.2 2400 12C 2ndCPU	Y	Y	T9U35AA	
Z840 Xeon E5-2630 v4 2.2 2133 10C 2ndCPU	Y	Y	T9U31AA	
Z840 Xeon E5-2687W v4 3.0 2400 12C 2ndCPU	Y	Y	T9U40AA	
Z840 Xeon E5-2660 v4 2.0 2400 14C 2ndCPU	Y	Y	T9U36AA	
Z840 Xeon E5-2667 v4 3.2 2400 8C 2ndCPU	Y	Y	T9U37AA	
Z840 Xeon E5-2695 v4 2.1 2400 18C 2ndCPU	Y	Y	T9U42AA	

Intel® Xeon® processors E5-2643v3 REQUIRES the 1125W (1450W at 200V Input Voltage) Power Supply Option.

Intel® Xeon® processors E5-2637v4, E5-2643v4, E5-2680v4, E5-2683v4, E5-2667v4, E5-2687Wv4, E5-2690v4, E5-2695v4, E5-2697v4 and E5-2699v4 require the 1125W (1450W at 200V Input Voltage) Power Supply Option.

When ordering two processors, the second processor must be the same as the first. Intel processor numbers are not a measurement of higher performance. Processor numbers differentiate features within each processor family, not across different processor families.

Monitors / Displays

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
HP Z Display Z27n 27-inch IPS LED Backlit Monitor		Y	K7C09A8#ABA	
HP Z Display Z25n 25-inch IPS LED Backlit Monitor		Y	K7C01A8#ABA	
HP Z Display Z24n 24-inch IPS LED Backlit Monitor		Y	K7B99A8#ABA	
HP Z Display Z24nq 23.8-inch IPS Backlit Monitor		Y	L1K59A8#ABA	
HP Z Display Z24nf 23.8-inch IPS Backlit Monitor		Y	K7C00A8#ABA	

Supported Components

HP Z Display Z23n 23-inch IPS LED Backlit Monitor	Y	M2J79A8#ABA
HP Z Display Z22n 21.5-inch IPS LED Backlit Monitor	Y	M2J71A8#ABA
HP DreamColor LP2480zx Professional Display	Y	GV546A8

Storage / Hard Drives

Sub-Section Description/Notes

NOTES: NCQ (Native Command Queuing) not supported in Red Hat Enterprise Linux
For hard drives, 1 GB = 1 billion bytes; TB = 1 trillion bytes. Actual formatted capacity is less. Up to 12 GB of hard drive (or system disk) is reserved for the system recovery software (XP and XP Pro). Up to 3 GB of system disk is reserved for system recovery software (Vista).

SAS Hard Drives

SAS Hard Drives for HP Workstations	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
300GB SAS 15K rpm 6Gb/s 3.5" HDD	Y	Y	LU967AA	
HP 300GB SAS 10K SFF HDD	Y	Y	A2Z20AA	
HP 600GB SAS 10K SFF HDD	Y	Y	A2Z21AA	
HP 1.2TB SAS 10K SFF HDD	Y	Y	E2P04AA	
Up to 5 3.5" SATA drives supported Up to 5 3.5" SAS drives supported				
Up to 8 2.5" (SFF) SAS drives with the High Density Storage Option or Up to 8 2.5" (SFF) SATA 2.5" drives with the High Density Storage Option 8 port SAS Controller included on the system board				

SATA Hard Drives

SATA Hard Drives for HP Workstations	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
4TB SATA 7200 rpm 6Gb/s 3.5" HDD HDD (Enterprise Class)	Y	Y	K4T76AA	
3.0TB* SATA 7200 rpm 6Gb/s 3.5" HDD	Y	Y	QF298AA	
2.0TB* SATA 7200 rpm 6Gb/s 3.5" HDD	Y	Y	QB576AA	
1TB* SATA 7200 rpm 6Gb/s 3.5" HDD	Y	Y	LQ037AA	
1TB SATA 7200 rpm 6Gb/s 3.5" HDD (Enterprise Class)	Y	Y	WOR10AA	
500GB* SATA 7200 rpm 6Gb/s 3.5" HDD	Y	Y	LQ036AA	
500GB* SATA 7.2K SED SFF HDD	Y	N	(not available today as After Market Option)	
1TB SATA 7200 rpm 8GB 3.5" SSHD (hybrid)	Y	Y	M7S54AA	
Up to 5 3.5" SATA drives supported Up to 5 3.5" SAS drives supported				
Up to 8 2.5" (SFF) SAS drives with the High Density Storage Option or Up to 8 2.5" (SFF) SATA 2.5" drives with the High Density Storage Option Up to 5 3.5" SATA drives supported				

Supported Components

Up to 5 3.5" SAS drives supported

Up to 8 2.5" (SFF) SAS drives with the High Density Storage Option or
Up to 8 2.5" (SFF) SATA 2.5" drives with the High Density Storage Option

SATA Solid State Drives	SATA SSDs for HP Workstations	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
	HP 128GB* SATA 6Gb/s SSD	Y	Y	A3D25AA	
	HP 256GB* SATA 6Gb/s SSD	Y	Y	A3D26AA	
	HP 512GB* SATA 6Gb/s SSD	Y	Y	D8F30AA	
	HP 1TB* SATA 6Gb/s SSD	Y	Y	F3C96AA	
	HP 2TB SATA 6Gb/s SSD	Y	Y	Y6P08AA	
	HP Enterprise Class 240GB SATA SSD	Y	Y	T3U07AA	
	HP Enterprise Class 480GB SATA SSD	Y	Y	T3U08AA	
	HP 256GB* SATA 6Gb/s SED Opal 1 SSD	Y	Y	G7U67AA	Note 1
	HP 512GB SATA SED SSD	Y	Y	N8T26AA	

NOTE 1:

The 256GB Self-Encrypting Drive (SED) version has similar performance to the standard 256GB SSD. It is also available in Opal 1.0 and Opal 2.0 versions

Up to 8 SATA SSD drives supported with the High Density Storage Option

Supported Components

PCIe Solid State Drives	PCIe SSDs for HP Workstations	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
	HP Z Turbo Drive G2 512GB SSD	Y	Y	M1F74AA	
	HP Z Turbo Drive G2 256GB SSD	Y	Y	M1F73AA	
	HP Z Turbo Drive G2 1TB SSD	Y	Y	T9H98AA	
	HP Z Turbo Drive				
	HP Z Turbo Drive G2 256GB SED SSD	Y	Y	Y1T55AA	
	HP Z Turbo Drive G2 1TB TLC SSD	Y	Y	Y1T52AA	
	HP Z Turbo Drive G2 256GB TLC SSD	Y	Y	Y1T46AA	
	HP Z Turbo Drive G2 512GB TLC SSD	Y	Y	Y1T49AA	
	HP Z Turbo Drive Quad Pro 256GB SSD module	Y	Y	N2M00AA	
	HP Z Turbo Drive Quad Pro 512GB SSD module	Y	Y	N2M01AA	
	HP Z Turbo Drive Quad Pro				
	HP Z Turbo Drive Quad Pro 256GB SSD module	Y	Y	N2M00AA	
	HP Z Turbo Drive Quad Pro 512GB SSD module	Y	Y	N2M01AA	
	HP Z Turbo Drive Quad Pro 1TB SSD module	Y	Y	T9J00AA	
	HP Z Turbo Drive Quad Pro 2x256GB PCIe SSD	Y	Y	N2M98AA	
	HP Z Turbo Drive Quad Pro 2x512GB PCIe SSD	Y	Y	N2M99AA	
	HP Z Turbo Drive Quad Pro 2x1TB PCIe SSD	Y	Y	T9H99AA	
	Intel 750 Series AIC				
	Intel 750 Series AIC 400GB PCIe SSD	Y	Y	Y4A61AV	
	Intel 750 Series AIC 800GB PCIe SSD	Y	Y	Y4A62AV	
	Intel 750 Series AIC 1.2TB PCIe SSD	Y	Y	Y4A63AV	

*For storage drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 30GB of system disk is reserved for system recovery software.

Supported Components

HP 4-Bay SAS-SATA 2.5in High Density Storage Kit

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
HP 4-Bay SAS-SATA 2.5in High Density Storage Kit		Y	K5J28AA	
<p>This kit converts two of the native 3.5" HDD bays to enable four SFF (2.5") HDDs or SSDs. Once the kit is installed, it enables independent, tool-free access for these SFF drives. Enterprise class SAS HDDs (15mm) are also supported. Up to two modules are supported in the Z840, which enables up to 8 SFF drives to be added to the internal section of the Z840. HDDs and SSDs are supported with up to 6Gb/s bandwidth.</p>				

Notes:

For a video installation guide, please see <http://www2.hp.com/index.html>

The installation guide can also be accessed in the Maintenance and Service Guide for your workstation at http://www.hp.com/support/workstation_manuals

HDD Carrier

HP 4-in-1 SFF (2.5 in) HDD Carrier

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
HP 4-in-1 SFF (2.5 in) HDD Carrier*		Y	B8K60AA	
<p>* For the Z440, Z640, and Z840, the carrier can be installed in any of the 5.25" ODD bays.</p>				

Notes:

Additional controllers may be required to support the additional drives located in this carrier.

This kit includes an additional 4 carriers which can be mounted to drives for easy external access and transfer of data between systems.

Hard Drive Controllers

Factory integrated RAID on motherboard for SATA drives

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
RAID 0 Configuration – Striped Array	Y	N		Note 1
RAID 0 Data Configuration -- Boot/OS Drive + 2 Drive Striped Array	Y	N		Note 2
RAID 1 Configuration – Mirrored Array	Y	N		Note 3
RAID 10 Configuration - Striped/Mirrored Array	Y	N		
RAID 5 Configuration - Parity Array	Y	N		Note 4
HP SAS Back Panel Connector kit	Y	Y		

Must have 4 or fewer SAS hard drives to configure this option

HP SAS Back Panel Bulkhead Connector Kit

HP SAS Back Panel Connector kit required. Internal SAS HD drives are not supported

LSI iBBU09 Battery Backup Unit	Y	Y	E0X19AA	
LSI 9270-8i SAS 6Gb/s ROC RAID Card	Y	Y	E0X21AA	
Integrated LSI SAS 2308 Controller with RAID 0/1/1E/10	Y	N		
Integrated SATA 6.0 Gb/s Controller	Y	N		

Integrated RAID for PCIe SSDs

Supported Components

RAID 0 Data Configuration	Y	N	Not available for Boot RAID Configurations
---------------------------	---	---	--

NOTE 1: Minimum of 2 storage drives needed. All drives must be identical (size/speed/type/bus/functional capabilities). Must have 2, 3 or 4 storage Drives.

NOTE 2: Minimum of 3 SATA hard drives needed. All hard drives must be identical (size/speed/type/bus/functional capabilities).

At least 3 HD Drives required. May have 4th and 5th HD Drives. Drives must be the same drive (size/speed/type/functional capability).

NOTE 3: 2 storage drives required. All hard drives must be identical (size/speed/type/bus/functional capabilities).

NOTE 4: Minimum of 3 storage drives needed. All drives must be identical (size/speed/type/bus/functional capabilities). SAS controller card required to support SAS RAID 5

NOTE: SATA hardware RAID is supported on Linux systems that have support for the Intel RSTe technology. The Linux kernel, with built-in software RAID, provides excellent functionality and performance. It is a good alternative to hardware-based RAID. Please visit http://www.hp.com/support/linux_hardware_matrix for RAID capabilities with Linux.

LSI RAID Definitions:

IS: Striping of 2 or more HDDs into a single logical volume

IM: Mirroring of 2 HDDs into a single logical volume

IME: Mirroring of 3 or more HDDs into a single logical volume

NOTE: Specific user-configured hardware SAS RAID configurations are supported on this Linux system. Please visit: http://www.hp.com/support/linux_hardware_matrix for details

Supported Components

Graphics

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes	Supported # of cards
Professional 2D					
NVIDIA NVS 310 1GB Graphics	Y	Y	M6V51AA	Note 1	3
NVIDIA NVS 315 1GB Graphics (for HP Workstations)	Y	Y	E1U66AA	Note 1	4
NVIDIA NVS 510 2GB Graphics	N	Y	C2J98AA	Note 2	2
Entry 3D					
NVIDIA® Quadro® K420 2GB Graphics	Y	Y	N1T07AA		2
NVIDIA® Quadro® K620 2GB Graphics	Y	Y	J3G87AA		2
NVIDIA® Quadro® P600 2GB Graphics	Y	Y	1ME42AA		2
AMD FirePro W2100 2GB Graphics	Y	Y	J3G91AA		2
Mid-range 3D					
NVIDIA® Quadro® K1200 4GB Graphics	Y	Y	L4D16AA		3
NVIDIA® Quadro® K2200 4GB Graphics	Y	Y	J3G88AA		2
NVIDIA® Quadro® M2000 4GB Graphics	Y	Y	T7T60AA		2
NVIDIA® Quadro® P2000 5GB Graphics	Y	Y	1ME41AA		2
AMD FirePro W4300 4GB Graphics	Y	Y	T7T58AA		2
AMD FirePro W5100 4GB Graphics	Y	Y	J3G92AA		2
Radeon Pro™ WX4100 4GB 1st GFX Graphics	Y	Y	Z0B15AA		1
High End 3D					
NVIDIA® Quadro® M4000 8GB Graphics	Y	Y	M6V52AA		3
NVIDIA® Quadro® M5000 8GB Graphics	Y	Y	M6V53AA		3
NVIDIA® Quadro® M6000 12 GB Graphics	Y	Y	L2K02AA		2
NVIDIA® Quadro® M6000 24GB Graphics	Y	Y	T7T61AA		2
NVIDIA® Quadro® P4000 8GB Graphics	Y	Y	1ME40AA		2
NVIDIA® Quadro® P5000 16GB Graphics	Y	Y	Z0B13AA		3
AMD FirePro W7100 8GB Graphics	Y	Y	J3G93AA		2
Radeon Pro™ WX7100 8GB Graphics*	Y	Y	Z0B14AA		3
Ultra 3D					
NVIDIA® Quadro® GP100 16GB Graphics	Y	Y	1ZE81AA		2
NVIDIA® Quadro® P6000 24GB Graphics	Y	Y	Z0B12AA		2
NVIDIA® Quadro® Sync II	Y	Y	1WT20AA		

For configurations not listed in this specification, please contact the factory for review

NOTE 1: 3rd and 4th graphics possible by using Option Kits.

NOTE 2: NVIDIA NVS 510 graphics available by using Option Kits only.

Supported Components

Memory

CTO

	DDR4-2133 ECC Registered DIMMs	Option Kit Part Number	Support Notes
	16GB DDR4-2133 ECC Registered RAM	J9P83AA	
	8GB DDR4-2133 ECC Registered RAM	J9P82AA	
	DDR4-2400 ECC Registered DIMMs		
	HP 64GB (1x64GB) DDR4-2400 ECC LR RAM	T9V42AA	
	HP 32GB (1x32GB) DDR4-2400 ECC Reg RAM	T9V41AA	
	HP 8GB (1x8GB) DDR4-2400 ECC Reg RAM	T9V39AA	
	HP 16GB (1x16GB) DDR4-2400 ECC Reg RAM	T9V40AA	
	HP 4GB (1x4GB) DDR4-2400 ECC Reg RAM	T9V38AA	

NOTES:

For details on the supported memory configurations on the HP Z840 Workstation, please refer to the System Technical Specifications - System Board section of this document.

DIMMs should be equally distributed across all four memory channels for optimal performance.

Each processor supports up to 4 channels of DDR4 memory. To realize full performance at least 1 DIMM must be inserted into each channel.

The CPUs determine the speed at which the memory is clocked. For example, if a 1600MT/s capable CPU is used in the system, the maximum speed the memory will run at is 1600MT/s regardless of the specified speed of the memory.

MT/s = Million Transfers per second

You cannot intermix LR DIMMs with Registered DIMMs. The system will not work.

The Z840 is designed to work ONLY with DDR4 memory. The system will not work with DDR3 memory.

NOTE: Factory-configured CTO (xxxxxAV) and aftermarket AMO (xxxxxAA, xxxxxAT) HP memory part numbers designated as “2133” will be transitioned to using 2400MHz speed memory components. This does not affect HP part number availability nor does it affect system performance or operation. All hardware configurations currently supporting HP memory part numbers designated as “2133” have been tested to work with 2400MHz memory and are fully-supported by HP under standard support terms.

Supported Components

Multimedia and Audio Devices

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
HP Thin USB Powered Speakers	N	Y	KK912AA	
Integrated IDT 92HD94 Audio	Y	N	NA	

Optical and Removable Storage

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
HP DX115 Removable Drive Enclosure				
HP DX115 Removable HDD Frame/Carrier	N	Y	FZ576AA	Note 1
HP DX115 Removable HDD Carrier	Y	Y	NB792AA	Note 2
HP 15-in-1 Media Card Reader				
HP 15-in-1 Media Card Reader	Y	Y	F4N90AA	
HP SlimTray Optical Drives				
HP 9.5mm Slim DVD Writer	Y	Y	K3R64AA	
HP 9.5mm Slim DVD-ROM Drive	Y	Y	K3R63AA	Note 3
HP 9.5mm Slim BDXL Blu-Ray Writer	Y	Y	K3R65AA	Note 4

Actual speeds may vary. Does not permit copying of commercially available DVD movies or other copyright protected materials. Intended for creation and storage of your original material and other lawful uses. Double Layer discs can store more data than single-layer DVD drives and players.

In order for some Blu-ray titles to play, they may require a DVI or HDMI digital connection and your display may require HDCP support. HD-DVD movies cannot be played on this workstation.

NOTE 1: Z840 support is for two DX115, in both of the 5.25" ODD bays.

NOTE 2: Carrier requires the workstation to have the DX115 frame installed. This part number is for the carrier only.

NOTE 3: Not supported as a 2nd Optical Drive

NOTE 4: Cannot be ordered in combination with another Blu-ray Writer drive.

Controller Cards

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
HP IEEE 1394b FireWire® PCIe Card	Y	Y	NK653AA	
HP Thunderbolt™-2 PCIe 1-port I/O Card*	Y	Y	F3F43AA	

Networking and Communications

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
HP X520 10GbE Dual Port Adapter	Y	Y	C3N52AA	
HP 10GbE SFP+ SR Transceiver	Y	Y	C3N53AA	
Intel® Ethernet I210-T1 PCIe NIC	Y	Y	E0X95AA	

Supported Components

Intel® 7260 802.11 a/b/g/n PCIe WLAN NIC	N	Y		
Integrated Intel I210AT PCIe GbE Controller	Y	N		Note 1
Integrated Intel I218LM PCIe GbE Controller	Y	N		Note 1
HP 361T PCIe Dual Port Gigabit NIC	Y	Y	C3N37AA	Note 1
Intel® Ethernet I350-T4 4-port 1Gb NIC	N	Y	W8X25AA	Note 1

NOTE 1: "Gigabit" or "GbE" Ethernet indicates compliance with IEEE standard 802.3ab for Gigabit Ethernet, and does not connote actual operating speed of 1 Gb/sec. For high speed transmission, connection to a Gigabit Ethernet server and network infrastructure is required.

*Wireless access point and internet service required. Availability of public wireless access points limited.

Racking and Physical Security

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
Security Cable with Kensington Lock	N	Y	PC766A	
HP Chassis Intrusion Sensor	Y	N		Standard on all systems
HP Z6/8 Adjustable Rail Rack Kit, Flush Mount	N	Y	B8S55AA	
HP Keyed Cable Lock 10mm	N	Y	T1A62AA	

Input Devices

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
HP USB Smart Card Keyboard	Y	Y	ED707AA	
HP 2.4GHz Wireless Keyboard & Mouse	N	Y	NB896AA	
HP SpaceExplorer 3D USB Controller	N	Y	RY429AA	
HP SpacePilot 3D USB Intelligent Controller	N	Y	WH343AA	
HP PS/2 Keyboard	Y	Y	QY774AA	
HP PS/2 Mouse	Y	Y	QY775AA	
HP USB Keyboard	Y	Y	QY776AA	
HP USB Optical Mouse	Y	Y	QY777AA	
HP USB 1000dpi Laser Mouse	Y	Y	QY778AA	
3Dconnexion CAD Mouse	Y	Y	M5C35AA	
HP PS/2 Business Slim Keyboard	Y	Y	N3R86AA	
HP USB Business Slim Keyboard	Y	Y	N3R87AA	
HP Wireless Business Slim Keyboard	Y	Y		
HP USB Hardened Mouse	Y	Y	P1N77AA	

Supported Components

Other Hardware

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
HP Internal USB Port Kit	N	Y	EM165AA	Note 1
HP SAS Back Panel Connector Kit	N	Y	EM164AA	
HP eSATA PCI Cable Kit	Y	Y	GM110AA	Note 2
HP Power Cord Kit	Y	N		
HP Workstation Mouse Pad	Y	N		Japan Only
HP Optical Bay HDD Mounting Bracket	N	Y	NQ099AA	
HP ENERGY STAR® Qualified Configuration	Y	N		
HP 4-Bay SAS-SATA 2.5in High Density Storage Kit	Y	Y	K5J28AA	Note 3
Z840 HP Z Cooler	Y	Y	N3R54AA	

NOTE 1: The HP Internal USB Port kit has a single USB 2.0 type A connector.

NOTE 2: No hot plug / hot swap supported with eSATA

NOTE 3: The CTO option (J8J30AV) installs two of these kits to create room for 8 2.5" bays.

Software

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
HP Performance Advisor	Y	Y		Note 1
HP Remote Graphics Software (RGS) 6.0	Y	Y		Note 2
MS Office Home & Business 2013	Y	N		Note 3
Cyberlink PowerDVD and Power2Go	Y	N		
Foxit PhantomPDF Express	Y	N		

NOTE 1: Available as a free download here: www.hp.com/go/performanceadvisor

NOTE 2: Supports Windows 7, Windows 8.1, SLED 11, and RHEL v6.5

NOTE 3: Must be selected as a Configure to Order option. Delivered in the form of a "Drop in the Box" CD.

Operating Systems

	Support Notes
Windows 10 Pro 64	
Windows 10 Pro downgrade to Windows 7 Professional 64	
Windows 10 Home 64	Note 1
Windows 8.1 Pro 64-bit	
Genuine Windows® 7 Professional 64-bit	
HP Linux Installer Kit	
Red Hat Enterprise Linux (RHEL) Workstation - Paper License (1yr)	Note 2

NOTE 1: Windows 10 Home High-End, not supported with dual-processor configurations

NOTE 2: This second OS must be ordered with the HP Linux Installer Kit as the first OS

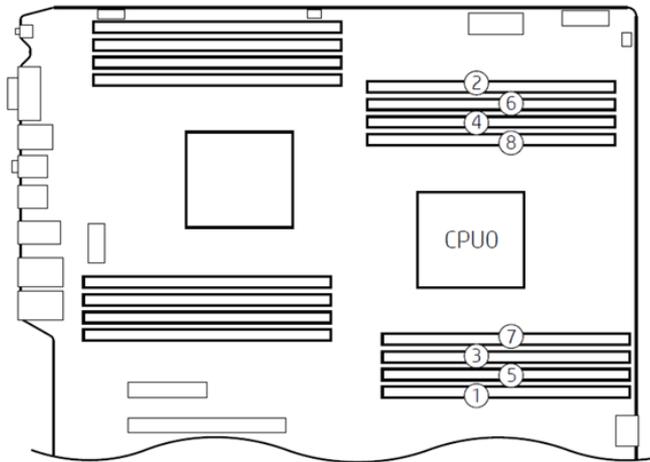
System Technical Specifications

Capacity	Notes	CPU 0								CPU 1								Rating
		Bottom Slots				Top Slots				Bottom Slots				Top Slots				
		DIMM 1	DIMM 2	DIMM 3	DIMM 4	DIMM 5	DIMM 6	DIMM 7	DIMM 8	DIMM 1	DIMM 2	DIMM 3	DIMM 4	DIMM 5	DIMM 6	DIMM 7	DIMM 8	
8 GB		4 GB								4 GB								Fair
16 GB		4 GB 8 GB							4 GB	4 GB 8 GB							4 GB	Good Fair
32 GB		4 GB 8 GB 16 GB		4 GB			4 GB		4 GB 8 GB	4 GB 8 GB 16 GB		4 GB			4 GB		4 GB 8 GB	Best Good Fair
64 GB		4 GB 8 GB	4 GB	4 GB 8 GB	4 GB	4 GB	4 GB 8 GB	4 GB	4 GB 8 GB	4 GB 8 GB	4 GB	4 GB 8 GB	4 GB	4 GB	4 GB 8 GB	4 GB	4 GB 8 GB	Best Best
96 GB	~	8 GB	4 GB	8 GB	4 GB	4 GB	8 GB	4 GB	8 GB	8 GB	4 GB	8 GB	4 GB	4 GB	8 GB	4 GB	8 GB	Best
128 GB	~	8 GB 16 GB 32 GB	8 GB	8 GB 16 GB	8 GB	8 GB	8 GB 16 GB	8 GB	8 GB 16 GB 32 GB	8 GB 16 GB 32 GB	8 GB	8 GB 16 GB	8 GB	8 GB	8 GB 16 GB	8 GB	8 GB 16 GB 32 GB	Best Best Good
192 GB	~	16 GB 16 GB	8 GB 16 GB	16 GB 16 GB	8 GB	8 GB	16 GB 16 GB	8 GB 16 GB	16 GB 16 GB	16 GB 16 GB	8 GB 16 GB	16 GB 16 GB	8 GB	8 GB	16 GB 16 GB	8 GB 16 GB	16 GB 16 GB	Best Better
256 GB		16 GB 32 GB	16 GB	16 GB 32 GB	16 GB	16 GB	16 GB 32 GB	16 GB	16 GB 32 GB	16 GB 32 GB	16 GB	16 GB 32 GB	16 GB	16 GB	16 GB 32 GB	16 GB 32 GB	16 GB 32 GB	Best Best
512 GB	~	32 GB 64 GB	32 GB	32 GB 64 GB	32 GB	32 GB	32 GB 64 GB	32 GB	32 GB 64 GB	32 GB 64 GB	32 GB	32 GB 64 GB	32 GB	32 GB	32 GB 64 GB	32 GB 64 GB	32 GB 64 GB	Best Best
1 TB	~	64 GB 128 GB	64 GB	64 GB 128 GB	64 GB	64 GB	64 GB 128 GB	64 GB	64 GB 128 GB	64 GB 128 GB	64 GB	64 GB 128 GB	64 GB	64 GB	64 GB 128 GB	64 GB	64 GB 128 GB	Best Best
Slot Load Order		1	9	5	13	15	7	11	3	2	10	6	14	16	8	12	4	

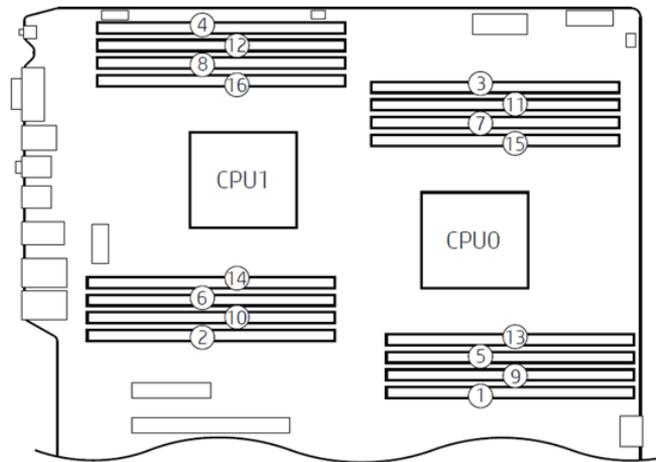
System Technical Specifications

Memory Loading Order:

Load Order for Single Processor Configuration



Load Order for Dual Processor Configuration



Maximum Memory

Supports up to 256GB using RDIMMs
Supports up to 1024GB using LRDIMMs

Memory Configuration (Supported)

- Not all memory configurations possible are represented. Not all memory configurations shown are available as CTO. Please check Ordering Guide for supported configurations.
- Only ECC DIMMs are supported.
- RDIMM (Registered) and LR DIMM (Load Reduction) memory cannot be mixed. All memory installed in the system must be either RDIMM or LR DIMM.
- Do not install memory modules into memory slots if corresponding processor is not installed.
- Dual processor configurations with memory modules installed for only one processor is not supported.

Notes

Please refer to the table above for details on how supported memory configurations are installed in your system.

* For 32 bit operating systems, there is a memory limit of 4GB.

*For systems installed with Microsoft Windows 7 (Ultimate, Enterprise or Pro), the maximum accessible system memory is 192GB

*For systems installed with Microsoft Windows 8.x (Enterprise or Pro), the maximum accessible system memory is 512GB

~ Although technically possible, these configurations are not available to order at this time.

The Z840 will support up to 512GB at initial release.

The Z840 will support up to 1024GB when 64GB DIMM support is added following initial Z840 release.

The Z840 will support up to 2048GB when 128GB DIMM support is added following initial Z840 release.

System Technical Specifications

PCI Express Connectors

Two PCIe Gen3 x16 with latch
 One PCIe Gen3 x16 with latch.

- Enabled only with optional 2nd CPU is installed.

One PCIe Gen3 x8 open-ended connector.

- Enabled only with optional 2nd CPU is installed.

One PCIe x8 open-ended connector.

- Enabled for One PCIe Gen2 x4 slot with 1 CPU
- Enabled for One PCIe Gen3 x8 with optional 2nd CPU installed

One PCIe Gen3 x4 open-ended connector.
 One PCIe Gen2 x1 open-ended connector

Supported Drive Interfaces

SATA

2 SATA @6Gb/s, supports RAID 0,1 and NCQ.
 4 sSATA @6Gb/s, Supports RAID 0,1,5,10 and NCQ.
 Factory integrated RAID is Microsoft Windows only.

External SATA (eSATA)*
 Supported on all SATA and sSATA ports configurable with optional eSATA* After-Market Option cable kit)
 * hot plug / hot swap not supported with eSATA

Serial Attached SCSI

Integrated 8-channel SAS 6.0Gb/sec controller with HW RAID 0, 1, 10

Integrated RAID

SATA: RAID 0, 1 (Supports one RAID)
 SATA: RAID 0, 1, 5, 10 (Supports up to 2 RAIDs)
 SAS: HW RAID 0, 1, 10 (Supports up to 2 RAIDs)

Integrated Graphics

None

Network Controller

Integrated Intel I218LM

Memory Integrated 3KB receive buffer and 3KB transmit buffer
 Data rates supported: 10/100/1000 Mb/s
 Compliance IEEE 802.1as, 802.1p, 802.1Q, 802.3, 802.3ab, 802.3az, 802.3i 802.3u, 802.3x, 802.3z
 Bus architecture PCIe 1.0 x1 and SMBus
 Power requirement 0.5 watts
 Boot ROM support
 Network transfer rates:
 10BASE-T (half-duplex) 10 Mb/s
 10BASE-T (full-duplex) 20 Mb/s
 100BASE-TX (half-duplex) 100 Mb/s
 100BASE-TX (full-duplex) 200 Mb/s
 1000BASE-T (full-duplex) 2000 Mb/s
 Management capabilities: WOL, auto MDI crossover, PXE, Multi-port teaming, RSS, Advanced cable diagnostics

AMT 9.1 support, vPro compliant

Integrated I210AT

System Technical Specifications

		Adjustable FIFO packet buffer memory up to 24KB Tx, 16KB Rx Data rates supported 10/100/1000 Mb/s Compliance IEEE 802.1as, 802.1q, 802.1Q, 802.3, 802.3ab, 802.3ap, 802.3az, 802.3u, 802.3x, 802.3z
		Bus architecture PCIe 1.0 x1 and SMBus Boot ROM support Network transfer rates: 10BASE-T (half-duplex) 10 Mb/s 10BASE-T (full-duplex) 20 Mb/s 100BASE-TX (half-duplex) 100 Mb/s 100BASE-TX (full-duplex) 200 Mb/s 1000BASE-T (full-duplex) 2000 Mb/s Management capabilities: WOL, auto MDI crossover, PXE, Multi-port teaming, RSS, Advanced cable diagnostics
	PCI-X Connectors	None
	PCI Card Guide	Yes
	Wake on LAN	Yes, both ports
	Integrated Trusted Platform Module	Trusted Platform Module (TPM) 1.2 (Infineon SLB 9660). Common Criteria EAL4+ Certified. Upgradable to TPM 2.0 through Firmware v5.51 upgrade (Infineon SLB9665). Convertible to FIPS 140-2 Certified mode. (TPM 2.0 is not available for Win 7 32-bit.). When the SLB 9660 is converted (via Firmware v5.51) to TPM 2.0 mode then it is renamed as SLB 9665. Once converted to TPM2.0 the SLB9665 is CC EAL4+ certified. CG TPM Certified products list: http://www.trustedcomputinggroup.org/certification/tpm-certified-products/
IEEE 1394 Connector(s)	Front	None
	Rear	None
	Internal	None
USB Connector(s)	Front	4 USB 3.0
	Rear	4 USB 3.0 2 USB 2.0
	Internal	1 USB 3.0 available with a single 20-pin shrouded connector. This header supports a USB Media Card reader. 2 USB 2.0 port available with one 2x5 header. This header supports an HP Internal USB Port Kit (EM165AA) to provide a single USB Type-A connector. This port kit uses one half of the 2x5 header. Third party adapters are also available.
HD Integrated Audio	Realtek ALC221	
Flash ROM	Yes	
CPU Fan Header	One header (blind mate) for CPU fans and memory fans	
Chassis Fan Header	One Chassis Fan Header	
Front PCI Fan Header	2 Front PCI Fan Headers	

System Technical Specifications

Front Control Panel/Speaker Header	Yes		
CMOS Battery Holder - Lithium Integrated Trusted Platform Module	Yes	Trusted Platform Module (TPM) 1.2 (Infineon SLB 9660). Common Criteria EAL4+ Certified. Upgradable to TPM 2.0 through Firmware v5.51 upgrade (Infineon SLB9665). Convertible to FIPS 140-2 Certified mode. (TPM 2.0 is not available for Win 7 32-bit.). When the SLB 9660 is converted (via Firmware v5.51) to TPM 2.0 mode then it is renamed as SLB 9665. Once converted to TPM2.0 the SLB9665 is CC EAL4+ certified.	
		TCG TPM Certified products list: http://www.trustedcomputinggroup.org/certification/tpm-certified-products/	
Power Supply Headers	Yes		
Power Switch, Power LED & Hard Drive LED Header	Front power switch, front power and hard drive LED. Rear power switch and rear power LED. Drive LED header on system board.		
Clear Password Jumper	Yes		
Serial Port	Yes, on rear panel		
Parallel Port	No		
Keyboard/Mouse	Yes		
Power Supply	850W 88% Efficient, Custom PSU (Wide-Ranging, Active PFC)		1125W/1275W*/1450W* 90% Efficient, Custom PSU (Wide-Ranging, Active PFC)
Operating Voltage Range	90-269 VAC		90-269 VAC
Rated Voltage Range	100-127 VAC 200-240 VAC	118 VAC	Rated Voltage Range 100-127 VAC 200-240 VAC
Rated Line Frequency	50-60 Hz	400 Hz	Rated Line Frequency 50-60 Hz
Operating Line Frequency Range	47-66 Hz	393-407 Hz	Operating Line Frequency Range 47-66 Hz
Rated Input Current	11A @ 100-127 VAC 5.5A @ 200-240 VAC	11A @ 118 VAC	Rated Input Current 11A @ 100-127 VAC 5.5A @ 200-240 VAC
Heat Dissipation (Configuration and software dependent)	Typical = 2142 btu/hr (540kg-cal/hr) Max = 3335 btu/hr (840 kg-cal/hr)		Typical = 2773 btu/hr (699 kg-cal/hr) Max-1 = 3878 btu/hr (977 kg-cal/hr) Max-2 = 5002 btu/hr (1260 kg-cal/hr) Max-3 = 5624 btu/hr (1417 kg-cal/hr)
Power Supply Fan	(2) 80x25 mm variable speed		(2) 80x25 mm variable speed
ENERGY STAR Qualified (Configuration dependent)	Yes		Yes
Power Supply Efficiency	88% Efficient		90% Efficient
	The Z840 850W power supply efficiency report can be found at this link: plugloadsolutions.com/psu_reports/HEWLETT%20PAC_KARD_719799-001_850W_ECOS%203882_Report.pdf		The Z840 1125W (1450W at 200V Input Voltage) power supply efficiency report can be found at this link: plugloadsolutions.com/psu_reports/HEWLETT%20PAC_KARD_719799-001_1125W_ECOS%203883_Report.pdf
FEMP Standby Power Compliant @115V (<2W in S5 - Power Off)	Yes		Yes

System Technical Specifications

EuP Compliant @ 230V (<0.5 W in S5 - Power Off)	Yes	Yes
CECP Compliant @ 220V (<4W in S3 - Suspend to RAM)	Yes; Configuration dependent	Yes; Configuration dependent
Power Consumption in sleep mode (as defined by ENERGY STAR) - Suspend to RAM (S3) (Instantly Available PC)	<23W	<30W
Built-in Self-Test LED	Yes	Yes
Surge Tolerant Full Ranging Power Supply (withstands power surges up to 2000V)	Yes	Yes

*Input voltage restriction

NOTE: The 1125W (1450W at 200V Input Voltage) power supply can also supply 1275W of output power when the input voltage is greater than 105V. If the input voltage is less than 105V, but greater than 90V for any reason, the maximum power that can be drawn is 1125W. An uninterruptible power supply (UPS) is highly recommended if 1275W output power is desired.

The 1125W Power Supply can also supply 1450W of output power when the input voltage is greater than 180V under all conditions.

AUX IN (audio)	No
Clear CMOS Button	Yes
Multibay Header	No
Integrated Gigabit Ethernet	Yes, dual port.
Access Panel Solenoid Lock Header	No
Access Panel Intrusion Sensor Header	Yes, as part of Front UI (Control Panel) cable header
Memory Fan Connector	Yes, blind-mate

SYSTEM CONFIGURATION

Example Configuration #1	Processor Info	1x Intel Xeon E5-2609v3 (Six-Core) 85W
	Memory Info	16GB DDR4-2133 (2x8GB) 1CPU RegRAM
	Graphics Info	1x NVIDIA® Quadro® K620
	Disks/Optical/Floppy	1x 500GB SATA 7200 rpm HDD/1x DVD-ROM SATA
	Power Supply	850W 88% Custom PSU
	Other	-

System Technical Specifications

Energy Consumption	115 VAC		230 VAC		100 VAC	
	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
Windows Idle (S0)	103.41 W		102.23 W		103.92 W	
Windows Busy Typ (S0)	183.75 W		181.88 W		189.37 W	
Windows Busy Max (S0)	204.93 W		201.28 W		206.74 W	
Sleep (S3)	3.711 W	3.587 W	3.785 W	3.711 W	3.587 W	3.785 W
Off (S5)	1.053 W	0.992 W	1.159 W	1.053 W	0.992 W	1.159 W
Zero Power Mode (ErP)	0.182 W		0.298 W		0.172 W	
Heat Dissipation** (Btu/hr)	115 VAC		230 VAC		100 VAC	
	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
Windows Idle (S0)	352.83 btu/hr		348.81 btu/hr		354.58 btu/hr	
Windows Busy Typ (S0)	626.96 btu/hr		620.57 btu/hr		646.13 btu/hr	
Windows Busy Max (S0)	699.22 btu/hr		686.77 btu/hr		705.40 btu/hr	
Sleep (S3)	12.66 btu/hr	12.24 btu/hr	12.91 btu/hr	12.66 btu/hr	12.24 btu/hr	12.91 btu/hr
Off (S5)	3.59 btu/hr	3.38 btu/hr	3.95 btu/hr	3.59 btu/hr	3.38 btu/hr	3.95 btu/hr
Zero Power Mode (ErP)	0.621 btu/hr		1.018 btu/hr		0.586 btu/hr	

Example Configuration #2 (ENERGY STAR QUALIFIED)	Processor Info	2x Intel Xeon E5-2640v3 (Eight-Core) 90W
	Memory Info	32GB DDR4-2133 (8x4GB) 2CPU RegRAM
	Graphics Info	1x NVIDIA® Quadro® K2200
	Disks/Optical/Floppy	3x 500GB SATA 7200/1x DVD-ROM SATA
	Power Supply	1125W (1450W at 200V Input Voltage) 90% Custom PSU
	Other	-

Energy Consumption	115 VAC		230 VAC		100 VAC	
	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
Windows Idle (S0)	142.17 W		141.01 W		142.47 W	
Windows Busy Typ (S0)	324.18 W		320.33 W		323.91 W	
Windows Busy Max (S0)	398.27 W		396.25 W		398.75 W	
Sleep (S3)	6.08 W	6.03 W	6.13 W	6.08 W	6.03 W	6.13 W
Off (S5)	1.04 W	0.99 W	1.10 W	1.04 W	0.99 W	1.10 W
Zero Power Mode (ErP)	0.181 W		0.308 W		0.172 W	
Heat Dissipation** (Btu/hr)	115 VAC		230 VAC		100 VAC	
	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
Windows Idle (S0)	485.08 btu/hr		481.13 btu/hr		486.11 btu/hr	
Windows Busy Typ (S0)	1106.10 btu/hr		1092.97 btu/hr		1105.18 btu/hr	
Windows Busy Max (S0)	1358.90 btu/hr		1352.01 btu/hr		1360.54 btu/hr	
Sleep (S3)	20.75 btu/hr	20.57 btu/hr	20.91 btu/hr	20.75 btu/hr	20.57 btu/hr	20.91 btu/hr
Off (S5)	3.55 btu/hr	3.38 btu/hr	3.76 btu/hr	3.55 btu/hr	3.38 btu/hr	3.76 btu/hr
Zero Power Mode (ErP)	0.619 btu/hr		1.051 btu/hr		0.587 btu/hr	

Example Z840 Configuration #3	Processor Info	2x Intel Xeon E5-2680v3 (12-Core) 120W
	Memory Info	64GB DDR4-2133 (8x8GB) 2CPU RegRAM

System Technical Specifications

	Graphics Info	1x NVIDIA® Quadro® K4200					
	Disks/Optical/Floppy	2x 300GB SAS 15K/1x DVDRW SATA					
	Power Supply	1125W (1450W at 200V Input Voltage) 90% Custom PSU					
	Other	-					
Energy Consumption		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
	Windows Idle (S0)	123.26 W		121.40 W		124.07 W	
	Windows Busy Typ (S0)	413.33 W		393.34 W		412.26 W	
	Windows Busy Max (S0)	496.46 W		483.26 W		498.07 W	
	Sleep (S3)	7.114 W	7.086 W	7.148 W	7.114 W	7.086 W	7.148 W
	Off (S5)	1.054 W	0.993 W	1.161 W	1.054 W	0.993 W	1.161 W
	Zero Power Mode (ErP)	0.181 W		0.307 W		0.177 W	
Heat Dissipation** (Btu/hr)		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
	Windows Idle (S0)	420.56 btu/hr		414.22 btu/hr		423.33 btu/hr	
	Windows Busy Typ (S0)	1410.28 btu/hr		1342.08 btu/hr		1406.63 btu/hr	
	Windows Busy Max (S0)	1693.95 btu/hr		1648.88 btu/hr		1700.10 btu/hr	
	Sleep (S3)	24.27 btu/hr	24.17 btu/hr	24.39 btu/hr	24.27 btu/hr	24.17 btu/hr	24.39 btu/hr
	Off (S5)	3.597 btu/hr	3.388 btu/hr	3.962 btu/hr	3.597 btu/hr	3.388 btu/hr	3.962 btu/hr
	Zero Power Mode (ErP)	0.619 btu/hr		1.049 btu/hr		0.607 btu/hr	

Example Z840 Configuration #4	Processor Info	2x Intel Xeon E5-2697v3 (14-Core) 145W					
	Memory Info	64GB DDR4-2133 (16x4GB) 2CPU RegRAM					
	Graphics Info	2x NVIDIA® Quadro® K5200					
	Disks/Optical/Floppy	4x 300GB SAS 15K/1x DVDRW SATA					
	Power Supply	1125W (1450W at 200V Input Voltage) 90% Custom PSU					
	Other	-					
	Energy Consumption		115 VAC		230 VAC		100 VAC
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
Windows Idle (S0)		141.75 W		140.45 W		141.63 W	
Windows Busy Typ (S0)		510.66 W		498.90 W		510.82 W	
Windows Busy Max (S0)		569.34 W		559.38 W		568.48 W	
Sleep (S3)		6.454 W	3.669 W	6.497 W	6.454 W	3.669 W	6.497 W
Off (S5)		1.105 W	0.987 W	1.165 W	1.105 W	0.987 W	1.165 W
Zero Power Mode (ErP)		0.180 W		0.306 W		0.178 W	
Heat Dissipation** (Btu/hr)							
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
	Windows Idle (S0)	483.65 btu/hr		497.22 btu/hr		483.24 btu/hr	
	Windows Busy Typ (S0)	1742.37 btu/hr		1702.25 btu/hr		1742.91 btu/hr	
	Windows Busy Max (S0)	1942.29 btu/hr		1908.60 btu/hr		1939.65 btu/hr	
	Sleep (S3)	22.02 btu/hr	21.63 btu/hr	22.16 btu/hr	22.02 btu/hr	21.63 btu/hr	22.16 btu/hr

System Technical Specifications

Off (S5)	3.77 btu/hr	3.37 btu/hr	3.97 btu/hr	3.77 btu/hr	3.37 btu/hr	3.97 btu/hr
Zero Power Mode (ErP)	0.616 btu/hr		1.046 btu/hr		0.608 btu/hr	

Example Configuration #5 (ENERGY STAR QUALIFIED)	Processor Info	2x Intel Xeon 2687Wv3 (10-Core) 160W					
	Memory Info	512GB DDR4-2133 (16x32GB) 2CPU LR RAM					
	Graphics Info	2x NVIDIA® Quadro® K6000					
	Disks/Optical/Floppy	6x 300GB 10K SAS SFF/1x DVD RW SATA					
	Power Supply	1125W (1450W at 200V Input Voltage) 90% Custom PSU					
	Other	-					
Energy Consumption		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
	On-Idle (ENERGY STAR® Idle (S0))	174.56 W		173.77 W		175.26 W	
	ENERGY STAR® P _{MAX} Windows running Linpack and Viewperf	561.98 W		559.23 W		567.75 W	
	ENERGY STAR® "Sleep" (S3)	16.426 W	16.279 W	16.099 W	16.426 W	16.279 W	16.099 W
	ENERGY STAR® "Standby" (Off) (S5)	1.047 W	0.997 W	1.144 W	1.047 W	0.997 W	1.144 W
	Heat Dissipation** (Btu/hr)		115 VAC		230 VAC		100 VAC
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
On-Idle (ENERGY STAR® Idle (S0))		595.60 btu/hr		592.90 btu/hr		597.99 btu/hr	
ENERGY STAR® P _{MAX} Windows running Linpack and Viewperf		1917.48 btu/hr		1908.09 btu/hr		1937.16 btu/hr	
ENERGY STAR® "Sleep" (S3)		56.046 btu/hr	55.545 btu/hr	54.935 btu/hr	56.046 btu/hr	55.545 btu/hr	54.935 btu/hr

DECLARED NOISE EMISSIONS (ENTRY-LEVEL AND HIGH-END CONFIGURATIONS)

System Configuration (Entry level)	Processor Info	1x Intel Xeon E5-2609v3 2.4GHz CPU
	Memory Info	2x 8GB DDR4-2133 RDIMM
	Graphics Info	1x NVIDIA® Quadro® K620
	Disks/Optical/Floppy	1x Seagate 500GB 6Gb/s 7200 RPM HDD 1x SATA DVD-RW

Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)		Sound Power (LWAd, bels)	Deskside Sound Pressure (LpAm, decibels)
	Idle	4.3	24
	Hard drive Operating (random reads)	4.3	24
	DVD-ROM Operating (sequential reads)	4.6	31
	Processor Info	2x Intel Xeon 2687Wv3 (10-Core) 160W	

System Technical Specifications

System Configuration (High-end)	Memory Info	16x 32GB DDR4-2133 RDMIM
	Graphics Info	2x NVIDIA® Quadro® K6000 Graphics Cards
	Disks/Optical/Floppy	4x Seagate 300GB 10K SFF HDDs
		1x Blue-ray DVD-RW

Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)		Sound Power (LWAd, bels)	Deskside Sound Pressure (LpAm, decibels)
		Idle	4.3
	Hard drive Operating (random reads)	4.3	26
	DVD-ROM Operating (sequential reads)	4.5	29

ENVIRONMENTAL DATA

Environmental Requirements	Temperature	Operating: 5° to 35° C (40° to 95° F) Non-operating: -40° to 60° C (-40° to 140° F)	
	Humidity	Operating: 8% to 85% RH, non-condensing Non-operating: 8% to 90% RH, non-condensing	
	Maximum Altitude	Operating: 3,000 m (10,000 feet) Non-operating: 9,100 m (30,000 feet)	
	Dynamic (new)	Shock	Operating: ½-sine: 40g, 2-3ms (~62 cm/sec) Non-operating: ½-sine: 160 cm/s, 2-3ms (~105g) square: 422 cm/s, 20g
			NOTE: Values represent individual shock events and do not indicate repetitive shock events.
		Vibration	Operating random: 0.5g (rms), 5-300 Hz, up to 0.0025 g ² /Hz Non-operating random: 2.0g (rms), 5-500 Hz, up to 0.0150 g ² /Hz NOTE: Values do not indicate continuous vibration.
Cooling	Above 1524 m (5000 ft.) altitude, maximum operating temperature is de-rated by 1° C (1.8° F) per 305 m (1000 ft.) elevation increase		

System Technical Specifications

PHYSICAL SECURITY AND SERVICEABILITY

Access Panel	Tool-less Includes system board and memory information
Optical Drive	Tool-less, no carrier or rails required
Hard Drives	Tool-less
Expansion Cards	Tool-less
Processor Socket	Tool-less
Green User Touch Points	Yes, on tool-free internal chassis components
Color-coordinated Cables and Connectors	Yes
Memory	Tool-less
System Board	Tool-less, retained by Front PCI Card Guide
Dual Color Power and HD LED on Front of Computer	Yes
Configuration Record SW	Yes
Over-Temp Warning on Screen	Yes
Restore CD/DVD Set	Restores the computer to its original factory shipping image - Can be obtained via HP Support
Dual Function Front Power Switch	Yes, causes a fail-safe power off when held for 4 seconds
Padlock Support	No
Cable Lock Support	Yes, Kensington Cable Lock (optional): Prevents entire system theft only. 3mm x 7mm slot at rear of system
Universal Chassis Clamp Lock Support	No
Solenoid Lock and Hood Sensor	No
Rear Port Control Cover	No
Serial, Parallel, USB, Audio, Network, Enable/Disable Port Control	Yes
Removable Media Write/Boot Control	Yes, prevents ability to boot from removable media on supported devices (and can disable writes to media)
Power-On Password Setup Password	Yes, prevents an unauthorized person from booting up the workstation Yes, prevents an unauthorized person from changing the workstation configuration
3.3V Aux Power LED on System PCA	No
NIC LEDs (integrated) (Green & Amber)	Yes
CPUs and Heatsinks	A torx driver (T15) is needed to remove the CPU heatsink(s) before the CPU can be removed. CPU removal is tool-less
Power Supply Diagnostic LED	Yes
Front Power Button	Yes
Front Power LED	Yes, white (normal), red (fault)
Front Hard Drive Activity LED	Yes, white
Front ODD Activity LED	Yes
Internal Speaker	Yes

System Technical Specifications

System/Emergency ROM Flash Recovery	Recovers corrupted system BIOS
Cooling Solutions	Air cooled forced convection
Power Supply Fans	2x - 80mm x 25mm
CPU Heatsink Fan	92 x 25mm 5-wire PWM for each CPU
Chassis Fan	Rear: 2x - 92mm x 25mm Front (850W config): 1x - 92mm x 25mm (upper position) Front (1125W (1450W at 200V Input Voltage) config): 2x - 92mm x 25mm
Memory Heatsink Fan	3x - 75 x 90 x 35mm memory blowers 80 x 25 mm 4-wire PW fan
HP Vision Diagnostics Offline Edition	HP Vision Diagnostics Offline Edition The diagnostics utility enables you to perform testing and to view critical computer hardware and software configuration information from various sources. This utility enables you to:

- Run diagnostics
- View the hardware configuration of the system

Key features and benefits

HP Vision Diagnostics simplifies the process of effectively identifying, diagnosing, and isolating the hardware issues. In addition to robust management tools, service tools can be invaluable in quickly resolving system problems. To streamline the service process and resolve problems quickly, it is necessary to have the right information available at the time that a service call is placed. The primary information requirement, which is also the one that provides the greatest Vision into potential system issues, is the configuration of the system. Vision Diagnostics helps provide higher system availability. Typical uses of the Vision Diagnostics are:

- Testing and diagnosing apparent hardware failures
- Documenting system configurations for upgrade planning, standardization, inventory tracking, disaster recovery, and maintenance
- Sending configuration information to another location for more in-depth analysis

Access Panel Key Lock	Yes, prevents removal of the access panel and all internal components including optical and floppy drives
ACPI-Ready Hardware	Advanced Configuration and Power Management Interface (ACPI). <ul style="list-style-type: none"> • Allows the system to wake from a low power mode. • Controls system power consumption, making it possible to place individual cards and peripherals in a low-power or powered-off state without affecting other elements of the system

Trusted Platform Module Chip Yes

Integrated Chassis Handles Yes, front and rear

Power Supply Tool-less, direct-connect (blind-mate)

PCIe Card Retention Yes, rear (all), middle (full-height cards), front (full-length with extender cards)

Flash ROM Yes. SPI ROM

Diagnostic Power Switch LED on board Yes

Clear Password Jumper Yes

Clear CMOS Button Yes

CMOS Battery Holder Yes

System Technical Specifications

DIMM Connectors Yes

System Technical Specifications

BIOS	
BIOS 32-bit Services	Standard BIOS 32-Bit Service Directory Proposal v0.4. BIOS supports 32 and 64-bit Operating systems.
PCI 3.0 Support	Full BIOS support for PCI Express through industry standard interfaces.
ATAPI	ATAPI Removable Media Device BIOS Specification Version 1.0.
BBS	BIOS Boot Specification v1.01
WMI Support	WMI is Microsoft's implementation of Web-Based Enterprise Management (WBEM) for Windows. WMI is fully compliant with the Distributed Management Task Force (DMTF) Common Information Model (CIM) and WBEM specifications.
BIOS Boot Spec 1.01+	Provides more control over how and from what devices the workstation will boot.
BIOS Power On	Users can define a specific date and time for the system to power on.
ROM Based Computer Setup Utility (F10)	Review and customize system settings controlled by the BIOS.
System/Emergency ROM Flash Recovery with Video	Recovers system BIOS in corrupted Flash ROM.
Replicated Setup	Saves BIOS settings to diskette or USB flash drive in human readable file. Repset.exe utility can then replicate these settings on machines being deployed without entering Computer Configuration Utility (F10 setup).
SMBIOS	System Management BIOS 2.7, for system management information
Boot Control	Disables the ability to boot from removable media on supported devices.
Memory Change Alert	Alerts management console if memory is removed or changed.
Thermal Alert	Monitors the temperature state within the chassis. Three modes: - NORMAL - normal temperature ranges. - ALERTED - excessive temperatures are detected. Raises a flag so action can be taken to avoid shutdown or provide for a smoother system shutdown. - SHUTDOWN - excessive temperatures are encountered. Automatically shuts down the computer without warning before hardware component damage occurs.
Remote ROM Flash	Provides secure, fail-safe ROM image management from a central network console.
ACPI (Advanced Configuration and Power Management Interface)	Allows the system to enter and wake from low power modes (sleep states). Enables an operating system to control system power consumption based on the dynamic workload. Makes it possible to place individual cards and peripherals in a low-power or powered-off state without affecting other elements of the system. Supports ACPI 4.0 for full compatibility with 64-Bit operating systems.
Ownership Tag	A user-defined string stored in non-volatile memory that is displayed in the BIOS splash screen.
Remote Wakeup/Remote Shutdown	System administrators can power on, restart, and power off a client computer from a remote location.
Instantly Available PC (Suspend to RAM - ACPI sleep state S3)	Allows for very low power consumption with quick resume time.
Remote System Installation via F12 (PXE 2.1) (Remote Boot from Server)	Allows a new or existing system to boot over the network and download software, including the operating system.
ROM revision levels	Reports the system BIOS revision level in Computer Configuration Utility (F10 Setup). Version is available through an industry standard interface (SMBIOS) so that management SW applications can use and report this information.

System Technical Specifications

System board revision level	Allows management SW to read the revision level of the system board Revision level is digitally encoded into the HW and cannot be modified.
Start-up Diagnostics (Power-on Self-Test)	Assesses system health at boot time with selectable levels of testing.
Auto Setup when new hardware installed	System automatically detects addition of new hardware.
Keyboard-less Operation	The system can be booted without a keyboard.
Localized ROM Setup	Common BIOS image supports System Configuration Utility (F10 Setup) menus in 12 languages with local keyboard mappings.
Asset Tag	Allows the user or MIS to set a unique tag string in non-volatile memory.
Per-slot Control	Allows I/O slot parameters (option ROM enable/disable, bus latency) to be configured individually.
Adaptive Cooling	Fan control parameters are set according to detected hardware configuration for optimal acoustics.
Pre-boot Diagnostics	Early (pre-video) critical errors are reported via beeps and blinks on the power LED.
Industry Standard Specification Support	
Industry Standard UEFI Specification Revision	Revision Supported by the BIOS 2.3.1
ACPI	Advanced Configuration and Power Management Interface, Version 4.0
ATA (IDE)	AT Attachment 6 with Packet Interface (ATA/ATAPI-6), Revision 3b
CD Boot	"El Torito" Bootable CD-ROM Format Specification Version 1.0
EDD	- Enhanced Disk Drive Specification Version 1.1 - BIOS Enhanced Disk Drive Specification Version 3.0
EHCI	Enhanced Host Controller Interface for Universal Serial Bus, Revision 1.0
PCI	- PCI Local Bus Specification, Revision 2.3 - PCI Power Management Specification, Revision 1.1 - PCI Firmware Specification, Revision 3.0, Draft .7
PCI Express	PCI Express Base Specification, Revision 2.0 PCI Express Base Specification, Revision 3.0
PMM	POST Memory Manager Specification, Version 1.01
SATA	Serial ATA Specification, Revision 1.0a Serial ATA 3 Gb/s: Serial ATA Specification, Revision 2.5 Serial ATA 6 Gb/s: Serial ATA Specification, Revision 3.0
SPD	PC SDRAM Serial Presence Detect (SPD) Specification, Revision 1.2B
TPM	Trusted Platform Module (TPM) 1.2 (Infineon SLB 9660). Common Criteria EAL4+ Certified. Upgradable to TPM 2.0 through Firmware v5.51 upgrade (Infineon SLB9665). Convertible to FIPS 140-2 Certified mode. (TPM 2.0 is not available for Win 7 32-bit.). When the SLB 9660 is converted (via Firmware v5.51) to TPM 2.0 mode then it is renamed as SLB 9665. Once converted to TPM2.0 the SLB9665 is CC EAL4+ certified.
	TCG TPM Certified products list: http://www.trustedcomputinggroup.org/certification/tpm-certified-products/
UHCI	Universal Host Controller Interface Design Guide, Revision 1.1
USB	Universal Serial Bus Revision 1.1 Specification Universal Serial Bus Revision 2.0 Specification Universal Serial Bus Revision 3.0 Specification
SMBIOS	System Management BIOS Reference Specification, Version 2.7 External BIOS Simulator found at: http://h20464.www2.hp.com/index.html
	External BIOS Simulator found at: http://h20464.www2.hp.com/index.html

System Technical Specifications

Social and Environmental Responsibility

Eco-Label Certifications & Declarations This product has received or is in the process of being certified to the following approvals and may be labeled with one or more of these marks:

- ENERGY STAR® (energy-saving features available on selected configurations-Windows only)
- US Federal Energy Management Program (FEMP)
- China Energy Conservation Program
- *The ECO Declaration (TED)*

Batteries

The battery in this product complies with EU Directive 2006/66/EC
Battery size: CR2032 (coin cell)
Battery type: Lithium Metal

The battery in this product does not contain:

- Mercury greater than 5ppm by weight
- Cadmium greater than 10ppm by weight
- Lead greater than 40ppm by weight

Restricted Material Usage This product meets the material restrictions specified in HP's General Specification for the Environment. <http://www.hp.com/hpinfo/globalcitizenship/environment/pdf/gse.pdf>

HP Inc. is committed to compliance with all applicable environmental laws and regulations, including the European Union Restriction of Hazardous Substances (RoHS) Directive. HP's goal is to exceed compliance obligations by meeting the requirements of the RoHS Directive on a worldwide basis.

Low Halogen Statement

This product is low halogen except for power cords, cables and peripherals, as well as the following customer-configurable internal components: 3 ½" SAS HDDs, LSI 9260-8i SAS 6Gb/s ROC RAID Card, Creative Recon3D PCIe Audio Card, Liquid Cooling Solution and Broadcom 5761 Gigabit PCIe NIC are not Low Halogen. Service parts obtained after purchase may not be Low Halogen.

End-of-Life Management and Recycling

HP Inc. offers end-of-life HP product return and recycling programs in many geographic areas. To recycle your product, please go to: <http://www.hp.com/recycle> or contact your nearest HP sales office. Products returned to HP will be recycled, recovered or disposed of in a responsible manner. This product is greater than 90% recyclable by weight when properly disposed of at end of life.

HP Inc. Corporate Environmental Information

For more information about HP's commitment to the environment:
Global Citizenship Report <http://www.hp.com/hpinfo/globalcitizenship/gcreport/index.html>

Eco-label certifications
<http://www.hp.com/hpinfo/globalcitizenship/environment/productdesign/ecolabels.html>

Additional Information

ISO 14001 certificates:
<http://www.hp.com/hpinfo/globalcitizenship/environment/operations/envmanagement.html>

- This HP product is designed to comply with the Waste Electrical and Electronic Equipment (WEEE) Directive – 2002/96/EC.
- Plastic parts weighing over 25 grams used in the product are marked per ISO 11469 and ISO1043.
- This product is >90% recycle-able when properly disposed of at end of life.
- EPEAT Gold registered in the United States. See <http://www.epeat.net> for registration status in your country. EPEAT® registered where applicable. EPEAT registration varies by country. See <http://www.epeat.net> for registration status by country. Search keyword *generator* on HP's 3rd party option store for solar energy accessory at www.hp.com/go/options

System Technical Specifications

Packaging

HP Workstation product packaging meets the HP General Specification for the Environment at http://www.hp.com/hpinfo/globalcitizenship/society/gen_specifications.html

- Does not contain restricted substances listed in HP Standard 011-1 General Specification for the Environment
- Does not contain ozone-depleting substances (ODS)
- Does not contain heavy metals (lead, mercury, cadmium or hexavalent chromium) in excess of 100 ppm sum total for all heavy metals listed
- Maximizes the use of post-consumer recycled content materials in packaging materials
- All packaging material is recyclable
- All packaging material is designed for ease of disassembly
- Reduced size and weight of packages to improve transportation fuel efficiency
- Plastic packaging materials are marked according to ISO 11469 and DIN 6120 standards formatting

Packaging Materials

Internal

Cushions and plastic bags made of low density polyethylene (LDPE).

External

Outer carton, accessories carton, and insert made of corrugated paper board.

MANAGEABILITY

Industry Standard Specifications

This product meets the following industry standard specifications for manageability functionality:

- DASH 1.1 (via Intel LAN on motherboard)

Intel Active Management Technology (AMT)

Intel® Active Management Technology (AMT) 9.1

An advanced set of remote management features and functionality providing IT administrators the latest and most effective tools to remotely discover, heal, and protect networked client systems regardless of the system's health or power state. AMT 9.1 includes the following advanced management functions:

- Power Management (on, off, reset, graceful shutdown, sleep and hibernate)
- Support in Max Power Savings (Shutdown and Hibernate Modes)
- Hardware Inventory (includes BIOS and firmware revisions)
- Hardware Alerting
- Agent Presence
- System Defense Filters
- Serial Over LAN (SOL)
- IDE Redirect
- ME Wake-on-LAN (WOL)
- DASH 1.1 compliance
- IPv6 Support
- Fast Call for Help - a client inside or outside the firewall may initiate a call for help via BIOS screen, periodic connections, or alert triggered connection
- Remote Scheduled Maintenance - pre-schedule when the system connects to the IT or service provider console for maintenance.
- Remote Alerts - automatically alert IT or service provider if issues arise
- Access Monitor - Provides oversight into Intel® AMT actions to support security requirements
- PC Alarm Clock
- Microsoft NAP Support
- Host Base set-up and configuration
- Management Engine (ME) firmware roll back

System Technical Specifications

- Local Time Sync to UTC Remote Memory Dump Command – Creates memory dump for debug

Intel® vPro™ Technology The HP Z840 Workstation supports Intel vPro technology when configured as outlined below:

- Intel® Xeon® processor E5-1600 v3 product family or E5-2600 v3 product family featuring Intel® vPro™ Technology
- Intel® C610 chipset
- Intel® I218LM GbE LAN

Remote Manageability Software Solutions

The HP Z840 Workstation is supported on the following remote manageability software consoles:

- LANDesk Management Suite (HP recommended solution)
- Microsoft System Center Configuration Manager
- HP Client Automation Enterprise

System Software Manager Service, Support, and Warranty

For questions or support for manageability needs, please visit <http://www.hp.com/go/easydeploy>
For questions or support for SSM, please visit: <http://www.hp.com/go/ssm>

On-site Warranty and Service (**Note 1**): Three-years, limited warranty and service offering delivers on-site, next business-day (**Note 2**) service for parts and labor and includes free telephone support (**Note 3**) 8am - 5pm. Global coverage (**Note 2**) ensures that any product purchased in one country and transferred to another, non-restricted country will remain fully covered under the original warranty and service offering.

NOTE 1: Terms and conditions may vary by country. Certain restrictions and exclusions apply.

NOTE 2: On-site service may be provided pursuant to a service contract between HP and an authorized HP third-party provider, and is not available in certain countries. Global service response times are based on commercially reasonable best effort and may vary by country.

NOTE 3: Technical telephone support applies only to HP-configured, HP and HP-qualified, third-party hardware and software. Toll-free calling and 24x7 support service may not be available in some countries.

HP Care Pack Services are extended service contracts that go beyond the standard limited warranties. Service starts from date of hardware purchase. To choose the right level of service for your HP product, use the HP Care Pack Services Lookup Tool at: <http://www.hp.com/go/lookuptool>. Additional HP Care Pack Services information by product is available at: <http://www.hp.com/hps/carepack>. Service levels and response times for HP Care Packs may vary depending on your geographic location. HP services are governed by the applicable HP terms and conditions of service provided or indicated to Customer at the time of purchase. Customer may have additional statutory rights according to applicable local laws, and such rights are not in any way affected by the HP terms and conditions of service or the HP Limited Warranty provided with your HP Product.

Product Change Notification

- Program to proactively communicate Product Change Notifications (PCNs) and Customer Advisories by email to customers, based on a user-defined profile.
- PCNs provide advance notification of hardware and software changes to be implemented in the factory providing time to plan for transition.
- Customer Advisories provide concise, effective problem resolution, greatly reducing the need to call technical support.

Stable & Consistent Offerings

Global Series SKUs

As part of its commitment to hardware, software, and solution innovation, HP is proud to introduce this breakthrough platform configuration stability to HP Workstation customers. HP Stable & Consistent Offerings are built on the foundation of a carefully chosen set of hardware and software designed and tested to work with all HP Z Workstation platforms through their end of life. These components and their corresponding HP Workstation platform compatibility are outlined in this section.

HP Stable & Consistent Offerings are available worldwide to all HP Workstation customers—no special programs, no additional cost—no kidding. Simply select your hardware and software components when you customize your HP Workstation and be assured that you'll be able to buy that same configuration throughout the lifecycle of the product.

Processors

Product #	Offering
J6F75AV	Intel Xeon E5-2620v3 2.4 1866 6C 1stCPU
J6F73AV	Intel Xeon E5-2630v3 2.4 1866 8C 1stCPU
J6F71AV	Intel Xeon E5-2637v3 3.5 2133 4C 1stCPU
J6F94AV	Intel Xeon E5-2620v3 2.4 1866 6C 2ndCPU
J6F92AV	Intel Xeon E5-2630v3 2.4 1866 8C 2ndCPU
J6F90AV	Intel Xeon E5-2637v3 3.5 2133 4C 2ndCPU

Hard Drives

Product #	Offering
J3K71AV	500GB 7200 RPM SATA 1st HDD
J3K72AV	1TB 7200 RPM SATA 1st HDD
J3K92AV	500GB 7200 RPM SATA 2nd HDD
J3K93AV	1TB 7200 RPM SATA 2nd HDD
J3L13AV	500GB 7200 RPM SATA 3rd HDD
J3L14AV	1TB 7200 RPM SATA 3rd HDD
J3L36AV	500GB 7200 RPM SATA 4th HDD
J3L37AV	1TB 7200 RPM SATA 4th HDD
J3L54AV	500GB 7200 RPM SATA 5th HDD
J3L55AV	1TB 7200 RPM SATA 5th HDD

Graphics

Product #	Offering
J1Q20AV	NVIDIA® Quadro® K2200 4GB 1st GFX
J1Q24AV	AMD FirePro W2100 2GB 1st GFX
J1Q30AV	NVIDIA® Quadro® K620 2GB 2nd GFX
J1Q31AV	NVIDIA® Quadro® K2200 4GB 2nd GFX
J1Q35AV	AMD FirePro W2100 2GB 2nd GFX
J1Q38AV	NVIDIA® Quadro® K2200 4GB 3rd GFX

Memory*

Product #	Offering
G8X58AV	8GB DDR4-2133 (1x8GB) 1CPU RegRAM
G8X61AV	16GB DDR4-2133 (2x8GB) 1CPU RegRAM
G8X63AV	32GB DDR4-2133 (4x8GB) 1CPU RegRAM

Stable & Consistent Offerings

G8X64AV	64GB DDR4-2133 (8x8GB) 1CPU RegRAM
G8X74AV	32GB DDR4-2133 (4x8GB) 2CPU RegRAM
G8X77AV	64GB DDR4-2133 (8x8GB) 2CPU RegRAM
G8X78AV	128GB DDR4-2133 (16x8GB) 2CPU RegRAM
G8X65AV	64GB DDR4-2133 (4x16GB) 1CPU RegRAM
G8X66AV	128GB DDR4-2133 (8x16GB) 1CPU RegRAM
G8X79AV	128GB DDR4-2133 (8x16GB) 2CPU RegRAM
G8X80AV	256GB DDR4-2133 (16x16GB) 2CPU RegRAM

Input Devices

Product #	Offering
G8U76AV	HP USB Keyboard
G8U87AV	HP USB Optical Mouse

*Factory-configured CTO (xxxxxAV) and aftermarket AMO (xxxxxAA, xxxxxAT) HP memory part numbers designated as “2133” will be transitioned to using 2400MHz speed memory components. This does not affect HP part number availability nor does it affect system performance or operation. All hardware configurations currently supporting HP memory part numbers designated as “2133” have been tested to work with 2400MHz memory and are fully-supported by HP under standard support terms.

Technical Specifications - Processors

PROCESSORS

Xeon E5-2603 v3 1.6 1600 6C CPU	J9V77AA
Xeon E5-2609 v3 1.9 1600 6C CPU	J9V76AA
Xeon E5-2620 v3 2.4 1866 6C CPU	J9V75AA
Xeon E5-2623 v3 3.0 1866 4C CPU	J9Q18AA
Xeon E5-2630 v3 2.4 1866 8C CPU	J9Q17AA
Xeon E5-2640 v3 2.6 1866 8C CPU	J9Q16AA
Xeon E5-2637 v3 3.5 2133 4C CPU	J9Q15AA
Xeon E5-2650 v3 2.3 2133 10C CPU	J9Q14AA
Xeon E5-2660 v3 2.6 2133 10C CPU	J9Q13AA
Xeon E5-2643 v3 3.4 2133 6C CPU	J9Q12AA
Xeon E5-2670 v3 2.3 2133 12C CPU	J9Q11AA
Xeon E5-2680 v3 2.5 2133 12C CPU	J9Q10AA
Xeon E5-2683 v3 2.0 2133 14C CPU	J9Q09AA
Xeon E5-2667 v3 3.2 2133 8C CPU	J9Q08AA
Xeon E5-2690 v3 2.6 2133 12C CPU	J9Q07AA
Xeon E5-2687Wv3 3.1 2133 10C CPU	J9Q06AA
Xeon E5-2695 v3 2.3 2133 14C CPU	J9Q05AA
Xeon E5-2697 v3 2.6 2133 14C CPU	J9Q04AA
Xeon E5-2699 v3 2.3 2133 18C CPU	J9Q03AA

Technical Specifications – Storage Hard Drives

HARD DRIVES

HP SAS (Serial Attached SCSI) Hard Drives for HP Workstations	300GB SAS 15K rpm 6Gb/s 3.5" HDD	Capacity	300GB			
		Height	1 in; 2.54 cm			
		Width	Media Diameter	3.5 in; 8.9 cm		
			Physical Size	4 in; 10.17 cm		
		Interface	SAS			
		Synchronous Transfer Rate (Maximum)	6Gb/s			
		Buffer	16MB			
		Seek Time (typical reads, includes controller overhead, including settling)	Single Track	0.2 ms		
			Average	3.4 ms		
			Full Stroke	6.6 ms		
			Rotational Speed	15,000 rpm		
	Operating Temperature	50° to 95° F (10° to 35° C)				
	600GB SAS 15K SFF HDD	Capacity	600GB			
		Height	5.9 in; 15 cm			
		Width	Media Diameter	Media Diameter		
		Interface	12Gb/s SAS			
		Synchronous Transfer Rate (Maximum)	up to 1200 MB/s (SAS single port)			
		Cache	128MB			
		Seek Time (typical reads, includes controller overhead, including settling)	Average	2.0ms		
		Rotational Speed	15K rpm			
		Operating Temperature	41° to 131° F (5° to 55° C)			
			300GB SAS 15K SFF HDD	Capacity	300GB	
				Height	5.9 in; 15 cm	
Width	Media Diameter			2.5 in; 6.36 cm		
Interface	12Gb/s SAS					
Synchronous Transfer Rate (Maximum)	up to 1200 MB/s (SAS single port)					
Cache	128MB					
Seek Time (typical reads, includes controller overhead, including settling)	Average			2.0ms		
Rotational Speed	15K rpm					
Operating Temperature	41° to 131° F (5° to 55° C)					

Technical Specifications – Storage Hard Drives

HP 300GB SAS 10K SFF HDD	Capacity	300GB	
	Height	0.6 in; 1.53 cm	
	Width		Media Diameter 2.5 in; 6.36 cm
			Physical Size 2.75 in; 6.99 cm
	Interface	SAS 6Gb/s	
	Synchronous Transfer Rate (Maximum)	Up to 600MB/s	
	Buffer	64MB	
	Cache	multi-segmentable cache buffer	
	Seek Time (typical reads, includes controller overhead, including settling)		Single Track 0.4 ms (max)
			Average 3.6 ms
			Full Stroke 7.3 ms
	Rotational Speed	10,000 rpm	
	Logical Blocks	585,937,500	
	Operating Temperature	41° to 131° F (5° to 55° C)	
HP 600GB SAS 10K SFF HDD	Capacity	600GB	
	Height	0.6 in; 1.53 cm	
	Width		Media Diameter 2.5 in; 6.36 cm
			Physical Size 2.75 in; 6.99 cm
	Interface	SAS 6Gb/s	
	Synchronous Transfer Rate (Maximum)	Up to 600MB/s	
	Buffer	64MB	
	Cache	multi-segmentable cache buffer	
	Seek Time (typical reads, includes controller overhead, including settling)		Single Track 0.4 ms (max)
			Average 3.6 ms
			Full Stroke 7.3 ms
	Rotational Speed	10,000 rpm	
	Logical Blocks	1,172,123,568	
	Operating Temperature	41° to 131° F (5° to 55° C)	
HP 1.2TB SAS 10K SFF HDD	Capacity	1.2TB	
	Height	0.6 in; 1.53 cm	
	Width		Media Diameter 2.5 in; 6.36 cm
			Physical Size 2.75 in; 6.99 cm
	Interface	SAS 6Gb/s	
	Synchronous Transfer Rate (Maximum)	Up to 600MB/s	
	Buffer	64MB	
	Seek Time (typical reads, includes controller overhead, including settling)		Single Track 0.18ms (max)
			Average 3.5ms
			Full Stroke 7.17ms
	Rotational Speed	10,000 rpm	

Technical Specifications – Storage Hard Drives

Logical Blocks	2,344,225,968
Operating Temperature	41° to 131° F (5° to 55° C)

SATA Hard Drives for HP Workstations	500GB SATA 10K rpm SFF HDD	Capacity	500GB
		Height	0.6 in; 1.53 cm
		Width	Media Diameter 2.5 in; 6.36 cm
			Physical Size 2.75 in; 6.99 cm
		Interface	Serial ATA (6Gb/s)
		Synchronous Transfer Rate (Maximum)	Up to 600MB/s
		Buffer	64MB
		Cache	Adaptive
		Seek Time (typical reads, includes controller overhead, including settling)	Single Track 1.2ms (typical)
			Average 3.6ms
			Full Stroke 9.0ms (typical)
		Rotational Speed	10K rpm
		Operating Temperature	41° to 131° F (5° to 55° C)
	1TB SATA 7200 rpm 6Gb/s 3.5" HDD	Capacity	1TB
		Height	1 in; 2.54 cm
		Width	Media Diameter 3.5 in; 8.9 cm
			Physical Size 4 in; 10.17 cm
		Interface	Serial ATA (6Gb/s)
		Synchronous Transfer Rate (Maximum)	Up to 600 MB/s
		Buffer	64MB
		Seek Time (typical reads, includes controller overhead, including settling)	Single Track 1.2ms (typical)
			Average 11ms
			Full Stroke 21ms (typical)
		Rotational Speed	7,200 rpm
		Logical Blocks	1,953,525,168
		Operating Temperature	41° to 131° F (5° to 55° C)
	2.0TB SATA 7200 rpm 6Gb/s 3.5" HDD	Capacity	2.0TB
		Height	1 in; 2.54 cm
		Width	Media Diameter 3.5 in; 8.9 cm
			Physical Size 4 in; 10.17 cm
		Interface	Serial ATA (6.0 Gb/s), NCQ Enabled
		Synchronous Transfer Rate (Maximum)	Up to 600 MB/s
		Buffer	64MB
		Seek Time (typical reads, includes controller)	Single Track 1.0 ms
			Average 11 ms
			Full Stroke 18 ms

Technical Specifications – Storage Hard Drives

		overhead, including settling)		
		Rotational Speed	7,200 rpm	
		Logical Blocks	3,907,029,168	
		Operating Temperature	41° to 131° F (5° to 55° C)	
3.0TB SATA 7200 rpm 6Gb/s 3.5" HDD	Capacity	3.0TB		
	Height	1 in; 2.54 cm		
	Width		Media Diameter	3.5 in; 8.9 cm
			Physical Size	4.0 in; 10.17 cm
	Interface	Serial ATA (6.0Gb/s), NCQ enabled		
	Synchronous Transfer Rate (Maximum)	Up to 6.0 Gb/s		
	Buffer	64MB		
	Seek Time (typical reads, includes controller overhead, including settling)		Single Track	0.6 ms
			Average	11 ms
			Full Stroke	Not Specified
	Rotational Speed	7,200 rpm		
	Operating Temperature	41° to 140° F (5° to 60° C)		
1TB SATA 7200 rpm 6Gb/s 3.5" HDD (Enterprise Class)	Capacity	1TB		
	Protocol	SATA		
	Form Factor	3.5"		
	Controller	AHCI		
	Reliability (MTBF)	2.0M hours		
	Rated Power On Hours	8760/yr		
	Annualized Failure Rate (based on Rated POH)	<0.62%		
	Rated for 24/7/365 operation	YES		
	Physical Size (Height)	1 in; 2.54 cm		
	Physical Size (Width)	4 in; 10.17 cm		
	Media Diameter	3.5 in; 8.9 cm		
	Interface	Serial ATA (6Gb/s), NCQ enabled		
	Synchronous Transfer Rate (Maximum)	Up to 600MB/s		
	Buffer	128MB		
	Seek Time (typical reads, includes controller overhead, including settling)		Single Track	0.32ms
			Average	7.45ms
			Full Stroke	14.2ms
	Operating Temperature	41° to 140° F (5° to 60° C)		
	Performance		Sequential Read	up to 226MB/s
			Sequential Write	up to 226MB/s
	Enterprise Class Features	High Reliability		

Technical Specifications – Storage Hard Drives

4TB SATA 7200 rpm 6Gb/s 3.5" HDD HDD (Enterprise Class)

Capacity	4TB
Height	1 in; 2.54 cm
Width	Media Diameter 2.5 in; 6.36 cm
	Physical Size 2.75 in; 6.99 cm
Interface	Serial ATA (6Gb/s), NCQ enabled
Synchronous Transfer Rate (Maximum)	Up to 600MB/s
Buffer	128MB
Seek Time (typical reads, includes controller overhead, including settling)	Single Track 0.7ms
	Average 8.5ms
	Full Stroke 15.7ms
Rotational Speed	7,200 rpm
Operating Temperature	41° to 131° F (5° to 55° C)

500GB SATA 7.2K SED SFF HDD

Capacity	500GB
Height	0.275 in; 0.7 cm
Width	Media Diameter 2.5 in; 6.36 cm
	Physical Size 2.75 in; 6.99 cm
Interface	Serial ATA (6Gb/s)
Synchronous Transfer Rate (Maximum)	Up to 600MB/s
Buffer	32MB
Seek Time (typical reads, includes controller overhead, including settling)	Single Track 1ms
	Average 4.2ms
	Full Stroke 25ms (typical)
Rotational Speed	7,200 rpm
Operating Temperature	32° to 140° F (0° to 60° C)

1TB SATA 7200 rpm 8GB 3.5" SSHD (hybrid)

Capacity	1TB
Height	1 in; 2.54 cm
Width	Media Diameter 3.5 in; 8.9 cm
	Physical Size 4 in; 10.17 cm
Interface	6Gb/s SATA
Synchronous Transfer Rate (Maximum)	Up to 600MB/s
Buffer	64MB standard HDD cache buffer
Cache	8GB NAND flash
Rotational Speed	7200 rpm
Operating Temperature	32° to 140° F (0° to 60° C)

Technical Specifications – Storage Hard Drives

SATA SSDs for HP Workstations	HP 128GB SATA 6Gb/s SSD	Capacity	128GB								
		Protocol	SATA								
		Form Factor	2.5"								
		Controller	AHCI								
		NAND Type	MLC								
		Endurance	100TBW (TB Written)								
		Reliability (MTTF)	1.5M hours								
		Physical Size (Height)	0.28 in; 0.7 cm								
		Physical Size (Width)	2.5 in; 6.36 cm								
		Interface	SATA 6Gb/s								
		Synchronous Transfer Rate (Maximum)	Up to 550MB/s (Sequential Read)								
		Operating Temperature	32° to 158° F (0° to 70° C)								
		Performance	<table border="0"> <tr> <td>Sequential Read</td> <td>560 MB/s</td> </tr> <tr> <td>Sequential Write</td> <td>400 MB/s</td> </tr> <tr> <td>Random Read</td> <td>90K IOPS</td> </tr> <tr> <td>Random Write</td> <td>88K IOPS</td> </tr> </table>	Sequential Read	560 MB/s	Sequential Write	400 MB/s	Random Read	90K IOPS	Random Write	88K IOPS
		Sequential Read	560 MB/s								
		Sequential Write	400 MB/s								
Random Read	90K IOPS										
Random Write	88K IOPS										
	HP 256GB SATA 6Gb/s SSD	Capacity	256GB								
		Protocol	SATA								
		Form Factor	2.5"								
		Controller	AHCI								
		NAND Type	MLC								
		Endurance	200TBW (TB Written)								
		Reliability (MTTF)	1.5M hours								
		Physical Size (Height)	0.28 in; 0.7 cm								
		Physical Size (Width)	2.5 in; 6.36 cm								
		Interface	SATA 6Gb/s								
		Synchronous Transfer Rate (Maximum)	Up to 600MB/s								
		Operating Temperature	32° to 158° F (0° to 70° C)								
		Performance	<table border="0"> <tr> <td>Sequential Read</td> <td>560MB/s (max)</td> </tr> <tr> <td>Sequential Write</td> <td>510MB/s (max)</td> </tr> <tr> <td>Random Read</td> <td>100K IOPS (max)</td> </tr> <tr> <td>Random Write</td> <td>88K IOPS (max)</td> </tr> </table>	Sequential Read	560MB/s (max)	Sequential Write	510MB/s (max)	Random Read	100K IOPS (max)	Random Write	88K IOPS (max)
		Sequential Read	560MB/s (max)								
		Sequential Write	510MB/s (max)								
Random Read	100K IOPS (max)										
Random Write	88K IOPS (max)										
	HP 256GB SATA 6Gb/s SED Opal 1 SSD	Capacity	256GB								
		Protocol	SATA								
		Form Factor	2.5"								
		Controller	AHCI								
		NAND Type	MLC								
		Endurance	200TBW (TB Written)								
		Reliability (MTTF)	1.5M hours								
		Physical Size (Height)	0.28 in; 0.7 cm								
		Physical Size (Width)	2.5 in; 6.36 cm								

Technical Specifications – Storage Hard Drives

	Interface	6Gb/s SATA								
	Synchronous Transfer Rate (Maximum)	Up to 550MB/s (Sequential Read)								
	Operating Temperature	32° to 158° F (0° to 70° C)								
	Performance	<table border="0"> <tr> <td>Sequential Read</td> <td>560MB/s</td> </tr> <tr> <td>Sequential Write</td> <td>510 MB/s</td> </tr> <tr> <td>Random Read</td> <td>100K IOPS</td> </tr> <tr> <td>Random Write</td> <td>88K IOPS</td> </tr> </table>	Sequential Read	560MB/s	Sequential Write	510 MB/s	Random Read	100K IOPS	Random Write	88K IOPS
Sequential Read	560MB/s									
Sequential Write	510 MB/s									
Random Read	100K IOPS									
Random Write	88K IOPS									
	Self-Encrypting Drive Support	OPAL 1								
HP 512GB SATA 6Gb/s SSD	Capacity	512GB								
	Protocol	SATA								
	Form Factor	2.5"								
	Controller	AHCI								
	NAND Type	MLC								
	Endurance	300TBW (TB Written)								
	Reliability (MTTF)	1.5M hours								
	Physical Size (Height)	0.28 in; 0.7 cm								
	Physical Size (Width)	2.5 in; 6.36 cm								
	Interface	SATA 6Gb/s								
	Synchronous Transfer Rate (Maximum)	Up to 550MB/s (Sequential Read)								
	Operating Temperature	32° to 158° F (0° to 70° C)								
	Performance	<table border="0"> <tr> <td>Sequential Read</td> <td>560 MB/s</td> </tr> <tr> <td>Sequential Write</td> <td>510 MB/s</td> </tr> <tr> <td>Random Read</td> <td>100K IOPS</td> </tr> <tr> <td>Random Write</td> <td>88K IOPS</td> </tr> </table>	Sequential Read	560 MB/s	Sequential Write	510 MB/s	Random Read	100K IOPS	Random Write	88K IOPS
Sequential Read	560 MB/s									
Sequential Write	510 MB/s									
Random Read	100K IOPS									
Random Write	88K IOPS									
HP 512GB SATA SED SSD	Capacity	512GB								
	Protocol	SATA								
	Form Factor	2.5"								
	Controller	AHCI								
	NAND Type	MLC								
	Endurance	300TBW (TB Written)								
	Reliability (MTTF)	1.5M hours								
	Physical Size (Height)	0.28 in; 0.7 cm								
	Physical Size (Width)	2.5 in; 6.36 cm								
	Interface	SATA 6Gb/s								
	Synchronous Transfer Rate (Maximum)	Up to 600MB/s								
	Operating Temperature	32° to 158° F (0° to 70° C)								
	Performance	<table border="0"> <tr> <td>Sequential Read</td> <td>560 MB/s</td> </tr> <tr> <td>Sequential Write</td> <td>510 MB/s</td> </tr> <tr> <td>Random Read</td> <td>100K IOPS</td> </tr> <tr> <td>Random Write</td> <td>88K IOPS</td> </tr> </table>	Sequential Read	560 MB/s	Sequential Write	510 MB/s	Random Read	100K IOPS	Random Write	88K IOPS
Sequential Read	560 MB/s									
Sequential Write	510 MB/s									
Random Read	100K IOPS									
Random Write	88K IOPS									

Technical Specifications – Storage Hard Drives

	Self-Encrypting Drive Support	OPAL 1 and 2								
HP 1TB SATA 6Gb/s SSD	Capacity	1TB								
	Protocol	SATA								
	Form Factor	2.5"								
	Controller	AHCI								
	NAND Type	MLC								
	Endurance	400TBW (TB Written)								
	Reliability (MTTF)	1.5M hours								
	Physical Size (Height)	0.28 in; 0.7 cm								
	Physical Size (Width)	2.5 in; 6.36 cm								
	Interface	SATA 6Gb/s								
	Synchronous Transfer Rate (Maximum)	Up to 550MB/s (Sequential Read)								
	Operating Temperature	32° to 158° F (0° to 70° C)								
	Performance	<table border="0"> <tr> <td>Sequential Read</td> <td>560 MB/s</td> </tr> <tr> <td>Sequential Write</td> <td>510 MB/s</td> </tr> <tr> <td>Random Read</td> <td>100K IOPS</td> </tr> <tr> <td>Random Write</td> <td>88K IOPS</td> </tr> </table>	Sequential Read	560 MB/s	Sequential Write	510 MB/s	Random Read	100K IOPS	Random Write	88K IOPS
	Sequential Read	560 MB/s								
Sequential Write	510 MB/s									
Random Read	100K IOPS									
Random Write	88K IOPS									
HP 2TB SATA 6Gb/s SSD	Capacity	2TB								
	Protocol	SATA								
	Form Factor	2.5"								
	Controller	AHCI								
	NAND Type	3D TLC								
	Endurance	400TBW (TB Written)								
	Reliability (MTTF)	1.5M hours								
	Physical Size (Height)	0.28 in; 0.7 cm								
	Physical Size (Width)	2.5 in; 6.36 cm								
	Interface	SATA 6Gb/s								
	Synchronous Transfer Rate (Maximum)	Up to 550MB/s (Sequential Read)								
	Operating Temperature	32° to 158° F (0° to 70° C)								
	Performance	<table border="0"> <tr> <td>Sequential Read</td> <td>530 MB/s</td> </tr> <tr> <td>Sequential Write</td> <td>500 MB/s</td> </tr> <tr> <td>Random Read</td> <td>92K IOPS</td> </tr> <tr> <td>Random Write</td> <td>83K IOPS</td> </tr> </table>	Sequential Read	530 MB/s	Sequential Write	500 MB/s	Random Read	92K IOPS	Random Write	83K IOPS
	Sequential Read	530 MB/s								
Sequential Write	500 MB/s									
Random Read	92K IOPS									
Random Write	83K IOPS									
HP Enterprise Class 240GB SATA SSD	Capacity	240GB								
	Protocol	SATA								
	Form Factor	2.5"								
	Controller	AHCI								
	NAND Type	MLC								
	Endurance	920TBW (TB Written)								
	Reliability (MTTF)	2.0M hours								
Physical Size (Height)	0.28 in; 0.7 cm									

Technical Specifications – Storage Hard Drives

Physical Size (Width)	2.5 in; 6.36 cm	
Interface	6Gb/s SATA	
Synchronous Transfer Rate (Maximum)	Up to 600MB/s	
Operating Temperature	32° to 158° F (0° to 70° C)	
Performance	Sequential Read	420 MB/s
	Sequential Write	290 MB/s
	Random Read	63K IOPS
	Random Write	18K IOPS
Enterprise Class Features	High Endurance NAND Power Loss Protection End-to-End Data Protection	

HP Enterprise Class 480GB SATA SSD

Capacity	480GB	
Protocol	SATA	
Form Factor	2.5"	
Controller	AHCI	
NAND Type	MLC	
Endurance	1850TBW (TB Written)	
Reliability (MTTF)	2.0M hours	
Physical Size (Height)	0.28 in; 0.7 cm	
Physical Size (Width)	2.5 in; 6.36 cm	
Interface	6Gb/s SATA	
Synchronous Transfer Rate (Maximum)	Up to 600MB/s	
Operating Temperature	32° to 158° F (0° to 70° C)	
Performance	Sequential Read	420 MB/s
	Sequential Write	380 MB/s
	Random Read	63K IOPS
	Random Write	23K IOPS
Enterprise Class Features	High Endurance NAND Power Loss Protection End-to-End Data Protection	

PCIe SSDs for HP Workstations

HP Z Turbo Drive G2 256GB SSD

Capacity	256GB	
Protocol	PCIe	
Form Factor	Half-height, half-length	
Controller	NVMe	
NAND Type	MLC	
Endurance	146TB	
Reliability (MTBF)	1.5M hours	
Interface	PCI Express 3.0 x4 electrical x4 physical	
Operating Temperature	32° to 158° F (0° to 70° C)	
Performance	Sequential Read	2150 MB/s
	Sequential Write	1260 MB/s
	Random Read	300K IOPS

Technical Specifications – Storage Hard Drives

		Random Write	100K IOPS
HP Z Turbo Drive G2 512GB SSD	Capacity	512GB	
	Protocol	PCIe	
	Form Factor	Half-height, half-length	
	Controller	NVMe	
	NAND Type	MLC	
	Endurance	292TB	
	Reliability (MTBF)	1.5M hours	
	Interface	PCI Express 3.0 x4 electrical x4 physical	
	Operating Temperature	32° to 158° F (0° to 70° C)	
	Performance	Sequential Read	2150 MB/s
		Sequential Write	1550 MB/s
		Random Read	300K IOPS
		Random Write	100K IOPS
HP Z Turbo Drive G2 1TB SSD	Capacity	1TB	
	Protocol	PCIe	
	Form Factor	Half-height, half-length	
	Controller	NVMe	
	NAND Type	MLC	
	Endurance	600TB	
	Reliability (MTTF)	1.5M hours	
	Interface	PCI Express 3.0 x4 electrical x4 physical	
	Operating Temperature	32° to 158° F (0° to 70° C)	
	Performance	Sequential Read	2500 MB/s
		Sequential Write	1550 MB/s
		Random Read	210K IOPS
		Random Write	130K IOPS
HP Z Turbo Drive G2 256GB TLC SSD	Capacity	256GB	
	Protocol	PCIe	
	Form Factor	M.2 in Half-height, half-length card	
	Controller	NVMe	
	NAND Type	3D TLC	
	Endurance	75TBW (TB Written)	
	Reliability (MTBF)	1.5M hours	
	Interface	PCI Express 3.0 x4 electrical x4 physical	
	Operating Temperature	32° to 158° F (0° to 70° C)	
	Performance	Sequential Read	2800 MB/s
		Sequential Write	320 MB/s (1100 MB/s max/Turbo)
		Random Read	250K IOPS
		Random Write	180K IOPS

Technical Specifications – Storage Hard Drives

HP Z Turbo Drive G2 512GB TLC SSD	Capacity	512GB
	Protocol	PCIe
	Form Factor	M.2 in Half-height, half-length card
	Controller	NVMe
	NAND Type	3D TLC
	Endurance	150TBW (TB Written)
	Reliability (MTBF)	1.5M hours
	Interface	PCI Express 3.0 x4 electrical x4 physical
	Operating Temperature	32° to 158° F (0° to 70° C)
	Performance	Sequential Read 2800 MB/s
		Sequential Write 660 MB/s (1600 MB/s max/Turbo)
		Random Read 260K IOPS
		Random Write 260K IOPS
HP Z Turbo Drive G2 1TB SSD	Capacity	1TB
	Protocol	PCIe
	Form Factor	M.2 in Half-height, half-length card
	Controller	NVMe
	NAND Type	3D TLC
	Endurance	300TBW (TB Written)
	Reliability (MTTF)	1.5M hours
	Interface	PCI Express 3.0 x4 electrical x4 physical
	Operating Temperature	32° to 158° F (0° to 70° C)
	Performance	Sequential Read 3000 MB/s
		Sequential Write 1150 MB/s (1700 MB/s max/Turbo)
		Random Read 360K IOPS
		Random Write 330K IOPS
HP Z Turbo Drive Quad Pro 2x256GB PCIe SSD	Capacity	512GB
	Protocol	PCIe
	Form Factor	PCIe Card, Full Height PCIe Slot
	Controller	NVMe
	NAND Type	MLC
	Endurance	146TB
	Reliability (MTTF)	1.5M hours
	Interface	PCIe Gen3 x4 architecture
	Operating Temperature	32° to 158° F (0° to 70° C)
	Performance	Sequential Read 2150 MB/s
		Sequential Write 1260 MB/s
		Random Read 300K IOPS
		Random Write 100K IOPS

Technical Specifications – Storage Hard Drives

HP Z Turbo Drive Quad Pro 2x512GB PCIe SSD	Capacity	1TB
	Protocol	PCIe
	Form Factor	PCIe Card, Full Height PCIe Slot
	Controller	NVMe
	NAND Type	MLC
	Endurance	292TB
	Reliability (MTTF)	1.5M hours
	Interface	PCIe Gen3 x4 architecture
	Operating Temperature	32° to 158° F (0° to 70° C)
	Performance	Sequential Read 2150 MB/s
		Sequential Write 1550 MB/s
		Random Read 300K IOPS
	Random Write 100K IOPS	
HP Z Turbo Drive Quad Pro 2x1TB PCIe SSD	Capacity	2TB
	Protocol	PCIe
	Form Factor	PCIe Card, Full Height PCIe Slot
	Controller	NVMe
	NAND Type	MLC
	Endurance	600TB
	Interface	PCI Express 3.0 x4 electrical x4 physical
	Operating Temperature	32° to 158° F (0° to 70° C)
	Performance	Sequential Read 3200 MB/s
		Sequential Write 1800 MB/s
		Random Read 430K IOPS
		Random Write 320K IOPS
HP Z Turbo Drive G2 256GB TLC SSD	Capacity	256GB
	Protocol	PCIe
	Form Factor	M.2 in Half-height, half-length card
	Controller	NVMe
	NAND Type	3D TLC
	Endurance	75TBW (TB Written)
	Reliability (MTBF)	1.5M hours
	Interface	PCI Express 3.0 x4 electrical x4 physical
	Operating Temperature	32° to 158° F (0° to 70° C)
	Performance	Sequential Read 2800 MB/s
		Sequential Write 320 MB/s (1100 MB/s max/Turbo)
		Random Read 250K IOPS
	Random Write 180K IOPS	
	Capacity 512GB	

Technical Specifications – Storage Hard Drives

HP Z Turbo Drive G2 512GB TLC SSD	Protocol	PCIe								
	Form Factor	M.2 in Half-height, half-length card								
	Controller	NVMe								
	NAND Type	3D TLC								
	Endurance	150TBW (TB Written)								
	Reliability (MTBF)	1.5M hours								
	Interface	PCI Express 3.0 x4 electrical x4 physical								
	Operating Temperature	32° to 158° F (0° to 70° C)								
	Performance	<table border="0"> <tr> <td>Sequential Read</td> <td>2800 MB/s</td> </tr> <tr> <td>Sequential Write</td> <td>660 MB/s (1600 MB/s max/Turbo)</td> </tr> <tr> <td>Random Read</td> <td>260K IOPS</td> </tr> <tr> <td>Random Write</td> <td>260K IOPS</td> </tr> </table>	Sequential Read	2800 MB/s	Sequential Write	660 MB/s (1600 MB/s max/Turbo)	Random Read	260K IOPS	Random Write	260K IOPS
	Sequential Read	2800 MB/s								
	Sequential Write	660 MB/s (1600 MB/s max/Turbo)								
	Random Read	260K IOPS								
Random Write	260K IOPS									
HP Z Turbo Drive G2 1TB TLC SSD	Capacity	1TB								
	Protocol	PCIe								
	Form Factor	M.2 in Half-height, half-length card								
	Controller	NVMe								
	NAND Type	3D TLC								
	Endurance	300TBW (TB Written)								
	Reliability (MTBF)	1.5M hours								
	Interface	PCI Express 3.0 x4 electrical x4 physical								
	Operating Temperature	32° to 158° F (0° to 70° C)								
	Performance	<table border="0"> <tr> <td>Sequential Read</td> <td>3000 MB/s</td> </tr> <tr> <td>Sequential Write</td> <td>1150 MB/s (1700 MB/s max/Turbo)</td> </tr> <tr> <td>Random Read</td> <td>360K IOPS</td> </tr> <tr> <td>Random Write</td> <td>330K IOPS</td> </tr> </table>	Sequential Read	3000 MB/s	Sequential Write	1150 MB/s (1700 MB/s max/Turbo)	Random Read	360K IOPS	Random Write	330K IOPS
	Sequential Read	3000 MB/s								
	Sequential Write	1150 MB/s (1700 MB/s max/Turbo)								
Random Read	360K IOPS									
Random Write	330K IOPS									
HP Z Turbo Drive G2 256GB SED SSD	Capacity	256GB								
	Protocol	PCIe								
	Form Factor	Half-height, half-length								
	Controller	NVMe								
	NAND Type	MLC								
	Endurance	150TBW (TB Written)								
	Reliability (MTTF)	1.5M hours								
	Interface	PCI Express 3.0 x4 electrical x4 physical								
	Operating Temperature	32° to 158° F (0° to 70° C)								
	Performance	<table border="0"> <tr> <td>Sequential Read</td> <td>3100 MB/s</td> </tr> <tr> <td>Sequential Write</td> <td>1400 MB/s</td> </tr> <tr> <td>Random Read</td> <td>330K IOPS</td> </tr> <tr> <td>Random Write</td> <td>280K IOPS</td> </tr> </table>	Sequential Read	3100 MB/s	Sequential Write	1400 MB/s	Random Read	330K IOPS	Random Write	280K IOPS
	Sequential Read	3100 MB/s								
	Sequential Write	1400 MB/s								
Random Read	330K IOPS									
Random Write	280K IOPS									
Self-Encrypting Drive Support	OPAL 2									

Technical Specifications – Storage Hard Drives

**HP Z Turbo Drive G2
512GB SED SSD**

Capacity	512GB	
Protocol	PCIe	
Form Factor	Half-height, half-length	
Controller	NVMe	
NAND Type	MLC	
Endurance	300TBW (TB Written)	
Reliability (MTBF)	1.5M hours	
Interface	PCI Express 3.0 x4 electrical x4 physical	
Operating Temperature	32° to 158° F (0° to 70° C)	
Performance	Sequential Read	3200 MB/s
	Sequential Write	1700 MB/s
	Random Read	330K IOPS
	Random Write	300K IOPS
Self-Encrypting Drive Support	OPAL 2	

Technical Specifications – Storage Hard Drives

HP Z Turbo Drive Quad Pro 256GB SSD module	Capacity	256GB (one M.2 PCIe NVMe module)
	Interface	PCI Express 3.0 x4 electrical x4 physical
	Operating Temperature	32° to 158° F (0° to 70° C)
HP Z Turbo Drive Quad Pro 512GB SSD module	Capacity	512GB (one M.2 PCIe NVMe module)
	Interface	PCI Express 3.0 x4 electrical x4 physical
	Operating Temperature	32° to 158° F (0° to 70° C)
HP Z Turbo Drive Quad Pro 1TB SSD module	Capacity	1TB (one M.2 PCIe NVMe module)
	Interface	PCI Express 3.0 x4 electrical x4 physical
	Operating Temperature	32° to 158° F (0° to 70° C)

Intel 750 Series AIC PCIe SSD	Intel 750 Series AIC 400GB PCIe SSD	Capacity	400GB
		Protocol	PCIe
		Form Factor	PCIe Card, Half Height
		Controller	NVMe
		NAND Type	MLC
		Endurance	127TBW (TB Written)
		Reliability (MTBF)	1.2M hours
		Operating Temperature	32° to 131° F (0° to 55° C)
		Performance	Sequential Read 2200 MB/s
			Sequential Write 900 MB/s
			Random Read 430K IOPS
			Random Write 230K IOPS
	Intel 750 Series AIC 800GB PCIe SSD	Intel 750 Series AIC 800GB PCIe SSD	Capacity
		Protocol	PCIe
		Form Factor	PCIe Card, Half Height
		Controller	NVMe
		NAND Type	MLC
		Endurance	127TBW (TB Written)
		Reliability (MTBF)	1.2M hours
		Operating Temperature	32° to 131° F (0° to 55° C)
		Performance	Sequential Read 2100 MB/s
			Sequential Write 800 MB/s
			Random Read 420K IOPS
			Random Write 210K IOPS

Technical Specifications – Storage Hard Drives

Intel 750 Series AIC 1.2TB PCIe SSD	Capacity	1.2TB
	Protocol	PCIe
	Form Factor	PCIe Card, Half Height
	Controller	NVMe
	NAND Type	MLC
	Endurance	127TBW (TB Written)
	Reliability (MTBF)	1.2M hours
	Operating Temperature	1.2TB
	Performance	Sequential Read 2500 MB/s
		Sequential Write 1200 MB/s
		Random Read 460K IOPS
	Random Write 290K IOPS	

HDD Carrier	HP 4-in-1 SFF (2.5in) HDD Carrier	Dimensions (L x W x H)	6.70 x 5.75 x 1.63 in
		Kit Contents	Drive Carrier, Drive trays (4), Power adapter
		Weight	1.77 lbs

Technical Specifications - Hard Drive Controllers

LSI 9270-8i SAS 6Gb/s ROC RAID Card and iBBU9 Battery Backup Unit	PCI Bus	x8 lane PCIe 3.0 compliant
	RAID Levels	RAID 0, 1, 5, and 6 RAID spans 10, 50 and 60
	PCI Card Type	Low profile, single PCIe slot design with full height bracket.
	PCI Voltage	+3.3V Add-in Card
	PCI Power	+3.3V, +12V
	Certification Level	PCI-Express 3.0
	IO Bus	Eight 6Gb/s and 3Gb/s compatible SAS/SATA ports
	SAS Processor	LSISAS2208 Dual-Core RAID on Chip (ROC)
	Internal Connectors	Two SAS SFF8087 x4 (Mini-SAS)
	External Connectors	None
	Maximum Number of SCSI Devices	Up to 128 SAS and/or SATA hard drives and SSDs Note: HP Workstations do not support this many internal drives.
	LED Indicators	Heartbeat LED on card

Technical Specifications – Graphics

GRAPHICS

NVIDIA NVS 310 1GB Graphics

Form Factor

Low Profile:
2.713 inches in height × 6.150 inches in length
Weight: ~142 grams

Graphics Controller

NVIDIA NVS 310
GPU: GF119-825

Bus Type

PCI Express x16, 2.0 compliant

Memory

Size: 1GBB DDR3
Clock: 875Mhz
Memory Bandwidth: 14GB/

Connectors

2x DisplayPort 1.2

Maximum Resolution

Up to 2560 × 1600 (digital display) per display.

Image Quality Features

The following video formats are supported:

- MPEG2
- MPEG4 Part 2 Advanced Simple Profile
- H.264 SVC codec support
- Support for 3D Blu Ray
- VC1
- DivX version 3.11 and later
- MVC

A full range of video resolutions are supported including 1080p, 1080i, 720p, 480p and 480i. The NVS 310 GPU provides hardware acceleration for the computationally intensive parts of video processing, as well as provides improved video playback speeds via faster decode and transcode.

Display Output

Up to 2 displays in the following configurations:

DisplayPort output:

- Drives two DisplayPort enabled digital display at resolutions up to 2560 × 1600 at 60 Hz with reduced blanking, when connected natively using the 2 DisplayPort connectors on the NVS 310 graphics card
- Supports 2 monitors up to resolution of 1920 × 1200 at 60 Hz with reduced blanking using DisplayPort 1.2 multi stream topology technology.

DVI-D output:

- Drives two digital display at resolutions up to 1920 × 1200 at 60 Hz with reduced blanking using DisplayPort to DVI-D single-link cable adaptors
- Drives two digital display at resolutions up to 2560 × 1600 at 60 Hz with reduced blanking using DisplayPort to DVI-D dual-link cable adaptors

HDMI output:

Technical Specifications – Graphics

- NVS 310 is capable of driving two high definition (HD) panels up to resolutions of 1920 × 1080P at 60 Hz using DisplayPort to HDMI cable adaptors

VGA display output:

- Drives two analog display at resolutions up to 1920 × 1200 at 60 Hz using DisplayPort to VGA cable adaptors

Shading Architecture Shader Model 5.0

Supported Graphics APIs DX11, OpenGL 4.1

Available Graphics Drivers Windows 8.1
Windows 8
Genuine Windows 7 Professional (64-bit and 32-bit)
Red Hat Enterprise Linux(RHEL)
SUSE Linux Enterprise Desktop 11 (64-bit and 32-bit)

HP qualified drivers may be preloaded or the latest HP qualified drivers are available from the HP support Web site:

<http://welcome.hp.com/country/us/en/support.html>

SUSE Linux Enterprise drivers may also be obtained from:

<ftp://download.nvidia.com/novell> or <http://www.nvidia.com>

Notes

1. The thermal solution used on this card is an active fan heatsink.
2. Factory configured NVS 310 graphics card have no cable adaptors included. Adapters must be ordered separately.
3. Option kit NVS 310 includes 2 DP to DVI-D cable adapters.
4. Configurations of three NVS 310 graphics cards in HP Z440 Workstation require the HP Z440 Fan and Front Card Guide Kit, configurable from the factory (CTO PN: G8T99AV) or as an Aftermarket Option (AMO PN: J9P80AA).

Technical Specifications – Graphics

NVIDIA NVS 315 512MB Graphics	Form Factor	Low Profile: 2.713 inches in height × 5.7 inches in length Weight: ~142 grams
	Graphics Controller	NVIDIA NVS 315 (using GF119-825 GPU) Number of Cores: 48 CUDA cores Max. Power: 19.3W Cooling Solution: Active fan heatsink
	Bus Type	PCI Express x16, 2.0 compliant
	Memory	Size: 1GB DDR3 Clock: 875MHz Memory Bandwidth: 14GB/s
	Connectors	DMS-59 output Cables included: - For CTO: DMS-59 to DVI cable - For AMO: DMS-59 to DVI cable and DMS-59 to VGA cable
	Maximum Resolution	Maximum number of displays supported: 2 Maximum Resolution Support: - DMS-59 to VGA: 2048 x 1536 @ 85Hz - DMS-59 to DVI: 1980 x 1200 @ 60Hz - DMS-59 to DP: 2560 x 1600 @ 60Hz
	Image Quality Features	See Display Output section. The following video formats are supported: - MPEG2 - MPEG4 Part 2 Advanced Simple Profile - H.264 SVC codec support - Support for 3D Blu Ray - VC1 - DivX version 3.11 or later A full range of video resolutions are supported including 1080p, 1080i, 720p, 480p and 480i. The NVS 315 GPU provides hardware acceleration for the computationally intensive parts of video processing, as well as provides improved video playback speeds via faster decode and transcode.
	Display Output	Up to 2 displays using one of the following DMS-59 cables: - DMS-59 to DVI - DMS-59 to VGA - DMS-59 to DP DisplayPort output: <ul style="list-style-type: none">• Drives two DisplayPort enabled digital displays at resolutions up to 2560 × 1600 at 60 Hz with reduced blanking, when connected via the DMS-59 to DP adapter. DVI-D output: <ul style="list-style-type: none">• Drives two digital displays at resolutions up to 1920 × 1200 at 60 Hz with reduced blanking using DMS-59 to DVI-D single-link cable adaptor

Technical Specifications – Graphics

VGA display output:

- Drives two analog displays at resolutions up to 2048 × 1536 at 85 Hz using DMS-59 to VGA cable adaptor.

Shading Architecture Shader Model 5.0
Supported Graphics APIs DX11, OpenGL 4.3

Available Graphics Drivers Windows 8
 Microsoft Windows 7 Professional (64-bit and 32-bit)
 Microsoft Windows XP Professional (64-bit and 32-bit)
 Red Hat Enterprise Linux(RHEL)
 SUSE Linux Enterprise Desktop 11 (64-bit and 32-bit)

HP qualified drivers may be preloaded or the latest HP qualified drivers are available from the HP support Web site:

<http://welcome.hp.com/country/us/en/support.html>

SUSE Linux Enterprise drivers may also be obtained from:

<ftp://download.nvidia.com/novell> or <http://www.nvidia.com>

NOTES:

1. The thermal solution used on this card is an active fan heatsink.
2. Factory configured graphics card includes DMS-59 to DVI cable.
3. Option kit graphics card includes DMS-59 to DVI and DMS-59 to VGA cables (one each).

NVIDIA NVS 510 2GB Graphics

Form Factor	Low Profile, 2.713 inches × 6.3 inches, single slot
Graphics Controller	NVS 510 GPU Core Clock: 797 MHz Memory Clock: 891 MHz CUDA Cores: 192
Bus Type	PCI Express x16, Generation 2.0
Memory	2GB DDR3
Connectors	Four mini-DisplayPort. Four mini-DisplayPort to DisplayPort adapters included. (DisplayPort to DVI-D, DisplayPort to VGA, DisplayPort to HDMI, and DisplayPort to Dual-Link DVI adapters available as separate accessories)
Maximum Resolution	Mini-DisplayPort connectors support ultra-high-resolution panels (up to 3840 x 2160 @ 60Hz) NOTE: This card supports up to four displays. For Windows XP, only 2 active displays are supported.
Image Quality Features	10-bit internal display processing, including hardware support for 10-bit scan-out
Display Output	DisplayPort with Multi-Stream Technology (MST) and High Bit Rate 2 (HBR2) support. Digital Display Support 1. DisplayPort Output

Technical Specifications – Graphics

- Drives four DisplayPort enabled digital display at resolutions up to 3840 × 2160 at 60 Hz with reduced blanking, when connected natively using the 4 DisplayPort connectors on the NVS 510 graphics card.
- DisplayPort Multi-Stream Topology (MST) Technology: Supports various combinations of display resolutions and number of displays when using DisplayPort multi stream topology technology – up to a maximum of 4 monitors at a resolution of 1920 × 1200 at 60 Hz with reduced blanking.

2. DVI-D Output

- Drives four digital displays at resolutions up to 1920 × 1200 at 60 Hz with reduced blanking using DisplayPort to DVI-D single-link cable adaptors.
- Drives four digital displays at resolutions up to 2560 × 1600 at 60 Hz with reduced blanking using DisplayPort to DVI-D dual-link cable adaptors.

HDMI Output

- The NVS 510 graphics board is capable of driving four high definition (HD) panels up to resolutions of 1920 × 1080P at 60 Hz using DisplayPort to HDMI cable adaptors.

Analog Display Support

1. VGA display output

- Drives four analog displays at resolutions up to 1920 × 1200 at 60 Hz using DisplayPort to VGA cable adaptors.

Supported Graphics APIs Full Microsoft DirectX 11, Shader Model 5.0 support
Full OpenGL 4.3 support

Available Graphics Drivers Genuine Windows 7 Professional (64-bit and 32-bit)
Microsoft Windows XP Professional (64-bit and 32-bit)
Red Hat Enterprise Linux(RHEL) 6 Desktop/Workstation
SUSE Linux Enterprise Desktop 11 (64-bit and 32-bit)

HP qualified drivers may be preloaded or available from the HP support Web site:

<http://welcome.hp.com/country/us/en/support.html>

NOTE: Heatsink cooler design is active.

Graphics Cable Adapter option choice is available starting Feb 1 2013 for the following graphics cards:

NVS 310, Quadro 410, Quadro K5000, FirePro V3900, FirePro W7000

New Graphics Cards introduced after Feb 1 2013 will be eligible for choosing Graphics Cable Adapters, unless otherwise specified.

No cable choice for NVS 300, NVS 510.

Maximum number of cables allowed is 8.

Graphics Cable Adapters

Technical Specifications – Graphics

NVIDIA® Quadro® K420 2GB Graphics	Form Factor	<p>Low Profile: 2.713 inches × 6.3 inches Cooling: Active</p>
	Graphics Controller	<p>NVIDIA® Quadro® K420 GPU: GK107 with 192 CUDA cores Power: 41W</p>
	Bus Type	<p>PCI Express x16, 2.0 compliant</p>
	Memory	<p>Size: 2GB DDR3 Clock: 891MHz Memory Bandwidth: 29GB/s Memory Width: 128 bit</p>
	Connectors	<p>One dual-link DVI-I connector One DisplayPort connector</p> <p>Factory Configured: No video cable adapter included After market option kit: One DP-to-DVI adapter included with card</p> <p>Additional DisplayPort-to-VGA or DisplayPort-to-DVI adapters are available as Factory Configuration or Option Kit accessories.</p>
	Maximum Resolution	<p>VGA (via adapter cable): - 2048 × 1536 × 32 bpp at 85 Hz</p> <p>Dual-link DVI - 2560 × 1600 × 32 bpp at 60 Hz (reduced blanking)</p> <p>Single-link DVI - 1920 × 1200 × 32 bpp at 60 Hz (reduced blanking)</p> <p>DisplayPort 1.2 - 3840 × 2160 × 30 bpp at 60 Hz</p>
	Image Quality Features	<p>12-bit internal display pipeline (hardware support for 12-bit scanout on supported panels, applications and connection)</p> <p>Stereoscopic 3D display support including NVIDIA® 3D Vision™ technology, 3D DLP, Interleaved, and passive stereo</p>
	Display Output	<p>Maximum number of displays: - 2 direct attached monitors - 4 using DP 1.2a with MST and HBR2 enabled monitors</p> <p>Maximum number of DisplayPort displays possible (may require MST and/or HBR2): - 4 1920x1200 - 2 2560x1600 - 1 3840x2160</p> <p>Maximum number of monitors across all available Quadro K420 outputs is 4.</p>
	Shading Architecture	<p>Shader Model 5.0</p>

Technical Specifications – Graphics

Supported Graphics APIs	DX11, OpenGL 4.4 Programming support for CUDA C, CUDA C++, DirectCompute 5.0, OpenCL, Python, and Fortran
Available Graphics Drivers	Microsoft Windows 8.1 Microsoft Windows 8 Microsoft Windows 7 Linux - Full OpenGL implementation, complete with NVIDIA and ARB extensions
Notes	<ol style="list-style-type: none"> 1. Factory configured Quadro K420 does not include any video adapters. Adapters must be ordered separately. 2. Option kit Quadro K420 includes one DP to DVI-D adapter. 3. Full Height Profile bracket installed. Low Profile bracket included in after market kit.

NVIDIA® Quadro® K620 2GB Graphics	Form Factor	2.713" H x 6.3" L Single Slot, Low Profile Full Height Profile bracket installed Low Profile bracket included Weight: 133 grams
	Graphics Controller	NVIDIA® Quadro® K620 Graphics Card GM107 GPU 384 CUDA cores Max Power: 45 Watts
	Bus Type	PCI Express 2.0 x16
	Memory	2 GB GDDR3, 900 MHz 128-bit memory I/O path 29 GB/s memory bandwidth
	Connectors	1 DL-DVI(I) output, 1 DisplayPort output Factory Configured: No video cable adapter included Option Kit: One DP-to-DVI adapter included with card
	Maximum Resolution	Additional DVI-to-VGA, DisplayPort-to-VGA or DisplayPort-to-DVI adapters are available as Factory Configuration or Option Kit accessories. DisplayPort 1.2: - up to 4096x2160 x 30 bpp @ 60Hz - supports High Bit Rate 2 (HBR2) and Multi-Stream Transport (MST) Dual Link DVI(I) output: - up to 2560 x 1600 x 32 bpp @ 60Hz Single Link-DVI(I) output: - up to 1920 x 1200 x 32 bpp @ 60Hz
	Image Quality Features	10-bit internal display processing pipeline 10-bit scan-out support
	Display Output	1 Dual-link DVI-I connector 1 Display Port connector
	Shading Architecture	Full Microsoft DirectX 11.1 Shader Model 5.0
	Supported Graphics APIs	OpenGL 4.4 DirectX 11.1 API support includes:

Technical Specifications – Graphics

Available Graphics Drivers	<p>CUDA C, CUDA C++, DirectCompute 5.0, OpenCL, Java, Python, and Fortran</p> <p>Microsoft Windows 8.1 Microsoft Windows 8 Microsoft Windows 7 Linux</p> <p>HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html</p> <ol style="list-style-type: none"> 1. Factory configured Quadro K620 does not include a video cable adapter. Video cable adapters must be ordered separately. 2. Quadro K620 offered as an Option Kit (AMO) includes one DP-to-DVI video cable adapter. Additional cables must be ordered separately.
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NVIDIA® Quadro® P600 2GB Graphics	<p>Form Factor Dimensions: 2.713” H x 5.7” L Single Slot, Low Profile Cooling: Active Weight: 129 grams</p> <p>Graphics Controller NVIDIA® Quadro® P600 Graphics Card GP107-850 GPU 384 CUDA cores Max Power: 40 Watts</p> <p>Bus Type PCI Express 3.0 x16</p> <p>Memory Size: 2 GB GDDR5, 2000 MHz Memory Interface: 128-bit Memory Bandwidth: 64 GB/s</p> <p>Connectors 4mDP Outputs*</p> <p>Maximum Resolution DisplayPort 1.4: - up to 4x 5120 x 2880 x 24 bpp @ 60Hz - supports Multi-Stream Transport (MST)</p> <p>Image Quality Features 10-bit internal display processing pipeline 10-bit scan-out support</p> <p>Display Output 4 mDP Connectors</p> <p>Shading Architecture Full Microsoft DirectX 12 Shader Model 5.1</p> <p>Supported Graphics APIs OpenGL 4.5 DirectX 12 Vulkan 1.0 API support includes: CUDA C, CUDA C++, DirectCompute , OpenCL</p> <p>Available Graphics Drivers Microsoft Windows 10 Microsoft Windows 8.1 Microsoft Windows 7 Linux</p> <p>HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html</p>
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Technical Specifications – Graphics

Notes

- *P400, P600 and P1000 only have mini-DisplayPort (mDP) video ports.
- Note 1:** Two mDP-to-DP adapters will ship with each P400, P600 or P1000 configured in HP Z Workstations Compatibles.
- Note 2:** AMO kits for P400, P600, P1000 and Adapters will ship in July 2017.
- Two mDP-to-DP Adapters are included in the P400, P600 and P1000 AMO kits.
 - If mDP-to-DP Adapters are needed, Adapters can be ordered separately:
 - 2KW86A6 - HP (Bulk 4) miniDP-to-DP Adapter Cables
 - 2KW87A6 - HP (Bulk 12) miniDP-to-DP Adapter Cables

AMD FirePro W4300 4GB Graphics

Form Factor

Low Profile, single slot (6.6" x 3.118")
Full Height, single slot (6.6" x 4.725")

Graphics Controller

AMD FirePro W4300 graphics
GPU Frequency: 930Mhz
Memory Clock Speed: 1500Mhz
GPU: 768 Stream Processors organized into 12 Compute Units
Power: <50 Watts
Cooling: Active

Bus Type

PCI Express® x16, Generation 3.0

Memory

4GB GDDR5 memory
Memory Bandwidth: up to 96 GB/s
Memory Width: 128 bit

Connectors

4x Mini Display Port 1.2 connectors with HBR2 and MST support.

Factory Configured: No video cable adapter included
After market option kit: No video cable adapter included

Additional DisplayPort-to-VGA, DisplayPort-to-HDMI, or DisplayPort-to-DVI adapters are available as Factory Configuration or Option Kit accessories.

Maximum Resolution

DisplayPort:
- 4096x2160 @24bpp (3 x 4K @ 60Hz, 4 x 4K @ 30Hz)

Image Quality Features

Advanced support for 8-bit, 10-bit, and 16-bit per RGB color component.
High bandwidth scaler for high quality up and downscaling
Incorporated Adaptive-Sync enables FreeSync™ technology from AMD that allows GPU control of display refresh rates for tear-free and jitter-free image quality when rotating models or viewing video content.(Requires FreeSync compliant displays)

Display Output

Max number of monitors supported using DisplayPort 1.2a:

- 4 direct attached monitors
- 6 using DP 1.2a with MST and HBR2 enabled monitors

Monitor chaining from a single DisplayPort (subject to a max of 6 total monitors across all outputs, requires use of DisplayPort enabled monitors supporting MST and HBR2):

Technical Specifications – Graphics

- one 4096x2160 display
- two 2560x1600 displays
- four 1920x1200 displays

Shading Architecture	Shader Model 5.0
Supported Graphics APIs	OpenGL 4.4 OpenCL 2.0 DirectX 12.0
Available Graphics Drivers	Windows 10 (64-bit and 32-bit) Windows® 7 (64-bit and 32-bit) Linux

HP qualified drivers may be preloaded or available from the HP support Web site:

<http://welcome.hp.com/country/us/en/support.html>

Notes	<ol style="list-style-type: none"> 1. AMD Eyefinity technology supports up to six DisplayPort™ monitors on an enabled graphics card. Supported display quantity, type and resolution vary by model and board design; confirm specifications with manufacturer before purchase. To enable more than two displays, or multiple displays from a single output, additional hardware such as DisplayPort-ready monitors or DisplayPort 1.2 MST-enabled hubs may be required. A maximum of two active adapters is recommended for consumer systems. See www.amd.com/eyefinityfaq for full details. 2. Configurations of two FirePro W4300 graphics cards in HP Z440 Workstation require the HP Z440 Fan and Front Card Guide Kit, configurable from the factory (CTO PN: G8T99AV) or as an Aftermarket Option (AMO PN: J9P80AA).
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AMD FirePro W2100 2GB Graphics	Form Factor	Low Profile, half length (full-height bracket included)
	Graphics Controller	AMD FirePro™ W2100 professional graphics based on Oland GPU. GPU: 320 Stream Processors organized into 5 Compute Units GPU Frequency: 630MHz Power: 35W Cooling: Active
	Bus Type	PCI Express® x8, Generation 3.0
	Memory	2GB DDR3 memory Memory Bandwidth: 28.8 GB/s Memory Width: 128bit
	Connectors	2x Display Port 1.2 connectors Factory Configured: No video cable adapter included Option Kit: One DP-to-DVI adapter included with card Additional DisplayPort-to-VGA or DisplayPort-to-DVI adapters are available as Factory Configuration or Option Kit accessories.
	Maximum Resolution	DisplayPort 1.2: up to 4096x2160 x 30 bpp @ 60Hz Dual Link DVI(I) (requires adapter cable):

Technical Specifications – Graphics

	up to 2560 x 1600 x 32 bpp @ 60Hz
	Single Link-DVI(I)(requires adapter): up to 1920 x 1200 x 32 bpp @ 60Hz
	VGA(requires adapter): up to 1920 x 1200 x 32 bpp @ 60Hz
Image Quality Features	Advanced support for 8-bit, 10-bit, and 16-bit per RGB color component. High bandwidth scaler for high quality up and downscaling.
Display Output	2 x DisplayPort® 1.2 Maximum number of displays: 2
Shading Architecture	Shader Model 5.0
Supported Graphics APIs	OpenCL™ 2.0, DirectX® 11.2/12 and OpenGL 4.4
Available Graphics Drivers	Windows 8.1 (64-bit and 32-bit) Windows 7 (64-bit and 32-bit) Linux HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html
	NOTE: Depending on the card model, native DisplayPort™ connectors and/or certified DisplayPort™ active or passive adapters to convert your monitor's native input to your card's DisplayPort™ or Mini-DisplayPort™ connector(s) may be required. See http://www.amd.com/firepro for details

NVIDIA® Quadro® K1200 4GB Graphics	Form Factor	Dimensions: 2.71" H x 6.875" L Single Slot, Low Profile Cooling: Active Weight: ~175 grams
	Graphics Controller	NVIDIA® Quadro® K1200 Graphics Card GPU: GM107 with 512 CUDA cores Power: 46 Watts
	Bus Type	PCI Express 2.0 x16
	Memory	Size: 4GB GDDR5 Memory Bandwidth: 80 GB/s Memory Width: 128-bit
	Connectors	4 mini-DisplayPort 1.2a Factory Configured Option: 4 mini-DP-to-DP adapters included with card Option Kit: 4 mini-DP-to-DP adapters included with card Additional DisplayPort-to-VGA or DisplayPort-to-DVI adapters are available as accessories
	Maximum Resolution	DisplayPort: - up to 4096 x 2160 x 30 bpp @ 60Hz - supports High Bit Rate 2 (HBR2) and Multi-Stream Transport (MST)

Technical Specifications – Graphics

DL-DVI(I) output:
- up to 2560 x 1600 x 32 bpp @ 60Hz

Single Link-DVI(I) output:
- up to 1920 x 1200 x 32 bpp @ 60Hz

VGA (via adapter cable):
- 2048 x 1536 x 32 bpp at 85 Hz

Image Quality Features 12-bit internal display pipeline (hardware support for 12-bit scanout on supported panels, applications and connection)

Display Output Maximum number of displays
- 4 direct attached monitors

Maximum number of DisplayPort displays possible:
- 4 1920x1200
- 4 2560x1600
- 4 4096x2160

Maximum number of monitors across all available Quadro K1200 outputs is 4.

Shading Architecture Shader Model 5.0

Supported Graphics APIs OpenGL 4.4
DirectX 11.1

API support includes:
CUDA C, CUDA C++, DirectCompute 5.0, OpenCL, Java, Python, and Fortran

Available Graphics Drivers Microsoft Windows 8.1
Microsoft Windows 8
Microsoft Windows 7
Linux - Full OpenGL implementation, complete with NVIDIA and ARB extensions

HP qualified drivers may be preloaded or available from the HP support Web site:
<http://welcome.hp.com/country/us/en/support.html>

Notes

1. Quadro K1200 offered as Factory Configured Option includes 4 miniDP to DP video cable adapters. Other video cable adapters must be ordered separately.
2. Quadro K1200 offered as an Option Kit includes 4 mini-DP to DP adapters. Additional cables must be ordered separately.
3. A total maximum of 4 active monitors are supported across all display output types. This may be accomplished by using daisy chained DisplayPort 1.2 displays (displays must support MST and HBR2).

Technical Specifications – Graphics

NVIDIA® Quadro® K2200 4GB Graphics	Form Factor	Dimensions: 4.38" H x 7.97" L Single Slot, Full Height Cooling: Active
	Weight:	240 grams
	Graphics Controller	NVIDIA® Quadro® K2200 Graphics Card GM107 GPU with 640 CUDA cores Power: 68 Watts
	Bus Type	PCI Express 2.0 x16
	Memory	Size: 4 GB GDDR5 Memory Bandwidth: 80 GB/s Memory Width: 128-bit
	Connectors	1 DL-DVI(I) 2 DisplayPort 1.2a
		Factory Configured Option: No video cable adapter included Option Kit: One DP-to-DVI adapter included with card
		Additional DVI-to-VGA, DisplayPort-to-VGA or DisplayPort-to-DVI adapters are available as accessories
	Maximum Resolution	DisplayPort: - up to 4096 x 2160 x 30 bpp @ 60Hz - supports High Bit Rate 2 (HBR2) and Multi-Stream Transport (MST) DL-DVI(I) output: - up to 2560 x 1600 x 32 bpp @ 60Hz Single Link-DVI(I) output: - up to 1920 x 1200 x 32 bpp @ 60Hz VGA (via adapter cable): - 2048 x 1536 x 32 bpp at 85 Hz
	Image Quality Features	12-bit internal display pipeline (hardware support for 12-bit scanout on supported panels, applications and connection) Stereoscopic 3D display support including NVIDIA® 3D Vision™ technology, 3D DLP, Interleaved, and passive stereo
	Display Output	Maximum number of displays - 3 direct attached monitors - 4 using DP 1.2a with MST and HBR2 enabled monitors Maximum number of DisplayPort displays possible (may require MST and/or HBR2): - 4 1920x1200 - 4 2560x1600 - 2 4096x2160 Maximum number of monitors across all available Quadro K2200 outputs is 4.
	Shading Architecture	Shader Model 5.0

Technical Specifications – Graphics

Supported Graphics APIs	OpenGL 4.4 DirectX 11.1
	API support includes: CUDA C, CUDA C++, DirectCompute 5.0, OpenCL, Java, Python, and Fortran
Available Graphics Drivers	Microsoft Windows 8.1 Microsoft Windows 8 Microsoft Windows 7 Linux - Full OpenGL implementation, complete with NVIDIA and ARB extensions
	HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html
	<ol style="list-style-type: none"> 1. Quadro K2200 offered as Factory Configured Option does not include a video cable adapter. Video cable adapters must be ordered separately. 2. Quadro K2200 offered as an Option Kit includes one DP-to-DVI video cable adapter. Additional cables must be ordered separately. 3. A total maximum of 4 active monitors are supported across all display output types. This may be accomplished by using daisy chained DisplayPort 1.2 displays (displays must support MST and HBR2).

NVIDIA® Quadro® M2000 4GB Graphics	Form Factor	Dimensions: 4.376" H x 6.6" L Single Slot, Full Height Cooling: Active Weight: 239 grams
	Graphics Controller	NVIDIA® Quadro® M2000 Graphics Card GPU: GM206 with 768 CUDA cores Power: 75 Watts
	Bus Type	PCI Express 3.0 x16
	Memory	Size: 4GB GDDR5 Memory Bandwidth: 105.7 GB/s Memory Width: 128-bit
	Connectors	4x DisplayPort 1.2a Factory Configured Option: No video cable adapter included After Market Option: No video cable adapter included Additional DisplayPort-to-VGA, DisplayPort-to-HDMI, or DisplayPort-to-DVI adapters are available as accessories
	Maximum Resolution	DisplayPort: - up to 4096 x 2160 x 30 bpp @ 60Hz - up to 2560 x 1600 x 30 bpp @ 120 Hz - supports High Bit Rate 2 (HBR2) and Multi-Stream Transport (MST)

Technical Specifications – Graphics

Using two DP outputs, the M2000 can drive one dual DP input display with 5120 x 2880 x 30 bpp @ 60Hz resolution.

Image Quality Features	12-bit internal display pipeline (hardware support for 12-bit scanout on supported panels, applications and connection)
	Stereoscopic 3D display support including NVIDIA® 3D Vision™ technology, 3D DLP, Interleaved, and passive stereo
Display Output	Maximum number of displays - 4 direct attached monitors
	Maximum number of monitors across all available Quadro M2000 outputs is 4.
Shading Architecture	Shader Model 5.0
Supported Graphics APIs	OpenGL 4.5 DirectX 12
	API support includes: CUDA C, CUDA C++, DirectCompute 5.0, and OpenCL software
Available Graphics Drivers	Microsoft Windows 10 Microsoft Windows 7 Linux - Full OpenGL implementation, complete with NVIDIA and ARB extensions
	HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html
Notes	<ol style="list-style-type: none"> 1. Quadro M2000 offered as Factory Configured Option does not include a video cable adapter. Video cable adapters must be ordered separately. 2. Quadro M2000 offered as an After Market Option does not include video cables. Video cable adapters must be ordered separately.

NVIDIA Quadro P2000 5GB Graphics

Form Factor	Dimensions: 4.4"Hx7.9"L Single Slot Cooling: Active Weight: 260 grams
Graphics Controller	NVIDIA Quadro P2000 Graphics Card Power: 75 Watts
Bus Type	PCI Express 3.0 x16
Memory	Size: 5GB GDDR5 Memory Bandwidth: 140 GB/s Memory Width: 160-bit

Technical Specifications – Graphics

Connectors	<p>4x DisplayPort 1.4</p> <p>Factory Configured Option: No adapter included with card After Market Option: No video cable adapter included</p> <p>Additional DVI to VGA, DisplayPort™ to VGA, DisplayPort™ to DVI, and DisplayPort™ to Dual-Link DVI adapters available as accessories.</p>
Maximum Resolution	<p>DisplayPort: - up to 5120 x 2880 x 24 bpp @ 60Hz - supports High Bit Rate 2 (HBR2) and Multi-Stream Transport (MST) DP 1.3 & 1.4 ready.</p> <p>DL-DVI(I) output: - up to 2560 x 1600 x 32 bpp @ 60 Hz</p> <p>Single Link-DVI(I) output: - up to 1920 x 1200 x 32 bpp @ 60Hz</p> <p>HDMI 2.0 (requires DP to HDMI adapter): 5120 x 2880 x 24 bpp @ 60Hz</p>
Image Quality Features	<p>12-bit internal display pipeline (hardware support for 12-bit scanout on supported panels, applications and connection)</p> <p>Stereoscopic 3D display support including NVIDIA® 3D Vision™ technology, NVIDIA® Mosaic and nView.</p>
Display Output	<p>Maximum number of displays - 4 direct attached monitors</p> <p>Maximum number of monitors across all available Quadro P2000 outputs is 4.</p>
Shading Architecture	Shader Model 5.1
Supported Graphics APIs	<p>OpenGL® 4.5 DirectX® 12</p> <p>API support includes: CUDA C, CUDA C++, DirectCompute 5.0, OpenCL, Java, Python, and Fortran software</p>
Available Graphics Drivers	<p>Microsoft Windows 10 Microsoft Windows 7 Professional 64bit Linux - Full OpenGL implementation, complete with NVIDIA and ARB extensions</p> <p>HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html</p>

Technical Specifications – Graphics

Notes

1. Quadro P2000 offered as Factory Configured Option does not include a video cable adapter. Video cable adapters must be ordered separately.
2. Quadro P2000 offered as an After Market Option does not include video cables. Video cable adapters must be ordered separately.

AMD FirePro W4300 4GB Graphics

Form Factor

Low Profile, single slot (6.6" x 3.118")
Full Height, single slot (6.6" x 4.725")

Graphics Controller

AMD FirePro W4300 graphics
GPU Frequency: 930Mhz
Memory Clock Speed: 1500Mhz
GPU: 768 Stream Processors organized into 12 Compute Units
Power: <50 Watts
Cooling: Active

Bus Type

PCI Express® x16, Generation 3.0

Memory

4GB GDDR5 memory
Memory Bandwidth: up to 96 GB/s
Memory Width: 128 bit

Connectors

4x Mini Display Port 1.2 connectors with HBR2 and MST support.

Factory Configured: No video cable adapter included
After market option kit: No video cable adapter included

Additional DisplayPort-to-VGA, DisplayPort-to-HDMI, or DisplayPort-to-DVI adapters are available as Factory Configuration or Option Kit accessories.

Maximum Resolution

DisplayPort:
- 4096x2160 @24bpp (3 x 4K @ 60Hz, 4 x 4K @ 30Hz)

Image Quality Features

Advanced support for 8-bit, 10-bit, and 16-bit per RGB color component.
High bandwidth scaler for high quality up and downscaling
Incorporated Adaptive-Sync enables FreeSync™ technology from AMD that allows GPU control of display refresh rates for tear-free and jitter-free image quality when rotating models or viewing video content.(Requires FreeSync compliant displays)

Display Output

Max number of monitors supported using DisplayPort 1.2a:

- 4 direct attached monitors
- 6 using DP 1.2a with MST and HBR2 enabled monitors

Monitor chaining from a single DisplayPort (subject to a max of 6 total monitors across all outputs, requires use of DisplayPort enabled monitors supporting MST and HBR2):

- one 4096x2160 display
- two 2560x1600 displays
- four 1920x1200 displays

Shading Architecture

Shader Model 5.0

Supported Graphics APIs OpenGL 4.4

Technical Specifications – Graphics

Available Graphics Drivers

OpenCL 2.0
DirectX 12.0
Windows 10 (64-bit and 32-bit)
Windows® 7 (64-bit and 32-bit)
Linux

HP qualified drivers may be preloaded or available from the HP support Web site:

<http://welcome.hp.com/country/us/en/support.html>

Notes

3. AMD Eyefinity technology supports up to six DisplayPort™ monitors on an enabled graphics card. Supported display quantity, type and resolution vary by model and board design; confirm specifications with manufacturer before purchase. To enable more than two displays, or multiple displays from a single output, additional hardware such as DisplayPort-ready monitors or DisplayPort 1.2 MST-enabled hubs may be required. A maximum of two active adapters is recommended for consumer systems. See www.amd.com/eyefinityfaq for full details.
4. Configurations of two FirePro W4300 graphics cards in HP Z440 Workstation require the HP Z440 Fan and Front Card Guide Kit, configurable from the factory (CTO PN: G8T99AV) or as an Aftermarket Option (AMO PN: J9P80AA).

Technical Specifications – Graphics

AMD FirePro W5100 4GB Graphics	Form Factor	Full height, single slot (6.75" X 4.376")
	Graphics Controller	AMD FirePro W5100 graphics GPU Frequency: 930Mhz GPU: 768 Stream Processors organized into 12 Compute Units Power: <75 Watts Cooling: Active
	Bus Type	PCI Express® x16, Generation 3.0
	Memory	4GB GDDR5 memory Memory Bandwidth: up to 96 GB/s Memory Width: 128 bit
	Connectors	4x Display Port 1.2 connectors with HBR2 and MST support. Factory Configured: No video cable adapter included After market option kit: No video cable adapter included Additional DisplayPort-to-VGA or DisplayPort-to-DVI adapters are available as Factory Configuration or Option Kit accessories.
	Maximum Resolution	DisplayPort: - 4096x2160 @24bpp 60Hz Dual Link DVI: - 2560x1600 (requires DP to DL-DVI adapter) Single Link DVI: - 1920x1200 (requires DP to DVI adapter) VGA: - 1920x1200 (requires DP to VGA adapter)
	Image Quality Features	Advanced support for 8-bit, 10-bit, and 16-bit per RGB color component. High bandwidth scaler for high quality up and downscaling
	Display Output	Max number of monitors supported using DisplayPort 1.2a: - 4 direct attached monitors - 6 using DP 1.2a with MST and HBR2 enabled monitors Monitor chaining from a single DisplayPort (subject to a max of 6 total monitors across all outputs, requires use of DisplayPort enabled monitors supporting MST and HBR2): - one 4096x2160 display - two 2560x1600 displays - four 1920x1200 displays
	Shading Architecture	Shader Model 5.0
	Supported Graphics APIs	OpenGL 4.4 OpenCL 1.2 and 2.0 DirectX 11.2 / 12 AMD Mantle

Technical Specifications – Graphics

Available Graphics Drivers

Windows 8.1 / 8 (64-bit and 32-bit)
Windows® 7 (64-bit and 32-bit)
Linux

HP qualified drivers may be preloaded or available from the HP support Web site:

<http://welcome.hp.com/country/us/en/support.html>

NOTES:

1. AMD Eyefinity technology supports up to six DisplayPort™ monitors on an enabled graphics card. Supported display quantity, type and resolution vary by model and board design; confirm specifications with manufacturer before purchase. To enable more than two displays, or multiple displays from a single output, additional hardware such as DisplayPort-ready monitors or DisplayPort 1.2 MST-enabled hubs may be required. A maximum of two active adapters is recommended for consumer systems. See <http://www.amd.com/eyefinityfaq> for full details.
2. Configurations of two FirePro W5100 graphics cards in HP Z440 Workstation require the HP Z440 Fan and Front Card Guide Kit, configurable from the factory (CTO PN: G8T99AV) or as an Aftermarket Option (AMO PN: J9P80AA).

**Radeon™ Pro WX 4100
4GB Graphics**

**Form Factor
Graphics Controller**

Low-Profile Single Slot (6.6" Length)
Polaris 11 Baffin GL XT
GPU: 1024 Stream Processors organized into 16 Compute Units
Power: 50 Watts
Cooling: Active

Memory

4GB GDDR5 memory
Memory Bandwidth: 6 Gbps / 96 GB/s
Memory Width: 128 bit

Connectors

4x Mini DisplayPort 1.4 – HDR ready connectors with HBR3 and MST support.

Factory Configured: Four mDP-to-DP cable adapters included
After market option kit: Four mDP-to-DP cable adapters included

Additional DisplayPort-to-VGA or DisplayPort-to-DVI adapters are available as Factory Configuration or Option Kit accessories.

Maximum Resolution

5K support @ 60Hz

- 1x single-cable 5K monitor, or 2x dual-cable 5K monitors

 4x 4K support @ 60Hz

Image Quality Features

Advanced support for 8-bit and 10-bit per RGB color component. High bandwidth scaler for high quality up and downscaling

Display Output

4 full physical DP1.3 HBR3 / DP1.4 HDR outputs
FreeSync support

Technical Specifications – Graphics

GPU Architecture	GCN 4th Generation
Supported Graphics APIs	DirectX® 12 OpenGL® 4.5 OpenCL™ 2.0 Vulkan™ 1.0
Available Graphics Drivers	Windows 10 64-bit Windows® 7 64-bit Linux 64-bit (selected Enterprise distributions)

HP qualified drivers may be preloaded or available from the HP support Web site:

<http://welcome.hp.com/country/us/en/support.html>

Notes

1. HDR content requires that the system be configured with a fully HDR-ready content chain, including: graphics card, monitor/TV, graphics driver and application. Video content must be graded in HDR and viewed with an HDR-ready player. Windowed mode content requires operating system support.
2. AMD PowerTune and AMD ZeroCore Power are technologies offered by certain FirePro™ and Radeon™ Pro products, which are designed to intelligently manage GPU power consumption in response to certain GPU load conditions.
3. As of September 2016, certified for DisplayPort™ 1.4 HBR3 and ready for DisplayPort™ 1.4 HDR based on independent verification by DisplayPort™ testing authority. HDR content requires that the system be configured with a fully HDR-ready content chain, including: graphics card, monitor/TV, graphics driver and application. Video content must be graded in HDR and viewed with an HDR-ready player. Windowed mode content requires operating system support.

NVIDIA® Quadro® M4000 8GB Graphics Form Factor

Dimensions: 4.4" H x 9.5" L
Single Slot, Full Height
Cooling: Active
Weight: 475 grams (without extender)

Graphics Controller

NVIDIA® Quadro® M4000
GPU: GM204 with 1664 CUDA cores
Power: 120 Watts

Bus Type

PCI Express 3.0 x16

Memory

Size: 8GB GDDR5
Memory Bandwidth: 192 GB/s
Memory Width: 256-bit

Connectors

4 DisplayPort 1.2a
Factory configured Option: No video cable adapter included
After market option kit: No video cable adapter included

Technical Specifications – Graphics

Additional DisplayPort-to-VGA or DisplayPort-to-DVI adapters are available as accessories

Maximum Resolution

DisplayPort:

- single DisplayPort up to 4096 x 2160 x 30 bpp @ 60Hz
- supports High Bit Rate 2 (HBR2) and Multi-Stream Transport (MST)

DL-DVI(I) output:

- up to 2560 x 1600 x 32 bpp @ 60Hz

Single Link-DVI(I) output:

- up to 1920 x 1200 x 32 bpp @ 60Hz

VGA (via adapter cable):

- 2048 x 1536 x 32 bpp at 85 Hz

Image Quality Features

12-bit internal display pipeline (hardware support for 12-bit scanout on supported panels, applications and connection)

NVIDIA® 3D Vision™ technology, 3D DLP, Interleaved, and other 3D stereo format support

Full OpenGL quad buffered stereo support

Support for large-scale, ultra-high resolution visualization using the NVIDIA® SVS platform which includes NVIDIA® Mosaic, NVIDIA® Sync and NVIDIA® Warp/Blend technologies

Display Output

Maximum number of displays

- 4 direct attached monitors
- 4 using DP 1.2a with MST and HBR2 enabled monitors

Maximum number of DisplayPort displays possible:

- 4 1920x1200
- 4 2560x1600
- 4 4096x2160
- 2 5120x2880 (requires dual DP input capable 5k displays)

Maximum number of monitors across all available Quadro M4000 outputs is 4.

Shading Architecture

Shader Model 5.0

Supported Graphics APIs

OpenGL 4.5
DirectX 12

API support includes:

CUDA C, CUDA C++, DirectCompute 5.0, OpenCL, Java, Python, and Fortran

Available Graphics Drivers

Microsoft Windows 10
Microsoft Windows 8.1
Microsoft Windows 8
Microsoft Windows 7

Technical Specifications – Graphics

Linux - Full OpenGL implementation, complete with NVIDIA and ARB extensions

HP qualified drivers may be preloaded or available from the HP support Web site:
<http://welcome.hp.com/country/us/en/support.html>

Notes

1. Configurations using the Quadro M4000 graphics card in HP Z440 Workstation require the HP Z440 Fan and Front Card Guide Kit, configurable from the factory (CTO PN: G8T99AV) or as an Aftermarket Option (AMO PN: J9P80AA).

NVIDIA® Quadro® M5000 8GB Graphics **Form Factor**

Dimensions: 4.4" H x 10.5" L
 Dual Slot, Full Height
 Cooling: Active
 Weight: 525 grams (without extender)

Graphics Controller

NVIDIA® Quadro® M5000
 GPU: GM204 with 2048 CUDA cores
 Power: 150 Watts

Bus Type

PCI Express 3.0 x16

Memory

Size: 8GB GDDR5 ECC capable
 Memory bandwidth: 211GB/s
 Memory Width: 256-bit

Connectors

1 Dual Link DVI-I
 4 DisplayPort 1.2a

Factory configured option: No adapter included with card.
 After market option kit: No adaptor included with card.

Additional DVI to VGA, DisplayPort to VGA, DisplayPort to DVI, and DisplayPort to Dual-Link DVI adapters available as accessories

Maximum Resolution

DisplayPort:
 - up to four 4096 x 2160 x 30 bpp @ 60Hz displays
 - up to two 5120 x 2880 @ 60Hz displays
 - supports High Bit Rate 2 (HBR2) and Multi-Stream Transport (MST)

DL-DVI(I) output:
 - up to 2560 x 1600 x 32 bpp @ 60Hz

Single Link-DVI(I) output:
 - up to 1920 x 1200 x 32 bpp @ 60Hz

VGA (via adapter cable):
 - 2048 x 1536 x 32 bpp at 85 Hz

Technical Specifications – Graphics

Image Quality Features	<p>12-bit internal display pipeline (hardware support for 12-bit scanout on supported panels, applications and connection)</p> <p>NVIDIA® 3D Vision™ technology, 3D DLP, Interleaved, and other 3D stereo format support.</p> <p>Full OpenGL quad buffered stereo support.</p> <p>Support for large-scale, ultra-high resolution visualization using the NVIDIA® SVS platform which includes NVIDIA® Mosaic, NVIDIA® Sync and NVIDIA® Warp/Blend technologies.</p>
Display Output	<p>Maximum number of displays</p> <ul style="list-style-type: none">- 4 direct attached monitors- 4 using DP 1.2a with MST and HBR2 enabled monitors <p>Maximum number of DisplayPort displays possible (may require MST and/or HBR2):</p> <ul style="list-style-type: none">- 4 1920x1200- 4 2560x1600- 4 4096x2160- 2 5120x2880 (requires dual DP input 5k displays) <p>Maximum number of monitors across all available Quadro M5000 outputs is 4.</p>
Shading Architecture	Shader Model 5.0
Supported Graphics APIs	OpenGL 4.5 DirectX 12
	API support for NVIDIA's CUDA™ C, CUDA C++, DirectCompute 5.0, OpenCL, Java, Python, Fortran
Available Graphics Drivers	Microsoft Windows 10 Microsoft Windows 8.1 Microsoft Windows 8 Microsoft Windows 7 Linux - Full OpenGL implementation, complete with NVIDIA and ARB extensions
	HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html
Notes	<ol style="list-style-type: none">1. Factory configured Quadro M5000 does not include a video cable adapter. Video cable adapters must be ordered separately.2. A total maximum of 4 active monitors are supported across all display output types. This may be accomplished by using daisy chained DisplayPort 1.2 displays (displays must support MST and HBR2).3. Configurations of a single Quadro M5000 graphics card in HP Z440 Workstation require the HP Z440 Fan and Front Card Guide Kit, configurable from the factory (CTO PN: G8T99AV) or as an Aftermarket Option (AMO PN: J9P80AA).

Technical Specifications – Graphics

AMD FirePro W7100 8GB Graphics	Form Factor	Full height, single slot (9.5" X 4.376")
	Graphics Controller	AMD FirePro W7100 graphics GPU: 1792 Stream Processors organized into 28 Compute Units Power: <75 Watts Cooling: Active
	Bus Type	PCI Express® x16, Generation 3.0
	Memory	8GB GDDR5 memory Memory Bandwidth: up to 176 GB/s Memory Width: 256 bit
	Connectors	4x Display Port 1.2a connectors with HBR2 and MST support. Factory Configured: No video cable adapter included After market option kit: No video cable adapter included Additional DisplayPort-to-VGA or DisplayPort-to-DVI adapters are available as Factory Configuration or Option Kit accessories.
	Maximum Resolution	DisplayPort: - 4096x2160 @24bpp 60Hz Dual Link DVI: - 2560x1600 (requires DP to DL-DVI adapter) Single Link DVI: - 1920x1200 (requires DP to DVI adapter) VGA: - 1920x1200 (requires DP to VGA adapter)
	Image Quality Features	Advanced support for 8-bit, 10-bit, and 16-bit per RGB color component. High bandwidth scaler for high quality up and downscaling
	Display Output	Max number of monitors supported using DisplayPort 1.2a: - 4 direct attached monitors - 6 using DP 1.2a with MST and HBR2 enabled monitors Monitor chaining from a single DisplayPort (subject to a max of 6 total monitors across all outputs, requires use of DisplayPort enabled monitors supporting MST and HBR2): - one 4096x2160 display - two 2560x1600 displays - four 1920x1200 displays
	Shading Architecture	Shader Model 5.0
	Supported Graphics APIs	OpenGL 4.4

Technical Specifications – Graphics

OpenCL 1.2 and 2.0
DirectX 11.2 / 12
AMD Mantle

Available Graphics Drivers

Windows 8.1 / 8 (64-bit and 32-bit)
Windows® 7 (64-bit and 32-bit)
Linux

HP qualified drivers may be preloaded or available from the HP support Web site:

<http://welcome.hp.com/country/us/en/support.html>

Notes

1. AMD Eyefinity technology supports up to six DisplayPort™ monitors on an enabled graphics card. Supported display quantity, type and resolution vary by model and board design; confirm specifications with manufacturer before purchase. To enable more than two displays, or multiple displays from a single output, additional hardware such as DisplayPort-ready monitors or DisplayPort 1.2 MST-enabled hubs may be required. See www.amd.com/eyefinityfaq for full details.
2. OpenGL 4.4 support available with driver 14.301.xxx or later.
3. OpenCL 2.0 support planned in driver updates for early 2015.
4. Configurations of a single FirePro W7100 graphics card in HP Z440 Workstation require the HP Z440 Fan and Front Card Guide Kit, configurable from the factory (CTO PN: G8T99AV) or as an Aftermarket Option (AMO PN: J9P80AA).

Radeon™ Pro WX 7100 8GB Graphics

Form Factor Graphics Controller

Full-Height Single Slot (9.5" Length)
Radeon™ Pro WX 7100 graphics
GPU: 2304 Stream Processors organized into 36 Compute Units
Power: 130 Watts
Cooling: Active

Memory

8GB GDDR5 memory
Memory Bandwidth: 7 Gbps / 224 GB/s
Memory Width: 256 bit

Connectors

4x Display Port 1.4 – HDR ready connectors with HBR3 and MST support.

Factory Configured: No video cable adapter included
After market option kit: No video cable adapter included

Additional DisplayPort-to-VGA or DisplayPort-to-DVI adapters are available as Factory Configuration or Option Kit accessories.

Maximum Resolution

5K support @ 60Hz

- 1x single-cable 5K monitor, or 2x dual-cable 5K monitors

Image Quality Features

Advanced support for 8-bit, 10-bit, and 16-bit per RGB color component. High bandwidth scaler for high quality up and downscaling

Technical Specifications – Graphics

Display Output 4 full physical DP1.3 HBR3 / DP1.4 HDR outputs
FreeSync support

GPU Architecture GCN 4th Generation

Supported Graphics APIs DirectX®12
OpenGL® 4.5
OpenCL™ 2.0
Vulkan™ 1.0

Available Graphics Drivers Windows 10 64-bit
Windows® 7 64-bit
Linux 64-bit

HP qualified drivers may be preloaded or available from the HP support Web site:

<http://welcome.hp.com/country/us/en/support.html>

Notes

4. HDR content requires that the system be configured with a fully HDR-ready content chain, including: graphics card, monitor/TV, graphics driver and application. Video content must be graded in HDR and viewed with an HDR-ready player. Windowed mode content requires operating system support.
5. Radeon VR Ready Creator Products are select Radeon Pro and AMD FirePro™ GPUs that meet or exceed the Oculus Rift or HTC Vive recommended specifications for video cards/GPUs. Other hardware (including CPU) and system requirements recommended by Oculus Rift or HTC Vive should also be met in order to operate the applicable HMDs as intended. As VR technology, HMDs and other VR hardware and software evolve and/or become available, these criteria may change without notice.
6. AMD PowerTune and AMD ZeroCore Power are technologies offered by certain FirePro™ and Radeon™ Pro products, which are designed to intelligently manage GPU power consumption in response to certain GPU load conditions.
7. As of September 2016, certified for DisplayPort™ 1.4 HBR3 and ready for DisplayPort™ 1.4 HDR based on independent verification by DisplayPort™ testing authority. HDR content requires that the system be configured with a fully HDR-ready content chain, including: graphics card, monitor/TV, graphics driver and application. Video content must be graded in HDR and viewed with an HDR-ready player. Windowed mode content requires operating system support.

Technical Specifications – Graphics

NVIDIA® QUADRO® M6000 Compatibility 12GB Graphics

HP Z840, Z640

Form Factor

4.42" H x 10.5" L
Dual Slot
Power: 250 Watts
Weight: 1030 grams

Graphics Controller

NVIDIA® QUADRO® M6000 Graphics Card based on the GM200 GPU
Core Count: 3072
Base Clock: 1026 MHz
Boost Clock: 1152 MHz
Idle Clock: 324 MHz

Bus Type

PCI Express 3.0 x16

Memory

12GB GDDR5
384-bit memory I/O path
317 GB/s memory bandwidth
ECC Memory (disabled by default)

Connectors

DP (x4)
Dual-Link DVI-I
3-pin mini-DIN connector
SLI connector
QUADRO® Sync connector
One 8-pin auxiliary power connector

Factory configured option: No adapter included with card.
Option Kit: No adaptor included with card.

DVI to VGA, DisplayPort™ to VGA, DisplayPort™ to DVI, and DisplayPort™ to Dual-Link DVI adapters available as accessories.

Image Quality Features

- DisplayPort™ with Multi-Stream Technology (MST) and High Bit Rate 2 (HBR2), HDMI 1.4, and HDCP 1.3 support
- NVIDIA® 3D Vision™ technology
- NVIDIA® Premium Mosaic and nView

Display Output

400 MHz integrated RAMDAC
• Maximum resolution over VGA (requires DVI to VGA cable or DP to VGA adapter): 2048 × 1536 × 32 bpp at 85 Hz

Dual-link internal TMDS (DVI 1.0)

- Maximum resolution over digital port (single GPU and SLI mode): 2560 × 1600 × 32 bpp at 60 Hz (reduced blanking)

Single-link internal TMDS (DVI 1.0)

- Maximum resolution over digital port (single GPU and SLI mode): 1920 × 1200 × 32 bpp at 60 Hz (reduced blanking)

DisplayPort™ 1.2a with MST and HBR2. Each DisplayPort™ connector has the following capabilities:

Technical Specifications – Graphics

- Maximum pixel clock: 592 MPixel/s
- Maximum bandwidth: 17.2 Gbps
- Example maximum resolution: 4096 × 2160 × 30 bpp at 60Hz

HDMI

- Maximum resolution (requires DP to HDMI adapter): 4096 × 2160 × 8 bpp at 60Hz

Shading Architecture Shader Model 5.0

Supported Graphics APIs Full OpenGL 4.4
Full DirectX 12
API support includes:
CUDA C, CUDA C++, DirectCompute 5.0, OpenCL, Java, Python, and Fortran

Available Graphics Drivers Windows 10
Windows 8.1
Windows 8
Windows 7 Professional
Linux®

HP qualified drivers may be preloaded or available from the HP support Web site:

<http://www8.hp.com/us/en/drivers.html>

Notes

1. NVIDIA® GRID VGX Pass Through feature supported on NVIDIA® QUADRO® M6000 to enable direct mapping of GPU to Virtual Machine.
2. No display output adapter included.
3. For HP Z840 Workstation configurations, the 1125W power supply option must be used.

NVIDIA® Quadro® M6000 24GB Graphics

Form Factor 4.4" H x 10.5" L
Dual Slot
Power: 250 Watts
Weight: 1023 grams

Graphics Controller NVIDIA® Quadro® M6000 Graphics Card based on the GM200 GPU
Core Count: 3072
Base Clock: 1026 MHz
Boost Clock: 1152 MHz
Idle Clock: 324 MHz

Bus Type PCI Express 3.0 x16

Memory 24GB GDDR5
384-bit memory I/O path
317 GB/s memory bandwidth
ECC Memory (disabled by default)

Connectors DP (x4)

Technical Specifications – Graphics

Dual-Link DVI-I
 Optional Stereo
 SLI connector
 Quadro Sync connector
 One 8-pin auxiliary power connector

Factory configured option: No adapter included with card.
 Option Kit: No adaptor included with card.

Dual-Link DVI to VGA, DisplayPort to VGA, DisplayPort to DVI, and DisplayPort to Dual-Link DVI adapters available as accessories.

Image Quality Features

- DisplayPort with Multi-Stream Technology (MST) and High Bit Rate 2 (HBR2), HDMI 1.4, and HDCP 1.3 support
- NVIDIA 3D Vision™ technology
- NVIDIA Premium Mosaic and nView

Display Output

400 MHz integrated RAMDAC
 • Maximum resolution over VGA (requires DVI to VGA cable or DP to VGA adapter): 2048 × 1536 × 32 bpp at 85 Hz

Dual-link internal TMDS (DVI 1.0)
 • Maximum resolution over digital port (single GPU and SLI mode): 2560 × 1600 × 32 bpp at 60 Hz (reduced blanking)

Single-link internal TMDS (DVI 1.0)
 • Maximum resolution over digital port (single GPU and SLI mode): 1920 × 1200 × 32 bpp at 60 Hz (reduced blanking)

DisplayPort 1.2a with MST and HBR2. Each DisplayPort connector has the following capabilities:

- Maximum pixel clock: 592 MPixel/s
- Maximum bandwidth: 17.2 Gbps
- Example maximum resolution: 4096 × 2160 × 30 bpp at 60Hz

HDMI

- Maximum resolution (requires DP to HDMI adapter): 4096 × 2160 × 8 bpp at 60Hz

Shading Architecture

Shader Model 5.0

Supported Graphics APIs

Full OpenGL 4.4
 Full DirectX 12
 API support includes:
 CUDA C, CUDA C++, DirectCompute 5.0, OpenCL, Java, Python, and Fortran

Available Graphics Drivers

Windows 10
 Windows 8.1
 Windows 8
 Windows 7 Professional
 Linux

Technical Specifications – Graphics

HP qualified drivers may be preloaded or available from the HP support Web site:

<http://www8.hp.com/us/en/drivers.html>

Notes

1. NVIDIA GRID VGX Pass Through feature supported on NVIDIA® Quadro® M6000 to enable direct mapping of GPU to Virtual Machine.
2. No display output adapter included.
3. For HP Z840 Workstation configurations, the 1125W power supply option must be used.

NVIDIA® Quadro® P4000 8GB Graphics

Form Factor

Dimensions: 4.4”H x 9.5”L
Single-slot, full-height
Weight: 475 grams (without extender)

Graphics Controller

NVIDIA® Quadro® P4000 Graphics Card
GPU: GP104 with 1792 CUDA cores
Power: 120 Watts

Bus Type Memory

PCI Express 3.0 x16
Size: 8GB GDDR5
Memory Bandwidth: 243 GB/s
Memory Width: 256-bit

Connectors

4 x DisplayPort 1.4
3-pin mini-DIN connector via optional bracket
1 x 6-pin auxiliary power connector
4-pin header for stereo signal
SYNC connector for Quadro® Sync II
2 x SLI connectors

Factory Configured Option: No video cable adapter included
After Market Option: No video cable adapter included

Additional DisplayPort-to-VGA, DisplayPort-to-HDMI, or DisplayPort-to-DVI adapters are available as accessories

Maximum Resolution

Dual-link internal TMDS (DVI 1.0):
- up to 2560 x 1600 x 32 bpp @ 60 Hz

Single-link internal TMDS (DVI 1.0):
- up to 1920 x 1200 x 32 bpp @ 60 Hz

HDMI™ 2.0b (requires DP to HDMI adapter):
- up to 5120 x 2880 x 24 bpp @ 60Hz

DisplayPort:
- up to 4096 x 2160 x 30 bpp @ 60Hz
- up to 2560 x 1600 x 30 bpp @ 120 Hz
- supports High Bit Rate 2 (HBR2) and Multi-Stream Transport (MST)

Using two DP outputs, the P4000 can drive one dual DP input display with 5120 x 2880 x 30 bpp @ 60Hz resolution.

Technical Specifications – Graphics

Image Quality Features	Advanced support for 8-bit, 10-bit, and 12-bit per RGB color component. HDCP 2.2 support over DisplayPort, DVI, and HDMI connectors NVIDIA 3D Vision™ and other 3D stereo technologies NVIDIA Mosaic and nView
Display Output	Maximum number of displays - 4 direct attached monitors Maximum number of monitors across all available Quadro P4000 outputs is 4.
Shading Architecture	Shader Model 5.1
Supported Graphics APIs	OpenGL 4.5 DirectX 12 Vulkan 1.0 API support includes: CUDA C, CUDA C++, DirectCompute 5.0, OpenCL, Java, Python, and Fortran
Available Graphics Drivers	Microsoft Windows 10 Microsoft Windows 7 Linux - Full OpenGL implementation, complete with NVIDIA and ARB extensions HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html
Notes	<ol style="list-style-type: none"> 1. Quadro P4000 offered as Factory Configured Option does not include a video cable adapter. Video cable adapters must be ordered separately. 2. Quadro P4000 offered as an After Market Option does not include video cables. Video cable adapters must be ordered separately.

NVIDIA® Quadro® P5000 16GB Graphics	Form Factor	Full-Height Dual Slot (4.4" Height x 10.5" Length) Weight: 815 grams / 1.80 lbs
	Graphics Controller	Quadro™ P5000 graphics GPU: 2560 NVIDIA CUDA® Parallel Processing Cores Power: 180 Watts Cooling: Active
	Memory	16GB GDDR5X memory Memory Bandwidth: Up to 288 GB/s Memory Width: 256 bit ECC Memory (disabled by default)

Technical Specifications – Graphics

Connectors	<p>DP (x4) with HDR support DL-DVI(D) 3-pin mini-DIN connector SLI connector Quadro Sync connector (compatible with Quadro II Sync) One 8-pin auxiliary power connector</p> <p>Factory configured option: No video cable adapter included with card. After market option Kit: No video cable adaptor included with card.</p> <p>DVI to VGA, DisplayPort to VGA, DisplayPort to DVI, and DisplayPort to Dual-Link DVI adapters available as accessories.</p>
Maximum Resolution	<p>5K support @ 60Hz 1x single-cable 5K monitor, or 2x dual-cable 5K monitors</p>
Image Quality Features	<p>Advanced support for 8-bit, 10-bit, and 12-bit per RGB color component. HDCP 2.2 support over DisplayPort, DVI, and HDMI connectors NVIDIA 3D Vision™ and other 3D stereo technologies NVIDIA Mosaic and nView Desktop Management</p>
Display Outputs¹	<p>4x DP1.4 HDR outputs (up to 3840x2160 UHD @ 120Hz refresh, or up to 8K at 30Hz) 1x Dual-link DVI-D output (up to 2560 x 1600 @ 60 Hz and 1920x1200 @ 120 Hz)</p>
GPU Architecture	NVIDIA Pascal™
Supported Graphics APIs	<p>DirectX® 12 , OpenGL® 4.5, OpenCL™ 1.0, Vulkan™ 1.0 Developer API support includes: CUDA C, CUDA C++, DirectCompute 5.0, OpenCL, Java, Python, and Fortran</p>
Available Graphics Drivers	<p>Windows® 10 64-bit Windows® 7 64-bit Linux 64-bit</p> <p>HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html</p>
Notes	<ol style="list-style-type: none"> 1- Supports up to a total of 4 displays 2- For HP Z440 Workstations, the 700W power supply option must be used. 3- For HP Z840 Workstation configurations, the 1125W power supply option must be used for multiple P5000 configurations.

Technical Specifications – Graphics

NVIDIA® Quadro® P6000 24GB Graphics	Form Factor	Full-Height Dual Slot (4.4" Height x 10.5" Length) Weight: 967 grams / 2.14 lbs
	Graphics Controller	Quadro™ P6000 graphics GPU: 3840 NVIDIA CUDA® Parallel Processing Cores Power: 250 Watts Cooling: Active
	Memory	24GB GDDR5X memory Memory Bandwidth: Up to 432 GB/s Memory Width: 384 bit ECC Memory (disabled by default)
	Connectors	DP (x4) with HDR support DL-DVI(I) 3-pin mini-DIN connector SLI connector Quadro Sync connector (compatible with Quadro II Sync) One 8-pin auxiliary power connector Factory configured option: No video cable adapter included with card. After market option Kit: No video cable adaptor included with card. DVI to VGA, DisplayPort to VGA, DisplayPort to DVI, and DisplayPort to Dual-Link DVI adapters available as accessories.
	Maximum Resolution	5K support @ 60Hz 1x single-cable 5K monitor, or 2x dual-cable 5K monitors
	Image Quality Features	Advanced support for 8-bit, 10-bit, and 12-bit per RGB color component. HDCP 2.2 support over DisplayPort, DVI, and HDMI connectors NVIDIA 3D Vision™ and other 3D stereo technologies NVIDIA Mosaic and nView
	Display Outputs¹	4x DP1.4 HDR outputs (up to 3840x2160 UHD @ 120Hz refresh, or up to 8K at 30Hz) 1x Dual-link DVI-D output (up to 2560 x 1600 @ 60 Hz and 1920x1200 @ 120 Hz)
	GPU Architecture	NVIDIA Pascal™
	Supported Graphics APIs	DirectX®12 , OpenGL® 4.5, OpenCL™ 1.0, Vulkan™ 1.0 Developer API support includes: CUDA C, CUDA C++, DirectCompute 5.0, OpenCL, Java, Python, and Fortran
	Available Graphics Drivers	Windows® 10 64-bit Windows® 7 64-bit Linux 64-bit

Technical Specifications – Graphics

HP qualified drivers may be preloaded or available from the HP support Web site:

<http://welcome.hp.com/country/us/en/support.html>

Notes

- 1- Supports up to a total of 4 displays
- 2- For HP Z440 Workstations, the 700W power supply option must be used.
- 3- For HP Z840 Workstation configurations, the 1125W power supply option must be used for multiple P5000 configurations.

NVIDIA® Quadro® GP100 16GB Graphics

Form Factor

Dual Slot (4.4" Height x 10.5" Length)
Weight: 989 grams +72 grams extender

Graphics Controller

NVIDIA® QUADRO® GP100
GPU: 3584 NVIDIA CUDA® Parallel Processing Cores
Power: 235 Watts
Cooling: Active

Memory

16GB HBM2
Memory Bandwidth: Up to 717 GB/s
Memory Width: 4096-bit
ECC Memory (disabled by default)

Connectors

DP (x4) with HDR support
DL-DVI(D)
3-pin mini-DIN connector via optional bracket
4-pin header for stereo signal
Quadro Sync connector SYNC for Quadro® Sync II
One 8-pin auxiliary power connector
(2x) NVLink connectors

Factory configured option: 8-pin power adapter included with card.
After market option Kit: 8-pin power adapter included with card.

DVI to VGA, DisplayPort™ to VGA, DisplayPort™ to DVI, and DisplayPort™ to Dual-Link DVI adapters available as accessories.

Maximum Resolution

5K support @ 60Hz
1x single-cable 5K monitor, or 2x dual-cable 5K monitors

Image Quality Features

HDR support over DisplayPort™ 1.4 (SMPTE 2084/2086, BT. 2020) (4K @ 60 Hz 10b/12b HEVC Decode, 4K @ 60 Hz 10b HEVC Encode)
HDCP 2.2 support over DisplayPort™, DVI, and HDMI connectors
NVIDIA 3D Vision™ technology
NVIDIA Mosaic and nView Desktop Management

Technical Specifications – Graphics

Display Outputs	<p>4x DP1.4 MST & HDR2 outputs (up to 5120 x 2880 @ 60Hz) 1x Dual-link DVI-D output (up to 2560 x 1600 @ 60 Hz) 1x Single-link DVI-D output (up to 1920 x 1200 @ 60 Hz) HDMI™ 2.0b (up to 5120 x 2880 @ 60Hz)*</p> <p>*requires DP to HDMI adapter</p>
GPU Architecture	NVIDIA GP
Supported Graphics APIs	<p>DirectX® 12, OpenGL® 4.5, Vulkan™ 1.0 Developer API support includes: CUDA C, CUDA C++, DirectCompute 5.0, OpenCL, Java, Python, and Fortran</p>
Available Graphics Drivers	<p>Windows® 10 Windows® 7 Professional 64-bit Linux®</p> <p>HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html</p>

NVIDIA® Quadro® Sync II	Part number	1WT20AA
	Dimensions (HxD)	6.0 inches × 4.2 inches
	Devices Supported	<p>NVIDIA® Quadro® P4000 NVIDIA® Quadro® P5000 NVIDIA® Quadro® P6000</p>
	Bus Type	Requires one free mechanical PCIe bus slot. 6-pin PCI or SATA power connector
	PCI Form Factor	Full Height, half length, single slot
	Ports	2 RJ45 connectors for carrying frame lock signals over CAT5 cables. BNC Connector for external house synchronization.
	Internal Connectors	<p>6 NVIDIA SLI® style edge fingers for connection to compatible GPUs</p> <ul style="list-style-type: none"> • Included with the board are 4 12-Inch Short Sync Cables to connect to GPU's • Included with the board are 2 24-Inch Long Sync Cables to connect to GPU's
	System Requirements	<p>Requires one free mechanical PCIe bus slot. 6-pin PCI or SATA power connector Must be used with NVIDIA Quadro P4000, P5000 or P6000 graphics cards. Requires Quadro driver version R375 or later.</p>
	Temperature - Operating	0° to 55° C
	Temperature - Storage	-40° to 60° C
	Relative Humidity - Operating	10% to 80%
	Power Requirements	Board power dissipation: <15W

Technical Specifications – Graphics

Operating Systems Supported

Windows 10 64-bit
Windows 7 64-bit
Linux 64-bit

Kit Contents

Contains:

- Quadro Sync II Card
 - 4 x 12-Inch Short Sync Cables
 - 2 x 24-Inch Long Sync Cables (Two)
 - Quick Start Guide
-

Technical Specifications - Optical and Removable Storage

OPTICAL AND REMOVABLE STORAGE

HP 9.5mm Slim DVD Writer	Description	9.5mm height, tray-load	
	Mounting Orientation	Either horizontal or vertical	
	Interface Type	SATA/ATAPI	
	Dimensions (WxHxD)	128 x 9.5 x 127mm	
	Supported Media Types	DVD+R DVD+RW DVD+R DL DVD-R DL DVD-R DVD-RW CD-R CD-RW	
	Disc Capacity	DVD-ROM Full Stroke DVD Full Stroke CD	8.5 GB DL or 4.7 GB standard < 200 ms (seek) < 200 ms (seek)
	Maximum Data Transfer Rates	CD ROM Read DVD ROM Read	CD-ROM, CD-R Up to 24X CD-RW Up to 24X DVD+RW Up to 8X DVD-RW Up to 8X DVD+R DL Up to 8X DVD-R DL Up to 8X DVD-ROM Up to 8X DVD-ROM DL Up to 8X DVD+R Up to 8X DVD-R Up to 8X
	Power	Source DC Power Requirements DC Current	SATA DC power receptacle 5 VDC ± 5%-100 mV ripple p-p 5 VDC -< 800 mA typical, <1600 mA maximum
	Operating Environmental (all conditions non-condensing)	Temperature Relative Humidity Maximum Wet Bulb Temperature	41° to 122° F (5° to 50° C) 10% to 80% 84° F (29° C)
	Operating Systems Supported	Windows 10, Windows 7 Professional 32-bit and 64-bit, Windows Vista Business 64*, Windows Vista Business 32*, Windows Vista Home Basic 32*, Windows 2000, Windows XP Professional or Windows XP Home 32*. Red Hat Enterprise Linux(RHEL) WS4**, 5, 6 Desktop/Workstation SUSE Linux Enterprise Desktop 10 & 11	
Kit Contents	9.5mm Slim DVD Writer, 5.25" ODD Bay adapter/carrier, slim SATA data/power cable, installation guide		

* No driver is required for this device. Native support is provided by the operating system.

Technical Specifications - Optical and Removable Storage

HP 9.5mm Slim DVD-ROM Drive	Description	9.5mm height, tray-load	
	Mounting Orientation	Either horizontal or vertical	
	Interface Type	SATA / ATAPI	
	Dimensions (WxHxD)	128 x 9.5 x 127mm	
	Disc Capacity	DVD-ROM	Single layer: Up to 4.7 GB
			Double layer: Up to 8.5 GB
	Access Times	DVD-ROM Single Layer	< 110 ms (typical)
		CD-ROM Mode 1	< 110 ms (typical)
		Full Stroke DVD	< 230 ms (typical)
		Full Stroke CD	< 220 ms (typical)
	Power	Source	SATA DC power receptacle
		DC Power Requirements	5 VDC ± 5%-100 mV ripple p-p
		DC Current	5 VDC – <800mA typical, < 1600 mA maximum
	Operating Environmental (all conditions non-condensing)	Temperature	41° to 122° F (5° to 50° C)
		Relative Humidity	10% to 80%
	Maximum Wet Bulb Temperature	84° F (29° C)	
Operating Systems Supported	Windows 10, Windows 7 Professional 32-bit and 64-bit, Windows Vista Business 64*, Windows Vista Business 32*, Windows Vista Home Basic 32*, Windows 2000, Windows XP Professional or Windows XP Home 32*. Red Hat Enterprise Linux(RHEL) WS4**, 5, 6 Desktop/Workstation SUSE Linux Enterprise Desktop 10 & 11		
	* No driver is required for this device. Native support is provided by the operating system.		
Kit Contents	9.5mm Slim DVD-ROM Drive, 5.25" ODD Bay adapter/carrier, slim SATA data/power cable, installation guide		

HP 9.5mm Slim BDXL Blu-Ray Writer	Description	9.5mm height, tray-load
	Mounting Orientation	Either horizontal or vertical
	Interface Type	SATA/ATAPI
	Dimensions (WxHxD)	128 x 9.5 x 127mm
	Supported Media Types	BD-ROM
		BD-R
		BD-RE
	DVD-RAM	
	DVD+R	
	DVD+RW	
	DVD+R DL	
	DVD-R DL	
	DVD-R	
	DVD-RW	
	CD-R	
	CD-RW	

Technical Specifications - Optical and Removable Storage

Disc Capacity	DVD-ROM	8.5 GB DL or 4.7 GB standard
	Blu-ray	25 GB (single-layer)
		50 GB (dual-layer)
		100/128 GB (BDXL)
	Full Stroke DVD	< 230 ms (seek)
	Full Stroke CD	< 220 ms (seek)
	Blu-ray	< 230 ms (seek) (Full Stroke Blu-ray)
	Startup Time	(Time to drive ready from tray loading)
		BD-ROM (SL/DL) 25S / 28S
		BD-R (SL/DL) 25S / 28S
		BD-RE (SL/DL) 25S / 28S
		DVD-ROM (SL/DL) 18S / 18S
		DVD-R (SL/DL) 25S / 25S
		DVD-RW 25S
	DVD+R (SL/DL) 25S / 25S	
	DVD+RW 25S	
	DVD-RAM 45S	
	CD-ROM 15S	
Maximum Data Transfer Rates	CD ROM Read	CD-ROM, CD-R Up to 24X
		CD-RW Up to 24X
	DVD ROM Read	DVD-RAM Up to 8X
		DVD+RW Up to 8X
		DVD-RW Up to 8X
		DVD+R DL Up to 8X
		DVD-R DL Up to 8X
		DVD-ROM Up to 8X
		DVD-ROM DL Up to 8X
		DVD+R Up to 8X
	DVD-R Up to 8X	
	Blu-ray	BD-ROM Up to 6X
BD-ROM DL Up to 6X		
BD-R Up to 6X		
BD-R DL Up to 6X		
	BD-R Up to 6X	
	BD-RE SL/DL Up to 6X	
Power	Source	SATA DC power receptacle
	DC Power Requirements	5 VDC ± 5%-100 mV ripple p-p
	DC Current	5 VDC -900 mA typical, 2000mA maximum
Operating Environmental (all conditions non-condensing)	Temperature	41° to 122° F (5° to 50° C)
	Relative Humidity	10% to 80%
	Maximum Wet Bulb Temperature	84° F (29° C)
Operating Systems Supported	Windows 8.1, Windows 8 32-bit and 64-bit, Windows 7 Professional 32-bit and 64-bit, Windows Vista Business 64*, Windows Vista Business 32*, Windows Vista Home Basic 32*, Windows 2000, Windows XP Professional or Windows XP Home 32*.	
	Red Hat Enterprise Linux(RHEL) WS4**, 5, 6 Desktop/Workstation	

Technical Specifications - Optical and Removable Storage

SUSE Linux Enterprise Desktop 10 & 11

No driver is required for this device. Native support is provided by the operating system.

Kit Contents

9.5mm Slim BDXL Blu-Ray Writer, 5.25" ODD Bay adapter/carrier, slim SATA data/power cable, installation guide

As Blu-ray is a new format containing new technologies, certain disc, digital connection, compatibility and/or performance issues may arise, and do not constitute defects in the product. Flawless playback on all systems is not guaranteed. In order for some Blu-ray titles to play, they may require a DVI or HDMI digital connection and your display may require HDCP support. HD-DVD movies cannot be played on this workstation.

HP DX115 Removable Drive Enclosure

Interface Type

Compatible with SAS or SATA controllers. Offers 6Gb/s performance when used with 6Gb/s HDDs.

Dimensions (WxHxD)

147.6 x 41.1 x 205 mm (5.81 x 1.62 x 8.08 in)

Weight

Frame and Carrier: 1.73 kg (3.8 lbs.)
Carrier: 0.45 kg (1 lbs.)

Technical Specifications - Optical and Removable Storage

HP 15-in-1 Media Card Reader	Description	<p>Supports hardware ECC (Error Correction Code) function</p> <p>Supports hardware CRC (Cyclic Redundancy Check) function</p> <p>Supports MS 4-bit parallel transfer mode</p> <p>Supports MS-PRO 4-bit parallel transfer mode</p> <p>Supports MS PRO-HG Duo 4-bit parallel transfer mode</p> <p>Supports SD 4-bit parallel transfer mode</p> <p>Supports UHS-104 SD 4-bit card (version 3.0)</p> <p>Supports CF v6.0 with PIO mode 6 and Ultra DMA 7 mode</p>
	Interface Type	<p>USB 3.0 High-speed interface</p> <p>NOTE: If there is a USB2 connection, USB2 transfer speeds are supported.</p>
	Dimensions (WxHxD)	<p>4.9 x 4 x 1 in (124.5 x 101.6 x 25.4 mm) Fits conveniently in the 5.25" drive bay.</p>
	Supported Media Types	<p>CompactFlash Type I</p> <p>CompactFlash Type II</p> <p>Microdrive</p> <p>Secure Digital Card (SD)</p> <p>Secure Digital High Capacity (SDHC)</p> <p>SD Extended Capacity Memory Card (SDXC)</p> <p>SD Ultra High Speed II(SD UHSII)</p> <p>Memory Stick</p> <p>Memory Stick Select</p> <p>Memory Stick Duo (MS Duo)</p> <p>Memory Stick PRO (MS PRO)</p> <p>Memory Stick PRO Duo (MS PRO Duo)</p> <p>Memory Stick PRO-HG Duo</p> <p>MagicGate Memory Stick (MG)</p> <p>MagicGate Memory Stick Duo</p> <p>These additional media types are supported with a card adapter.</p> <p>Memory Stick Micro (M2)</p> <p>miniSD</p> <p>miniSD High Capacity</p> <p>Micro SD Memory Card (MicroSD)</p> <p>Micro SD High Capacity Memory Card (MicroSDHC)</p>
	Operating Systems Supported	<p>Test Parameters/Conditions - Power applied, unit operating on system ±5%</p> <p>Windows 8 Pro (64-bit)*</p> <p>Windows 8.1 (64-bit)*</p> <p>Windows 8 (64-bit)*</p> <p>Windows 7 Professional (32-bit)**</p> <p>Windows 7 Professional (64-bit)**</p> <p>Windows Vista Business 64</p> <p>Windows Vista Business 32</p> <p>Windows Vista Home Basic 32</p> <p>Windows XP Professional</p> <p>Windows XP Home 32</p> <p>No driver is required for this device. Native support is provided by the operating system.</p> <p>Not all features are available in all editions of Windows 8. Systems may require upgraded and/or separately purchased hardware, drivers and/or</p>

Technical Specifications - Optical and Removable Storage

	<p>software to take full advantage of Windows 8 functionality. See http://www.microsoft.com.</p> <p>Not all features are available in all editions of Windows 7. This system may require upgraded and/or separately purchased hardware to take full advantage of Windows 7 functionality. See http://www.microsoft.com/windows/windows-7/ for details.</p>
Kit Contents	Media card reader, 5.25" bracket/rails/bezel, Install Guide, IO & Security Software and Documentation CD
Approvals	USB-IF, WHQL, Compliant with USB Mass Storage Class Bulk only Transport Specification Rev. 1.0, Compliant Intel Front Panel I/O Connectivity Design Guide V. 1.3, FCC, CE, BSMI, C-Tick, VCCI, MIC, cUL, TUVT
Weight	0.35 lbs. (0.16 kg)

Technical Specifications - Controller Cards

CONTROLLER CARDS

HP IEEE 1394b FireWire PCIe Card	Data Transfer Rate	Supports up to 800 Mb/s
	Devices Supported	IEEE-1394 compliant devices
	Bus Type	PCIe card full height PCIe slots
	Ports	Two IEEE-1394b external 9-Pin connectors (Rear)
	Internal Connectors	One 10-Pin header connector
	System Requirements	Windows 8.1 64-bit, Windows 7 Professional 32-bit and 64-bit, SLED 11 and RHEL 6. Intel i5 series or higher processor, min 2GB of RAM, 20GB Hard Drive, CD-ROM drive, built in sound system, Available PCIe slot.
	Temperature – Operating	50° to 131° F (10° to 55° C)
	Temperature – Storage	-22° to 140° F (-30° to 60° C)
	Relative Humidity – Operating	20% to 80%
	Compliances	FCC Part 15B, cULus 60950, CE Mark EN55022B(1995)/EN55024-1998 STD, Taiwan BSMI CNS13438, Korea MIC
	Operating Systems Supported	Windows 8.1 64-bit, Windows 7 Professional 32-bit and 64-bit
HP Thunderbolt-2 PCIe 1-port I/O Card	Data Transfer Rate	Supports up to 20 Gb/s (20,000 Mb/s)
	Devices Supported	Thunderbolt™ certified devices
	Bus Type	PCIe card, full or half height PCIe slots
	Ports	One Thunderbolt™ 2 external 20-Pin output connectors (Rear) One full size DisplayPort input connector (Rear)
	Internal Connectors	One 5-Pin header connector
	System Requirements	Genuine Windows 7 Professional 64-bit, Genuine Windows 8.1 64-bit, Intel i5 series or higher processor, 4-GB RAM, 20-GB Hard Drive, available PCIe slot.
	Temperature - Operating	50° to 131° F (10° to 55° C)
	Temperature - Storage	-22° to 140° F (-30° to 60° C)
	Relative Humidity - Operating	20% to 80%
	Compliances	FCC Part 15B, cULus 60950, CE Mark EN55022B(1995)/EN55024-1998 STD, Taiwan BSMI CNS13438, Korea MIC
	Operating Systems Supported	Genuine Windows 7 Professional 64-bit, Genuine Windows 8.1 64-bit.
Kit Contents	HP Thunderbolt™ 2 PCIe 1-port I/O Card, full height and half height bracket, DisplayPort to DisplayPort cable, internal header cables (2), user documentation and warranty card.	

Technical Specifications - Networking and Communications

NETWORKING AND COMMUNICATIONS

HP X520 10GbE Dual Port Adapter **Hardware Certifications** FCC B, UL, CE, VCCI, BSMI, CTICK, KCC

HP 10GbE SFP+ SR Transceiver

Operating Temperature 0C to 45C (32F to 113F)

Operating Humidity 0% to 85%, noncondensing

Dimensions (H x W x D) 0.47(h) x 0.54(w) x 2.19(d)inches (1.19 x 1.38 x 5.57 cm)

Intel 7260 802.11 a/b/g/n PCIe WLAN NIC

Operating Humidity Operating 10% to 90% (non-condensing)
Non-operating 5% to 95% (non-condensing)

Dimensions (H x W x D) Native HMC: 26.8 x 30.0 x 2.4 mm
Carrier Card Assembly 3.3 x 4.7 in (84 x 119 mm)

Kit Contents PCIe x1 card with full height bracket, rf antenna, antenna cable, separate low profile bracket, software CD and warranty.

NOTES:

1. WLAN supplier's client utility is required for Cisco Compatible Extensions support with Microsoft Windows XP. WLAN may also be compatible with certain third-party software supplicants. WLAN supplier IHV extensions required for Cisco Compatible Extensions support for Microsoft Windows Vista.
2. Check latest software/driver release for updates on supported security features.
3. Maximum output power may vary by country according to local regulations.
4. In Power Save Polling mode and on battery power.
5. Receiver sensitivity is measured at a packet error rate of 8% for 802.11b (CCK modulation) and a packet error rate of 10% for 802.11a/g (OFDM modulation).
6. 802.11a/g (OFDM modulation).

Integrated Intel I210AT PCIe GbE Controller

Connector RJ-45 (motherboard integration)

Controller Intel I210 GbE platform LAN connect networking controller

Memory Programmable FIFO packet buffer memory
Tx 24KB default
Rx up to 16KB

Data Rates Supported 10/100/1000 Mbps

Compliance 802.1as, 802.1q, 802.1Q, 802.3, 802.3ab, 802.3ap, 802.3az, 802.3u, 802.3x, 802.3z

Bus Architecture PCI Express 2.1 (x1) and SMBus

Data Transfer Mode PCIe-based interface for active state operation (S0 state) and SMBus for host and management traffic (Sx low power state)

Power Requirement Requires 3.3V only (integrated regulators)

Boot ROM Support Yes

Network Transfer Mode Full-duplex; Half-duplex (not supported for the 1000BASE-T transceiver)

Network Transfer Rate 10BASE-T (half-duplex) 10 Mbps
10BASE-T (full-duplex) 20 Mbps
100BASE-TX (half-duplex) 100 Mbps

Technical Specifications - Networking and Communications

		100BASE-TX (full-duplex) 200 Mbps 1000BASE-T (full-duplex) 2000 Mbps
	Management Capabilities	WOL, auto MDI crossover, PXE, Multi-port teaming, RSS, Advanced cable diagnostics
Integrated Intel I218LM PCIe GbE Controller	Connector	RJ-45 (motherboard integration)
	Controller	Intel I218LM GbE platform LAN connect networking controller
	Memory	3 KB FIFO packet buffer memory (both Tx and Rx)
	Data Rates Supported	10/100/1000 Mbps
	Compliance	802.1as, 802.1p, 802.1Q, 802.3, 802.3ab, 802.3az, 802.3i, 802.3u, 802.3x, 802.3z
	Bus Architecture	PCI Express 1.1 (x1) and SMBus
	Data Transfer Mode	PCIe-based interface for active state operation (S0 state) and SMBus for host and management traffic (Sx low power state)
	Power Requirement	Requires 3.3V only (integrated regulators)
	Boot ROM Support	Yes
	Network Transfer Mode	Full-duplex; Half-duplex (not supported for the 1000BASE-T transceiver)
	Network Transfer Rate	10BASE-T (half-duplex) 10 Mbps 10BASE-T (full-duplex) 20 Mbps 100BASE-TX (half-duplex) 100 Mbps 100BASE-TX (full-duplex) 200 Mbps 1000BASE-T (full-duplex) 2000 Mbps
	Management Capabilities	WOL, auto MDI crossover, PXE, Multi-port teaming, RSS, Advanced cable diagnostics AMT 9.1 support, vPro compliant
HP 361T PCIe Dual Port Gigabit NIC	Connector	Two RJ-45
	Controller	Intel® Ethernet I350 Controller
	Data Rates Supported	10/100/1000 Mbps, Half- and full-duplex
	Compliance	802.3, 802.3u, 802.3x, 802.3ab, 802.3ad, 802.1p, 802.1Q, 802.3az, IEEE 1588 PCIe v2.0 standard RoHS (6 of 6) FCC (U.S. only) Class B DOC (Canada) Class B CE EN 55024, EN55022 Class B VCCI Class II UL 1950 CSA 950 EN 60950 CE ACPI 1.1a Microsoft WHQL (Windows Hardware Quality Labs)
	Data Path Width	Four lane (x4) PCI Express compatible with x4, x8, and x16 PCI Express slots
	Power Requirement	4.1W idle without EEE link partner 3.2W idle with EEE link partner 4.2W maximum
	Network Transfer Rate	10BASE-T (half-duplex) 10 Mb/s

Technical Specifications - Networking and Communications

10BASE-T (full-duplex) 20 Mb/s
 100BASE-TX (half-duplex) 100 Mb/s
 100BASE-TX (full-duplex) 200 Mb/s
 1000BASE-T (full-duplex) 2000 Mb/s

Operating Temperature 32° to 131° F (0° to 55° C)
Operating Humidity 10% to 95% non-condensing
Dimensions (H x W x D) 5.3 x 2.5 in (13.50cm x 6.4 cm) (without brackets)
Operating System Driver Support Windows 7 Professional 32-bit and 64-bit.
 Red Hat Enterprise Linux(RHEL) WS4, 5, 6 Desktop/Workstation
 Novell SLED 10 & SLED 11

Kit Contents HP 361T PCIe Dual Port Gigabit NIC PCA with a standard height bracket attached to it (the low profile bracket is included in the clamshell that the PCA ships in)
 Product Warranty statement and the Quick Install Card (QIC).

Intel Ethernet I350-T4 4-port 1Gb NIC

Connector Four RJ-45
Controller Intel® Ethernet I350 Controller
Data Rates Supported 10/100/1000 Mbps, Half- and full-duplex
Compliance 802.3, 802.3u, 802.3x, 802.3ab, 802.3ad, 802.1p, 802.1Q, 802.3az, IEEE 1588
 PCIe v2.1 standard
 RoHS (6 of 6)
 FCC (U.S. only) Class B
 DOC (Canada) Class B
 CE EN 55024, EN55022 Class B
 VCCI Class II
 UL 1950
 CSA 950
 EN 60950
 CE
 ACPI 1.1a
 Microsoft WHQL (Windows Hardware Quality Labs)

Data Path Width Four lane (x4) PCI Express compatible with x4, x8, and x16 PCI Express slots

Power Requirement 5.0W (typical)

Network Transfer Rate 10BASE-T (half-duplex) 10 Mb/s
 10BASE-T (full-duplex) 20 Mb/s
 100BASE-TX (half-duplex) 100 Mb/s
 100BASE-TX (full-duplex) 200 Mb/s
 1000BASE-T (full-duplex) 2000 Mb/s

Operating Temperature 32° to 131° F (0° to 55° C)
Operating Humidity 10% to 95% non-condensing
Dimensions (H x W x D) 5.3 x 2.5 in (13.50cm x 6.4 cm) (without brackets)
Operating System Driver Support Windows 7 32-bit and 64-bit; Windows 10 32-bit and 64-bit; Red Hat Enterprise Linux(RHEL) WS4, 5, 6 Desktop/Workstation
 Novell SLED 10 & SLED 11

Technical Specifications - Networking and Communications

Kit Contents

Intel I350-T4 PCIe Quad Port Gigabit NIC PCA with a standard height bracket attached to it (the low profile bracket is included in the clamshell that the PCA ships in)
Product Warranty statement and the Installation Guide.

Intel X540-T2 10GbE Dual Port Adapter**Operating Temperature**

32° to 131° F (0° to 55° C)

Operating Humidity

5% to 95% non-condensing

Dimensions (H x W x D)

Standard PCIe with full height bracket installed, half height bracket included.
0.7 x 2.7 x 6.0 in

Operating System Driver Support

The HP driver drop is a unified package that includes the X540-T2 driver. It is the same driver as is used for the 561T. Currently, it includes drivers for Win7-32, Win7-x64, Win8-x64, and Win81-x64.

Kit Contents

Intel X540 10Gb Ethernet Dual port adapter, Installation guide, Warranty card.

Windows Server 2012 R2, Windows Server 2012, Windows 8, Windows Server 2008 R2, Windows 7, Windows Server 2008 SP2, Windows Vista SP2, Windows Server 2003 R2, Windows Server 2003 SP2, Linux Stable Kernel version 3.x, 2.6.x, Red Hat Enterprise Linux 5, 6, SUSE Linux Enterprise Server 10, 11, FreeBSD 9, VMware ESX/ESXi. Note: Not all OS's supported on all HP Z Workstations.

Summary of Changes

SUMMARY OF CHANGES

Date of change:	Version History:		Description of change:
August 21, 2014	v1	Added	Style and technical specifications
October 24, 2014	From v1 to v2	Added	note to supported components: memory, Foxit PhantomPDF Express and Cyberlink Power2Go: software, Optical drives: DVD, BD-XL specs
November 1, 2014	From v2 to v3	Added	Note for Internal USB connector conversion, Overview,
		Changed	Internal USB statement in Overview and System Board sections
December 1, 2014	From v3 to v4	Added	Intel X540-T2 10GbE Dual Port Adapter, HP 4-in-1 SFF (2.5in) HDD Carrier
January 1, 2015	From v4 to v5	Added	RHEL for Preinstalled OS, AMD FirePro W7100, Tesla K40 to GPU and High Performance Computing; Ubuntu 14.04 for Supported Components
		Changed	Memory Load Order, High Performance Computing for K40
February 1, 2015	From v5 to v6	Added	Windows 8.1 Pro 64-bit OS, Red Hat Enterprise Linux (RHEL), HP DX115 Removable HDD Carrier, and notes, 4-Bay SAS-SATA and notes, HP 4-Bay SAS-SATA 2.5in High Density Storage Kit
		Changed	Overview OS, Processors table Power Supply table, Hard Drives Notes, Optical and Removable Storage order, Power Consumption and Chassis Fan
		Removed	Windows 7 Professional 64-bit (National Academic)
March 1, 2015	From v6 to v7	Added	Overview: RAID support. Supported Components, Hard Drives: New SAS SFF 15 HDD line and notes, 4TB SATA HDD
		Changed	SAS, and SATAHDD Description Notes. System Board: Memory section.
April 1, 2015	From v7 to v8	Added	NVIDIA® Quadro® M6000 12GB Graphics, Memory notes
		Changed	Memory from Supported Components, Memory Speed Supported from System Board, ACPI version updated in BIOS section.
May 1, 2015	From v8 to v9	Added	Integrated RAID for PCIe SSDs, Declared Noise Emissions (Entry and high end configs), ISO 7779-9296
		Changed	Form factor from Minitower to Tower
May 6, 2015	From v9 to v10	Changed	NVIDIA GPU front and back specs reorder.
June 1, 2015	From v10 to v11	Added	1TB SATA 7200 rpm 8GB 3.5" SSHD (hybrid), 3Dconnexion CADMouse
		Changed	Reordered SAS Hard Drives in Supported and Technical Specifications
		Removed	600GB SAS 15K rpm
July 1, 2015	From v11 to v12	Added	Z Turbo G2 256 and 512GB drives
August 1, 2015	From v12 to v13	Added	Windows 10 64-bit to Supported OS; NVIDIA NVS 310 1GB Graphics, NVIDIA® Quadro® K420 2GB Graphics Professional 2D and Entry 3D
		Changed	SUSE Linux Enterprise Desktop 11 SP3, 12, LSI iBBU09 Battery Backup Unit changed to AMO; System Board Memory Notes; System Configurations.
		Removed	Windows 8.1 Emerging Market in Overview OS and Supported Components
September 1, 2015	From v12 to v13	Removed	Intel Pro 1500 180GB SATA SSD from Storage SATA SSDs

Summary of Changes

November 1, 2015	From v14 to v15	Added	HP Z Turbo Drive Quad Pro, 256GB, and 512GB SSD modules, NVIDIA® Quadro® M4000 8GB Graphics, NVIDIA® Quadro® M5000 8GB Graphics, Z480 HP Z Cooler
		Removed	300 and 600GB SAS 15K SFF HDD from SAS Hard Drives section.
December 3, 2015	From v15 to v16	Added	64 ECC LR Memory in supported components section and Maximum Memory under Technical Specifications section
December 8	From v16 to v17	Added	HP PS/2 Business Slim Keyboard, HP USB Business Slim Keyboard, HP Wireless Business Slim Keyboard, Windows 10 Home versions to Supported components, Operative systems, Overview
January 1, 2015	From v17 to v18	Added	240/480GB Enterprise Class SSDs, NVIDIA® Quadro® K1200 4GB Graphics
		Removed	NVIDIA® Quadro® K6000 12GB Graphics
February 1, 2015	From v18 to v19	Changed	HP 4-Bay SAS-SATA 2.5in High Density Storage Kit installation guide link
		Removed	Samsung Enterprise 240GB SATA SSD, Samsung Enterprise 480GB SATA SSD
March 1, 2016	From v19 to v20	Added	AMD FirePro W4300 4GB Graphics in Mid-Range 3D Category,
		Removed	Ubuntu 14.04, Supported Components OS; NVIDIA NVS 310 512MB Graphics, NVIDIA® Quadro® K420 1GB Graphics in Graphics
March 31, 2016	From v20 to v21	Added	Intel Xeon E5-2600 v4 Series CPU, Preinstalled Windows 10 Pro 64 bit; HP Z Turbo Drive G2 1TB SSD; DDR4-2400 ECC Registered DIMMs
		Changed	Processor disclaimers and notes; Hard Drives, PCIe notes; Supported components OS notes.
May 1, 2016	From v21 to v22	Added	M2000 and M6000 24GB graphics
		Removed	ZCooler availability note, K4200 and K5200 graphics
May 5, 2016	From v22 to v23	Changed	Pgs. 24, 25, 32: Modified TPM info to: Trusted Platform Module (TPM) 1.2 (Infineon SLB9660). Common Criteria EAL4+ Certified. Upgradable to TPM 2.0. Convertible to FIPS 140-2 Certified mode. (TPM 2.0 is not available for Win 7 32-bit.)
May 12, 2016	From v23 to v24	Changed	Integrated TPM extended specs in pgs 25,26, and 37
June 7, 2016	From v24 to v25	Added	Hardened Mouse HDD, (Enterprise Class) to 4TB SATA HDD
		Removed	EOL Win8.1 Downgrade to Win7
July 1, 2016	From v25 to v26	Added	Number of Aux power connections under the power supply section of the Overview
		Changed	Corrected RAID notes
August 1, 2016	From v26 to v27	Added	HP Keyed Cable Lock 10mm to Racking and Physical Security
September 1, 2016	From v27 to v28	Added	ZTurbo SED 256/512 drives
		Removed	NVIDIA® Quadro® M6000/12GB
November 1, 2016	From v28 to v29	Added	1TB SATA 7200 rpm HDD (Enterprise Class), HP Z Turbo Drive G2 TLC SSDs, HP Z Turbo Drive Quad Pro SSDs module, Intel 750 Series AIC SSDs
		Changed	Intel Xeon E5-2600 Series CPU and notes
		Removed	Intel Xeon E5-2600 v3 Series CPU and notes, 4, 32, and 64GB DDR4-2133 RAM DIMMs
January 1, 2016	From v29 to v30	Added	Radeon Pro WX 7100 8GB graphics, HP Z Turbo Drive G2 256GB TLC, HP Z Turbo Drive G2 512GB TLC, HP Z Turbo Drive G2 1TB TLC, 2TB SATA SSD, 9.5mm Slim DVD-Writer.

Summary of Changes

		Removed	HP Z Turbo Drive 256GB, HP Z Turbo Drive 512GB, HP USB Optical 3-Button Mouse
February 1, 2016	From v30 to v31	Changed	HP 9.5mm Slim SuperMulti DVD Writer, HP Slim DVD-Writer Drive OS Support
March 1, 2017	From v31 to v32	Added	NVIDIA® Quadro® P5000 16GB Graphics and NVIDIA® Quadro® P6000 24GB Graphics
May 1, 2017	From v32 to v33	Added	The NVIDIA® Quadro® P2000 5GB Graphics to Mid-range 3D Graphics
		Changed	Changed The HP 9.5mm Slim SuperMulti DVD Writer for The HP 9.5mm Slim DVD Writer
June 5, 2017	From v33 to v34	Added	The AMD Radeon Pro WX 4100 4 GB Graphics to Mid-range 3D Graphics, added NVIDIA Quadro P600 to Entry 3D Graphics section, added NVIDIA Quadro Sync II, added NVIDIA Quadro P4000 to High-end 3D section
		Changed	HP 9.5mm Slim DVD Writer Option Kit Part Number under Optical and Removable Storage section
		Removed	DVD-RAM as a supported format under the DVD writer section
July 6, 2017	From v34 to v35	Added	NVIDIA Quadro GP100 16GB Graphics to Ultra 3D Graphics, added Intel Ethernet I350-T4 4-port 1Gb NIC to Networking and Communications section
		Changed	The Note 2 for NVIDIA Quadro P600, changed the Operating Systems supported section for the NVIDIA Quadro Sync II and changed the info for the NVIDIA Quadro P4000 8GB Graphics
		Removed	The Tesla K40 as High Performance GPU Computing and removed Slim DVDRW SATA 1st & 2nd ODD from the Stable & Consistent Offerings section
August 21, 2017	From v35 to v36	Changed	EPEAT statement
August 28, 2017	From v36 to v37	Changed	The supported Operating Systems section
September 6, 2017	From v37 to v38	Added	Memory footnotes
		Changed	Displays section and changed RAID 5 support footnotes and changed the info for the NVIDIA Quadro P4000 8GB Graphics
October 1, 2017	From v38 to v39	Changed	Available Processors table

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Attachment 7 – HP Customer Terms – Portfolio

HP's proposal is based upon and subject to the terms and conditions of the HP Customer Terms ("Terms") included on the following pages. These Terms will apply to all orders issued to HP, resultant from an award of the ARFQ, and no other terms and conditions shall take precedence, including any purchase order pre-printed terms.





HP CUSTOMER TERMS – PORTFOLIO

1. **Parties.** These terms represent the agreement (“**Agreement**”) that governs the purchase of products and services from the HP Inc. (“**HP**”) by the State of West Virginia (“**Customer**”).
2. **Orders.** “**Order**” means the accepted order including any supporting material which the parties identify as incorporated either by attachment or reference (“**Supporting Material**”). Supporting Material may include (as examples) product lists, hardware or software specifications, standard or negotiated service descriptions, data sheets and their supplements, and statements of work (“**SOW**”), published warranties and service level agreements, and may be available to Customer in hard copy or by accessing a designated HP website.
3. **Scope and Order Placement.** These terms may be used by Customer either for a single Order or as a framework for multiple Orders. In addition, these terms may be used on a global basis by the parties’ “**Affiliates**,” meaning any entity controlled by, controlling, or under common control with a party. The parties can confirm their agreement to these terms either by signature where indicated at the end or by referencing these terms on Orders. Affiliates participate under these terms by placing orders which specify product or service delivery in the same country as the HP Affiliate accepting the Order, referencing these terms, and specifying any additional terms or amendments to reflect local law or business practices.
4. **Order Arrangements.** Customer may place orders with HP through our website, customer-specific portal, or by letter, fax or e-mail. Where appropriate, orders must specify a delivery date. If Customer extends the delivery date of an existing Order beyond ninety (90) days, then it will be considered a new order. Customer may cancel a hardware Order at no charge up to five (5) business days prior to shipment date.
5. **Prices and Taxes.** Prices will be as quoted in writing by HP or, in the absence of a written quote, as set out on HP’s website, customer-specific portal, or HP published list price at the time an order is submitted to HP. Prices are exclusive of taxes, duties, and fees (including installation, shipping, and handling) unless otherwise quoted. If a withholding tax is required by law, please contact the HP order representative to discuss appropriate procedures.
6. **Invoices and Payment.** Customer agrees to pay all invoiced amounts within thirty (30) days of HP’s invoice date. HP may suspend or cancel performance of open Orders or services if Customer fails to make payments when due.
7. **Products.**
 - (a) Title. Risk of loss or damage and title for hardware products will pass upon delivery to Customer or its designee. Where permitted by law, HP retains a security interest in products sold until full payment is received.
 - (b) Delivery. HP will use all commercially reasonable efforts to deliver products in a timely manner. HP may elect to deliver software and related product/license information by electronic transmission or via download.
 - (c) Installation. If HP is providing installation with the product purchase, HP’s site guidelines (available upon request) will describe Customer requirements. HP will conduct its standard installation and test procedures to confirm completion.
 - (d) Product Performance. All HP-branded hardware products are covered by HP’s limited warranty statements that are provided with the products or otherwise made available. Hardware warranties begin on the date of delivery or if applicable, upon completion of HP installation, or (where Customer delays HP installation) at the latest 30 days from the date of delivery. Non-HP branded products receive warranty coverage as provided by the relevant third party supplier.
 - (e) Product Warranty Claims. When we receive a valid warranty claim for an HP hardware or software product, HP will either repair the relevant defect or replace the product. If HP is unable to complete the repair or replace the product within a reasonable time, Customer will be entitled to a full refund upon the prompt return of the product to HP (if hardware) or upon written confirmation by Customer that the relevant software product has been destroyed or permanently disabled. HP will pay for shipment of repaired or replaced products to Customer and Customer will be responsible for return shipment of the product to HP.
8. **Software.**
 - (a) License Grant. HP grants Customer a non-exclusive license to use the version or release of the HP-branded software listed in the Order. Permitted use is for internal purposes only (and not for further



commercialization), and is subject to any specific software licensing information that is in the software product or its Supporting Material. For non-HP branded software, the third party's license terms will govern its use.

- (b) Updates. Customer may order new software versions, releases or maintenance updates ("Updates"), if available, separately or through an HP software support agreement. Additional licenses or fees may apply for these Updates or for the use of the software in an upgraded environment. Updates are subject to the license terms in effect at the time that HP makes them available to Customer.
- (c) License Restrictions. HP may monitor use/license restrictions remotely and, if HP makes a license management program available, Customer agrees to install and use it within a reasonable period of time. Customer may make a copy or adaptation of a licensed software product only for archival purposes or when it is an essential step in the authorized use of the software. Customer may use this archival copy without paying an additional license only when the primary system is inoperable. Customer may not copy licensed software onto or otherwise use or make it available on any public external distributed network. Licenses that allow use over Customer's intranet require restricted access by authorized users only. Customer will also not modify, reverse engineer, disassemble, decrypt, decompile or make derivative works of any software licensed to Customer under this Agreement unless permitted by statute, in which case Customer will provide HP with reasonably detailed information about those activities.
- (d) License Term and Termination. Unless otherwise specified, any license granted is perpetual, provided however that if Customer fails to comply with the terms of this Agreement, HP may terminate the license upon written notice. Immediately upon termination, or in the case of a limited-term license, upon expiration, Customer will either destroy all copies of the software or return them to HP, except that Customer may retain one copy for archival purposes only.
- (e) License Transfer. Customer may not sublicense, assign, transfer, rent or lease the software or software license except as permitted by HP. HP-branded software licenses are generally transferable subject to HP's prior written authorization and payment to HP of any applicable fees. Upon such transfer, Customer's rights shall terminate and Customer shall transfer all copies of the software to the transferee. Transferee must agree in writing to be bound by the applicable software license terms. Customer may transfer firmware only upon transfer of associated hardware.
- (f) License Compliance. HP may audit Customer compliance with the software license terms. Upon reasonable notice, HP may conduct an audit during normal business hours (with the auditor's costs being at HP's expense). If an audit reveals underpayments then Customer will pay to HP such underpayments. If underpayments discovered exceed five (5) percent of the contract price, Customer will reimburse HP for the auditor costs.
- (g) Software Performance. HP warrants that its branded software products will conform materially to their specifications and be free of malware at the time of delivery. HP warranties for software products will begin on the date of delivery and unless otherwise specified in Supporting Material, will last for ninety (90) days. HP does not warrant that the operation of software products will be uninterrupted or error-free or that software products will operate in hardware and software combinations other than as authorized by HP in Supporting Material.
- (h) US Federal Government Use. If software is licensed to Customer for use in the performance of a US Government prime contract or subcontract, Customer agrees that consistent with FAR 12.211 and 12.212, commercial computer software, documentation and technical data for commercial items are licensed under HP's standard commercial license.

9. Services.

- (a) Support Services. HP's support services will be described in the applicable Supporting Material, which will cover the description of HP's offering, eligibility requirements, service limitations and Customer responsibilities, as well as the Customer systems supported. Support services are further described in Exhibit A – Supplemental Data Sheet.
- (b) Professional Services. HP will deliver any ordered IT consulting, training or other services as described in the applicable Supporting Material.
- (c) Professional Services Acceptance. The acceptance process (if any) will be described in the applicable Supporting Material, will apply only to the deliverables specified, and shall not apply to other products or services to be provided by HP.
- (d) Services Performance. Services are performed using generally recognized commercial practices and standards. Customer agrees to provide prompt notice of any such service concerns and HP will re-perform any service that fails to meet this standard.



- (e) Services with Deliverables. If Supporting Material for services defines specific deliverables, HP warrants those deliverables will conform materially to their written specifications for 30 days following delivery. If Customer notifies HP of such a non-conformity during the 30 day period, HP will promptly remedy the impacted deliverables or refund to Customer the fees paid for those deliverables and Customer will return those deliverables to HP.
- (f) Dependencies. HP's ability to deliver services will depend on Customer's reasonable and timely cooperation and the accuracy and completeness of any information from Customer needed to deliver the services.
- (g) Expenses. HP will charge separately for reasonable out-of-pocket expenses, such as travel expenses incurred in providing professional services.
- (h) Change Orders. We each agree to appoint a project representative to serve as the principal point of contact in managing the delivery of services and in dealing with issues that may arise. Requests to change the scope of services or deliverables will require a change order signed by both parties.

10. **Eligibility.** HP's service, support and warranty commitments do not cover claims resulting from:
- (a) improper use, site preparation, or site or environmental conditions or other non-compliance with applicable Supporting Material;
 - (b) modifications or improper system maintenance or calibration not performed by HP or authorized by HP;
 - (c) failure or functional limitations of any non-HP software or product impacting systems receiving HP support or service;
 - (d) malware (e.g. virus, worm, etc.) not introduced by HP; or
 - (e) abuse, negligence, accident, fire or water damage, electrical disturbances, transportation by Customer, or other causes beyond HP's control.
11. **Remedies.** This Agreement states all remedies for warranty claims. To the extent permitted by law, HP disclaims all other warranties.
12. **Intellectual Property Rights.** No transfer of ownership of any intellectual property will occur under this Agreement. Customer grants HP a non-exclusive, worldwide, royalty-free right and license to any intellectual property that is necessary for HP and its designees to perform the ordered services. If deliverables are created by HP specifically for Customer and identified as such in Supporting Material, HP hereby grants Customer a worldwide, non-exclusive, fully paid, royalty-free license to reproduce and use copies of the deliverables internally.
13. **Indemnification**
- (a) Intellectual Property Rights Infringement. HP will defend and/or settle any claims against Customer that allege that an HP-branded product or service as supplied under this Agreement infringes the intellectual property rights of a third party. HP will rely on Customer's prompt notification of the claim and cooperation with HP's defense. HP may modify the product or service so as to be non-infringing and materially equivalent, or we may procure a license. If these options are not available, we will refund to Customer the amount paid for the affected product in the first year or the depreciated value thereafter or, for support services, the balance of any pre-paid amount or, for professional services, the amount paid. HP is not responsible for claims resulting from any unauthorized use of the products or services. This section shall also apply to deliverables identified as such in the relevant Supporting Material except that HP is not responsible for claims resulting from deliverables content or design provided by Customer.
 - (b) General Indemnification. HP will defend and settle third party claims against Customer for tangible property damage, bodily injury and death, to the extent caused by HP's negligence or willful misconduct, provided that Customer promptly notifies HP of such claims, cooperates with HP in the defense of the claims, and grants HP sole defense of such claims. In connection with such claims, HP will pay all defense costs, settlement amounts, court awarded damages (including court costs and reasonable attorneys' fees), and third party costs incurred by Customer at the request of HP in connection with the defense of the claim.
14. **Confidentiality.** Information exchanged under this Agreement will be treated as confidential if identified as such at disclosure or if the circumstances of disclosure would reasonably indicate such treatment. Confidential information may only be used for the purpose of fulfilling obligations or exercising rights under this Agreement, and shared with employees, agents or contractors with a need to know such information to support that purpose. Confidential information will be protected using a reasonable degree of care to prevent unauthorized use or disclosure for three (3) years from the date of receipt or (if longer)



for such period as the information remains confidential. These obligations do not cover information that: (i) was known or becomes known to the receiving party without obligation of confidentiality; (ii) is independently developed by the receiving party; or (iii) where disclosure is required by law or a governmental agency.

15. **Personal Information.** Each party shall comply with their respective obligations under applicable data protection legislation. HP does not intend to have access to personally identifiable information (“PII”) of Customer in providing services. To the extent HP has access to Customer PII stored on a system or device of Customer, such access will likely be incidental and Customer will remain the data controller of Customer PII at all times. HP will use any PII to which it has access strictly for purposes of delivering the services ordered.
16. **Limitation of Liability.** HP’s liability to Customer under this Agreement is limited to the greater of \$1,000,000 or the amount payable by Customer to HP for the relevant Order. Neither Customer nor HP will be liable for lost revenues or profits, downtime costs, loss or damage to data or indirect, special or consequential costs or damages. This provision does not limit either party’s liability for: unauthorized use of intellectual property, death or bodily injury caused by their negligence; acts of fraud; willful repudiation of the Agreement; nor any liability which may not be excluded or limited by applicable law.
17. **Termination.**

Either party may terminate this Agreement on written notice if the other fails to meet any material obligation and fails to remedy the breach within a reasonable period after being notified in writing of the details. If either party becomes insolvent, unable to pay debts when due, files for or is subject to bankruptcy or receivership or asset assignment, the other party may terminate this Agreement and cancel any unfulfilled obligations.
18. **General.**
 - (a) Entire Agreement. This Agreement represents the parties’ entire understanding with respect to its subject matter and supersedes any previous communication or agreements that may exist.
 - (b) Amendments. Modifications to the Agreement will be made only through a written amendment signed by both parties.
 - (c) Governing Law. The Agreement will be governed by the laws of the country of HP or the HP Affiliate accepting the Order and the courts of that locale will have jurisdiction, however, HP or its Affiliate may, bring suit for payment in the country where the Customer Affiliate that placed the Order is located. Customer and HP agree that the United Nations Convention on Contracts for the International Sale of Goods will not apply. Claims arising or raised in the United States will be governed by the laws of the state of West Virginia, excluding rules as to choice and conflict of law.
 - (d) Disputes. If Customer is dissatisfied with any products or services purchased under these terms and disagrees with HP’s proposed resolution, we both agree to promptly escalate the issue to a Vice President (or equivalent executive) in each party’s respective organizations for an amicable resolution without prejudice to the right to later seek a legal remedy.
 - (e) Force Majeure. Neither party will be liable for performance delays nor for non-performance due to causes beyond its reasonable control, except for payment obligations
 - (f) Global Trade Compliance. Products and services provided under these terms are for Customer’s internal use and not for further commercialization. If Customer exports, imports or otherwise transfers products and/or deliverables provided under these terms, Customer will be responsible for complying with applicable laws and regulations and for obtaining any required export or import authorizations. HP may suspend its performance under this Agreement to the extent required by laws applicable to either party.
 - (g) Assignment. Neither party may, nor will it have the power to, assign or novate the Agreement without the consent of the other, such consent not to be unreasonably withheld.
 - (h) Survival. Any terms in the Agreement which by their nature extend beyond termination or expiration of the Agreement will remain in effect until fulfilled and will apply to both parties’ respective successors and permitted assigns.



The parties confirm their agreement to these terms by referencing these terms in the relevant Order or by executing below, which is effective as of the last date signed below ("Effective Date"):

HP INC.

CUSTOMER: STATE OF WEST VIRGINIA

By: _____

By: _____

Name: _____

Name: _____

Title: _____

Title: _____

Date: _____

Date: _____



EXHIBIT A – SUPPLEMENTAL DATA SHEET

This Supplemental Data Sheet provides additional general requirements and limitations that apply to HP's support offerings, which are set forth in detail in offering-specific datasheets, with the exception of those support offerings delivered by HP Software.

1. SERVICE ELIGIBILITY

- (a) Hardware Support-General Eligibility. Hardware products must be in good operating condition, as reasonably determined by HP, to be eligible for placement under support. You (“**you**” or “**your**”) must also maintain eligible products at the latest HP-specified configuration and revision levels.
- (b) Return to Support. If you allow support to lapse, HP may charge you additional fees to resume support or require you to perform certain hardware or software upgrades.
- (c) Use of Proprietary Service Tools. HP may require you to use certain hardware and/or software system and network diagnostic and maintenance programs (“**Proprietary Service Tools**”), as well as certain diagnostic tools that may be included as part of the your system. Proprietary Service Tools are and remain the sole and exclusive property of HP, and are provided “as is.” Proprietary Service Tools may reside on your systems or sites. You may only use the Proprietary Service Tools during the applicable Support coverage period and only as allowed by HP and you may not sell, transfer, assign, pledge, or in any way encumber or convey the Proprietary Service Tools. Upon termination of Support, you will return the Proprietary Service Tools or allow HP to remove these Proprietary Service Tools. You will also be required to:
 - (i) Allows HP to keep the Proprietary Service Tools resident on your systems or sites, and assist HP in running them;
 - (ii) Install Proprietary Service Tools, including installation of any required updates and patches;
 - (iii) Use the electronic data transfer capability to inform HP of events identified by the software;
 - (iv) If required, purchase HP-specified remote connection hardware for systems with remote diagnosis service; and
 - (v) Provide remote connectivity through an approved communications line.

2. SUPPORT LIMITATIONS

- (a) Local Availability of Support. Some offerings, features, and coverage (and related products) may not be available in all countries or areas. In addition, delivery of support outside of the applicable HP coverage areas may be subject to travel charges, longer response times, reduced restoration or repair commitments, and reduced coverage hours.
- (b) Version Support. Unless otherwise agreed by HP in writing, and for those offerings not delivered by HP Software, HP only provides support for the current version and the immediately preceding version of HP branded software, and provided that HP branded software is used with hardware or software included in HP-specified configurations at the specified version level. “**Version**” means a release of software that contains new features, enhancements, and/or maintenance updates, or for certain software, a collection of revisions packaged into a single entity and, as such, made available to HP customers.
- (c) Relocation and Impact on Support. Relocation of any products under support is your responsibility and is subject to local availability and fee changes. Reasonable advance notice to HP may be required to begin support after relocation. For products, any relocation is also subject to the license terms for such products.
- (d) Multi-vendor Support. HP provides support for certain non-HP branded products. The relevant data sheet will specify availability and coverage levels and the support will be provided accordingly, whether or not the non-HP branded products are under warranty. HP may discontinue support of non-HP branded products if the manufacturer or licensor ceases to provide support for them.
- (e) Modifications. You will allow HP, at HP's request, and at no additional charge, to modify products to improve operation, supportability, and reliability, or to meet legal requirements.

3. CUSTOMER RESPONSIBILITIES

- (a) Site and Product Access. You will provide HP access to the products covered under support; and if applicable, adequate working space and facilities within a reasonable distance of the products; access to and use of information, customer resources, and facilities as reasonably determined necessary by HP to service the products; and other access requirements described in the relevant data sheet. If you fail to provide such access, resulting in HP's inability to provide support, HP shall be entitled to charge you for



the support call at HP's published service rates. You are responsible for removing any products ineligible for support, as advised by HP, to allow HP to perform support. If delivery of support is made more difficult because of ineligible products, HP will charge you for the extra work at HP's published service rates.

- (b) Licenses. You may purchase available product support for HP branded products only if you can provide evidence that you have rightfully acquired an appropriate HP license for the products, and you may not alter or modify the products unless authorized by HP at any time.
- (c) Software Support Documentation and Right to Copy. You may only copy documentation updates if you purchased the right to copy them for the associated products. Copies must include appropriate HP trademark and copyright notices.
- (d) Loaner Units. HP maintains title and you shall have risk of loss or damage for loaner units if provided at HP's discretion as part of hardware support or warranty services and such units will be returned to HP without lien or encumbrance at the end of the loaner period.
- (e) Hardware Support, Compatible Cables and Connectors. You will connect hardware products covered under support with cables and connectors (including fiber optics if applicable) that are compatible with the system, according to the manufacturer's operating manual.
- (f) Data Backup. To reconstruct your lost or altered files, data, or programs, you must maintain a separate backup system or procedure that is not dependent on the products under support.
- (g) Temporary Workarounds. You will implement temporary procedures or workarounds provided by HP while HP works on a permanent solution.
- (h) Hazardous Environment. You will notify HP if you use products in an environment that poses a potential health or safety hazard to HP employees or subcontractors. HP may require you to maintain such products under HP supervision and may postpone service until you remedy such hazards.
- (i) Authorized Representative. You will have a representative present when HP provides support at your site.
- (j) Product List. You will create, maintain and update a list of all products under support including: the location of the products, serial numbers, the HP-designated system identifiers, and coverage levels.
- (k) Solution Center Designated Callers. You will identify a reasonable number of callers, as determined by HP and Customer ("**Designated Callers**"), who may access HP's customer Support call centers ("**Solution Centers**") or online help tools.
- (l) Solution Center Caller Qualifications. Designated Callers must be generally knowledgeable and demonstrate technical aptitude in system administration, system management, and, if applicable, network administration and management and diagnostic testing. HP may review and discuss with you any Designated Caller's experience to determine initial eligibility. If issues arise during a call to the Solution Center that, in HP's reasonable opinion, may be a result of a Designated Caller's lack of general experience and training, you may be required to replace that Designated Caller. All Designated Callers must have the proper system identifier as provided to you when Support is initiated. Solution Centers may provide support in English or local languages, or both.

4. GENERAL PROVISIONS

- a. Cancellation. You may cancel support orders or delete products from support upon thirty (30) days written notice, unless otherwise agreed in writing. HP may discontinue support for products and specific support services no longer included in HP's support offering upon sixty (60) days written notice, unless otherwise agreed in writing. If you cancel prepaid support, HP will refund you a pro-rata amount for the unused prepaid support subject to any restrictions or early termination fees as may be set forth in writing.
- b. Pricing. Except for prepaid support or if otherwise agreed in writing, HP may change support prices upon sixty (60) days' written notice.
- c. Additional Services. Additional services performed by HP at your request, and that are not included in your purchased support, will be chargeable at the applicable published service rates for the country where the service is performed.
- d. Replacement Parts. Parts provided under hardware support may be whole unit replacements, or be new or functionally equivalent to new in performance and reliability and warranted as new. Replaced parts become the property of HP, unless HP agrees otherwise and you pay any applicable charges.