Eldorado do Sul, 17 de setembro de 2025

À
DECISION SERVIÇOS DE TECNOLOGIA DA INFORMAÇÃO LTDA
A/C Sr. Maristela Vargas

Ref.: COMPANHIA DE PROCESSAMENTO DE DADOS DO MUNICÍPIO DE PORTO ALEGRE – PROCEMPA - LICITAÇÃO ELETRÔNICA Nº 055/2025

ASSISTÊNCIAS TÉCNICAS

A **DELL COMPUTADORES DO BRASIL LTDA. ("Dell"),** inscrita no CNPJ/MF sob o nº 72.381.189/0001-10, com sede na Av. Industrial Belgraf, 400 – Medianeira – Cep 92990-000, Eldorado do Sul/RS, vem, através da presente, informar as suas assistências técnicas autorizadas:

Nome	UF	Cidade	Razão Social	CNPJ	Endereços	CEP	Gerente Logistico
Porto Alegre	RS	Porto Alegre	Proxxi Tecnologia Ltda	47379565000438	RUA BEIRUTE, 340 - NAVEGANTES - PORTO ALEGRE - CEP 90240-080	90240-080	Nicoly Ribeiro Pereira - (48) 98841-4694

Atenciosamente,

DELL COMPUTADORES DO BRASIL LTDA:72381189000110
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Date: 2025.09.17 17:26:15 -03'00'

Dell Computadores do Brasil Ltda

Juliane Casagrande Rodrigues – Gerente de Vendas

Esta declaração é válida pelo prazo de 90 (noventa dias) da sua emissão.

Eldorado do Sul, 17 de setembro de 2025.

À
DECISION SERVIÇOS DE TECNOLOGIA DA INFORMAÇÃO LTDA
Ref.: COMPANHIA DE PROCESSAMENTO DE DADOS DO MUNICÍPIO DE PORTO ALEGRE – PROCEMPA - LICITAÇÃO ELETRÔNICA Nº 055/2025

DECLARAÇÃO

A **Dell Computadores do Brasil Ltda**. ("Dell") inscrita no CNPJ sob o n. 72.381.189.0001-10 e com sede na Av. Industrial Belgraf n. 400, Eldorado do Sul, RS, vem, por meio de seu representante legal, declarar que a empresa **DECISION SERVIÇOS DE TECNOLOGIA DA INFORMAÇÃO LTDA**, com sede na Rua Holdercim, 1308, setor II, Civit II, Serra/ES, CEP 29.168-066, inscrita no CNPJ sob o nº 03.535.902/0009-78, faz parte do Programa de Parceria DELL TECHNOLOGIES e é atualmente parceira da Dell, estando autorizada a comercializar os produtos Dell em todo o território brasileiro.

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Date: 2025.09.17 17:25:30 -03'00'

Dell Computadores do Brasil Ltda.

Juliane Casagrande Rodrigues – Gerente de Vendas

Esta declaração é válida pelo prazo de 90 (noventa dias) da sua emissão.

DECLARAÇÃO DO FABRICANTE

A **DELL COMPUTADORES DO BRASIL LTDA. ("Dell")**, inscrita no CNPJ sob o nº 72.381.189/0001-10, na qualidade de fabricante do(s) equipamento(s) de marca Dell (abaixo identificado(s)), ofertado(s) pela empresa **DECISION SERVIÇOS DE TECNOLOGIA DA INFORMAÇÃO LTDA**, no certame licitatório **LICITAÇÃO ELETRÔNICA Nº 055/2025**, promovido pela **COMPANHIA DE PROCESSAMENTO DE DADOS DO MUNICÍPIO DE PORTO ALEGRE – PROCEMPA**, vem, através desta, declarar que:

- o(s) modelo(s) **PowerEdge R760** possui(em) garantia de 60 meses, on-site, com atendimento telefônico 24 horas por dia, 7 dias na semana.

Declaramos, ainda, que:

- Os equipamentos por nós fabricados serão novos, sem uso e não são produtos descontinuados;

- A **DECISION SERVIÇOS DE TECNOLOGIA DA INFORMAÇÃO LTDA** está autorizada a comercializar os equipamentos propostos para esse certame.

Eldorado do Sul, 17 de setembro de 2025

DELL COMPUTADORES DO BRASIL LTDA:72381189000110

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Date: 2025.09.17 17:25:07 -03'00'

Dell Computadores do Brasil Ltda.

Juliane Casagrande Rodrigues – Gerente de Vendas

Esta declaração é válida pelo prazo de 90 (noventa) dias da sua emissão.

Eldorado do Sul, 17 de setembro de 2025

À
DECISION SERVIÇOS DE TECNOLOGIA DA INFORMAÇÃO LTDA
A/C Sr. Maristela Vargas

Ref.: COMPANHIA DE PROCESSAMENTO DE DADOS DO MUNICÍPIO DE PORTO ALEGRE – PROCEMPA - LICITAÇÃO ELETRÔNICA Nº 055/2025

DECLARAÇÃO TÉCNICA

DELL COMPUTADORES DO BRASIL LTDA. ("Dell"), inscrita no CNPJ/MF sob o n° 72.381.189/0001-10, com sede na Av. Industrial Belgraf, 400 – Medianeira – CEP 92990-000, Eldorado do Sul/RS, com o objetivo de complementar as informações que não constam no Catálogo Técnico Oficial do(s) produto(s) abaixo ofertado(s), vem, através da presente, declarar o que segue:

Objeto: **PowerEdge R760**
- A BIOS do servidor é desenvolvida pela Dell;
- Os módulos de memória suportam a tecnologia de correção de erros: Advanced ECC;
- Todos os componentes ofertados são novos (sem uso, reforma ou recondicionamento) e não estão fora de linha de fabricação;
- O sistema de gerenciamento/monitoramento do equipamento é fabricado pela Dell.

DELL COMPUTADORES DO BRASIL LTDA:72381189000110
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Dell Computadores do Brasil Ltda

Juliane Casagrande Rodrigues – Gerente de Vendas

Esta declaração é válida pelo prazo de 90 (noventa dias) da sua emissão.

ProSupport for Infrastructure

Introduction

Dell Technologies[1] is pleased to provide ProSupport for Infrastructure (the "**Service(s)" or "Support Services**") in accordance with this Service Description ("**Service Description**"). Your quote, order form or other mutually-agreed upon form of invoice or order acknowledgment from Dell Technologies (the "**Order Form**") will include the name(s) of the Product(s)[2], applicable Service(s) and related option(s), if any. For additional assistance, or to request a copy of your governing agreement applicable to the Services (the "**Agreement**"), contact your Dell Technologies sales representative. For a copy of your agreement with your applicable Dell Technologies reseller, contact that reseller.

The Scope of This Service

The features of this Service include:

- Access on a 24x7 basis (including holidays)[3] to the Dell Technologies Customer Service and Support organization for troubleshooting assistance of Products.
- On-site dispatch of a technician and/or delivery of replacement parts to the Installation Site or other Customer business location approved by Dell Technologies as detailed in the Agreement (as necessary and according to the support option purchased) to address a Product problem. See below for more details on severity levels and onsite service options.
- Replacement parts, spares, components when deemed necessary to resolve or prevent an issue
- ProSupport AIOps Platforms include Dell AIOps, TechDirect and MyService 360, which are enabled via connectivity software, such as Secure Connect Gateway (SCG), and provide benefits not limited to the following:
    - Proactive issue detection and automated case creation
    - Predictive detection of hardware failures
    - Self-serve case creation
    - Self-serve part dispatch
    - Dell Security Advisories
    - Dell AIOps Cybersecurity Assessment

Please review the table below for more details.

How to Contact Dell Technologies if You Require Service

Online, Chat, and Email Support: Dell Technologies website, chat, and email support available for select products at www.dell.com/contactus.

Telephone Support Requests: Available on a 24x7 basis (including holidays). Availability may differ outside of the United States and is limited to commercially reasonable efforts unless otherwise specified in this document. Visit www.dell.com/contactus for a list of applicable telephone numbers for your location.

The following chart lists the service features of ProSupport for Infrastructure provided under Dell Technologies' warranty and/or maintenance terms. ProSupport for Infrastructure is available to support and maintain:

1. Dell Technologies Equipment which is identified on the Dell Technologies Product Warranty and Maintenance Table and/or on your Order Form as:

- including ProSupport for Infrastructure during the applicable warranty period; or

[1] "Dell Technologies", as used in this document, means the applicable Dell sales entity ("Dell") specified on your Dell Order Form and the applicable EMC sales entity ("EMC") specified on your EMC Order Form. The use of "Dell Technologies" in this document does not indicate a change to the legal name of the Dell or EMC entity with whom you have dealt.

[2] As used in this document, "Dell Technologies Products", "Products", "Equipment" and "Software" means the Dell Technologies Equipment and Software identified on the Dell Technologies Product Warranty and Maintenance Table or on your Order Form, and "Third Party Products" is defined in your Agreement, or in the absence of such definition in your Agreement, in the Dell Technologies Commercial Terms of Sale, or your local Dell Technologies terms of sale, as applicable. "You" and "Customer" refers to the entity named as the purchaser of these Services named in the Agreement. Server/Storage/Networking Software are not classified as Equipment.

[3] Availability varies by country. Contact your sales representative for more information.

- eligible for upgrade to ProSupport for Infrastructrure during the applicable warranty period; or
- eligible for ProSupport for Infrastructure during a subsequent maintenance period.

Dell Technologies Software which is identified on the Dell Technologies Product Warranty and Maintenance Table and/or on your Order Form as eligible for ProSupport for Infrastructure during a maintenance period.

SERVICE FEATURE	DESCRIPTION	PROSUPPORT—COVERAGE DETAILS
GLOBAL TECHNICAL SUPPORT	Customer contacts Dell Technologies by telephone or web interface on a 24x7 basis to report an Equipment or Software problem. Telephone contacts will be routed to a remote technical support contact to assist with their issue. Automated case creation is available when the AIOps platform has been set up via Secure Connect Gateway (SCG).	For Severity 1 issues customers receive Incident Manager coverage.
ONSITE RESPONSE	Dell Technologies sends authorized personnel to Installation Site to work on the problem after Dell Technologies has isolated the problem and deemed Onsite Response necessary.	Included for Equipment only. Initial Onsite Response objective is based on the option purchased by the Customer. The options available to the Customer are the following; either 1) a four-hour service response or 2) a service response during the next local business day, during normal business hours, after Dell Technologies deems Onsite Response is necessary. 4-Hour On-site Response A technician typically arrives on-site within 4 hours after completion of troubleshooting and isolating the issue. • Available seven (7) days each week, twenty-four (24) hours each day, including holidays. • Available within defined four (4) hour response locations. • 4 Hour parts locations stock essential operational components, as determined by Dell Technologies. Non-essential parts may be shipped using overnight delivery. Next Business Day On-site Response Following troubleshooting and diagnosis, a technician will typically be dispatched to arrive on-site the next business day. • Calls received by Dell Technologies after local cut-off time as applicable at Customer site may require an additional business day for service technician to arrive at Customer's location. • Available only on select models of Products. Onsite Response does not apply to Software and may be separately purchased.

PROSUPPORT AIOPS PLATFORMS	AIOps is artificial intelligence (AI) for IT operations. It refers to the strategic use of AI, machine learning (ML), and machine reasoning (MR) technologies that simplify and streamline processes and optimize the use of Customer's IT resources.	Included. ProSupport AIOps Platforms include DellAIOps ,TechDirect, and MyService 360, which are all enabled via connectivity software, such as secure connect gateway, and provide benefits not limited to the following: • Proactive issue detection and case creation • Predictive detection of hardware failures • Self-serve case creation • Self-serve part dispatch • Dell Security Advisories • DellAIOps • Cybersecurity Assessment Dell AIOps is a cloud-based AIOps application that provides for simple and proactive monitoring and troubleshooting of your Dell IT infrastructure. It leverages machine learning to proactively monitor and measure the overall health of servers, storage, converged, hyperconverged, data protection, and network devices through intelligent, comprehensive, and predictive analytics. Predictive analytics for capacity and performance of components, such as Solid State Drives and Memory, are enabled through use of Dell AIOps. Dell is available at no additional charge for products with a valid ProSupport (or higher) contract. Dell AIOps is hosted on Dell Technologies Private Cloud, providing each customer an independent, secure portal and ensures that customers will only be able to see their own environment. MyService360 provides 360 degree data visualizations and analytics across your datacenter, and an end-to-end services history for Dell Technologies products. Key benefits include: • Proactive display of real-time critical incidents and risks • Clear, prescriptive recommendations for simplified action and planning • Historical trends and data analytics • Manage services health for data protection, storage and converged systems TechDirect allows customer self dispatch of parts. Secure Connect Gateway (SCG) is an enterprise monitoring technology that is delivered as an appliance and a stand-alone application. It monitors your devices and proactively detects hardware issues that may occur. Depending on your service contract, it also automates support request creation for issues that are detected on the monitored devices. Please contact your Dell Technologies representative for covered products

REPLACEMENT PARTS	Dell Technologies provides replacement parts when deemed necessary by Dell Technologies.	Included. Replacement parts delivery objective is based on the option purchased by the Customer. The options available to the Customer are the following; either 1) a four-hour service response or 2) a service response during the next local business day, during normal business hours, after Dell Technologies deems that a replacement part delivery is necessary Four-hour (4) parts locations stock essential operational components as determined by Dell Technologies. Non-essential parts may be shipped using overnight delivery. Parts deemed non-essential and/or not stocked in four-hour (4) parts locations include, but are not limited to: bezels, mechanical chassis, hard drive blanks, rail kits, cable management accessories and Graphical Processing Units (GPUs). Parts that may be deemed essential are: motherboards, CPUs, select memory modules and hard disk drive that may impact array and production environment. Local country shipment cut-off times may impact the same day/next local business day delivery of non-essential replacement parts. Dell currently stocks parts in various locations throughout the world. Selected parts may not be stocked in the location closest to a customer's site. If a part that is needed to repair the supported Products is not available from a Dell facility near the Customer's location and must be transferred from another facility, it will be shipped using overnight delivery or as soon as is practical and commercially reasonable. Four (4) hour parts locations stock components of the system, as determined by Dell. In order to receive four (4) hour parts, Customer must be located within the coverage area determined by Dell. For more details on geographic limitations, see the Supplemental Terms and Conditions below. The parts delivery response times referenced above are only applicable for stocking parts in accordance with standard configurations. Stocking of service parts for new products or non-standard configurations may require longer than thirty (30) days lead time. Installation of all replacement parts is performed by Dell Technologies as part of Onsite Response, but Customer has option to perform installation of Customer Replaceable Units (CRUs). See Dell Technologies Product Warranty and Maintenance Table for listing of parts designated as CRUs for specific Equipment or contact Dell Technologies for more details. If Dell Technologies installs the replacement part, Dell Technologies will arrange for its return to a Dell Technologies facility. If Customer installs the CRU, Customer is responsible for returning the replaced CRU to a facility designated by Dell Technologies. Should a customer need assistance replacing a CRU, Dell Technologies may assist remotely and/or with a technician onsite to assist with replacement. If during diagnosis, the Dell Technician determines that a repair can be accomplished with a CRU-designated part or if Customer chooses to self-dispatch a CRU-designated part, Dell will ship the CRU-designated part directly to the Customer. If the Dell technician determines that the Supported Product is one that should be replaced as a whole unit, Dell Technologies reserves the right to send Customer a whole replacement unit. Whole unit replacements may not be stocked for same day response times and there may be extended lead times for arrival of a whole unit replacement at your location, depending on where you are located and the type of Product being replaced.

PROACTIVE SOLID STATE DRIVE REPLACEMENT	If, prior to reaching its Endurance Level, a solid state drive reaches the Endurance Level Threshold (as determined by Dell) or beyond, the Customer is eligible to receive a replacement solid state drive. "Endurance Level" means the average life span of an eligible SSD. "Endurance Level Threshold" is the point in the SSD's life span (as determined by Dell) at which the drive becomes eligible for replacement--for example, upon reaching 95% of the Endurance Level. Endurance Level Thresholds will vary.	Included for Storage and Hyperconverged/Converged Infrastructure Products. Response objective is based on the applicable Replacement Parts Delivery and Onsite Response service features detailed above. Customer must activate and maintain the currently supported version(s) of remote IT support and monitoring software (implemented as a secure connect gateway),during the applicable term of support. Connectivity software enablement, as applicable, is a prerequisite for these additional renewal service features. Pre-imaged drives are not eligible for Proactive Solid State Drive Replacement by Dell Technologies.
RIGHTS TO NEW RELEASES OF SOFTWARE	Dell Technologies provides the rights to new Software Releases as made generally available by Dell Technologies.	Included.
INSTALLATION OF NEW SOFTWARE RELEASES	Dell Technologies performs the remote installation of new Software Releases.	**Equipment Operating Environment (OE) Software** Included with ProSupport 4-hour only on storage equipment when the associated embedded operating environment software being installed is covered by a Dell warranty or a current Dell maintenance contract. Equipment operating environment software is defined as user interface software programming and/or microcode needed to enable the Equipment administration, control, and perform its basic functions, and without which the equipment cannot operate. Customer is entitled to remote installation of the OE software updates with an activated and maintained supported version of secure connect gateway software. Please reference the Dell Technologies Product Warranty and Maintenance Table for eligible products. **Other Software (non-OE)** Customer performs the installation of new Software Releases unless otherwise deemed necessary by Dell Technologies.
24X7 REMOTE MONITORING AND REPAIR	Certain Products will automatically and independently contact Dell Technologies to provide input to assist Dell Technologies in problem determination. Dell Technologies remotely accesses Products if necessary for additional diagnostics and to provide remote support.	Included for Products that have SCG, or other Dell enabled connectivity tools, for remote monitoring and technology available from Dell Technologies. See details about the SCG tool above in AIOPs platform section. Once Dell Technologies is notified of a problem, the same response objectives for Global Technical Support and Onsite Response will apply as previously described.

***SEVERITY LEVEL DEFINITIONS**

SEVERITY 1 Critical – loss of ability to perform critical business functions and requires immediate response

SEVERITY 2 High – able to perform business functions, but performance/capabilities are degraded or severely limited.

SEVERITY 3 Medium/Low – little to no business impact.

Exclusions

The following activities are not included in the scope of this Service Description:

- De-installation, re-installation or configuration of product(s), software or application(s)
- Removal of de-installed Product from the Customer's premises
- Operating environment Software troubleshooting above and beyond returning the Product to a working state (e.g. consulting, performance tuning, configuration, scripting or benchmarking are excluded)
- Services required due to failure to maintain software and Supported Product(s) at any specified minimum release level as set forth in the Reference Code Document.
- Services required due to failure of Customer to incorporate any system fix, repair, patch, or modification provided by Dell Technologies or due to failure of the Customer to take avoidance action previously advised by Dell Technologies, such as a communicated security advisory or critical fix update that a customer does not implement
- Services that, in the opinion of Dell Technologies, are required due to improper treatment or use of the products or equipment
- Customization of the Customer's server or storage device except as expressly stated in this Service Description
- Any recovery or transfer of data or applications
- Warranty service or support for non-Dell Technologies systems, software, or additional components
- Services that, in the opinion of Dell Technologies, are required due to unauthorized attempts by third-party personnel to install, repair, maintain, or modify hardware, firmware, or software
- Network printer installation or network file share mapping
- Server, storage, network or router configuration of any kind
- Network services, including attachment of a system to a network (other than an Ethernet LAN)
- Any activity not specifically set forth in this Service Description.

This Service Description does not confer on Customer any warranties which are in addition to the warranties provided under the terms of your master services agreement or Agreement, as applicable.

COLLABORATIVE ASSISTANCE

If a Customer opens a service request and Dell Technologies determines that the problem arises with an eligible third-party vendor's products commonly utilized in conjunction with Products covered by a current Dell Technologies warranty or maintenance contract, Dell Technologies will endeavor to provide Collaborative Assistance under which Dell Technologies: (i) serves as a single point of contact until the problems are isolated; (ii) contacts the third-party vendor; (iii) provides problem documentation; and (iv) continues to monitor the problem and obtain status and resolution plans from the vendor (where reasonably possible).

To be eligible for Collaborative Assistance, Customer must have the appropriate active support agreements and entitlements directly with the respective third-party vendor and Dell Technologies or an authorized Dell Technologies reseller. Once isolated and reported, the third-party vendor is solely responsible for providing all support, technical and otherwise, in connection with resolution of the Customer's problem. **Dell Technologies IS NOT RESPONSIBLE FOR THE PERFORMANCE OF OTHER VENDORS' PRODUCTS OR SERVICES**. A list of Collaborative Assistance partners can be found on the Collaborative Assistance List. Please note that supported third-party products may change at any time without notice to Customers.

DELL TECHNOLOGIES SYSTEM SOFTWARE SUPPORT

Dell Technologies Software support included within ProSupport for Infrastructure provides support for select Third Party Products, including select end-user applications, operating systems, hypervisors and firmware when such Third Party Products are 1) purchased from Dell Technologies, 2) purchased with Products, 3) currently installed and operating on Products at the time that support is requested, and 4) The Product is covered by an existing ProSupport for Infrastructure support and maintenance term of service. Customer is solely responsible for correcting any problems with licenses and purchases of eligible software to be eligible to receive

these Services at any time during the coverage period. A list of eligible software can be found on the Comprehensive Software Support List. Please note that supported Third Party Products may change at any time without notice to Customers. Situations giving rise to Customer's questions must be reproducible on a single system, which may be physical or virtual. Customer understands and accepts that resolutions of certain issues giving rise to Customer's service request may not be available from the publisher of the relevant software title (including but not limited to, instances where the publisher is no longer providing support or maintenance on the relevant software title for any reason) or may require additional support from the publisher, including installation of additional software or other changes to Products, Customer accepts that in such situations where no resolution is available from the publisher of the relevant software title, Dell Technologies' obligation to provide support to the Customer will also be fully satisfied.

Additional Terms and Conditions Applicable to End Users Purchasing Product(s) from an OEM

An "OEM" is a reseller who sells the Supported Products in a capacity as an original equipment manufacturer that is purchasing Dell Technologies Products and Services from the OEM Solutions (or its successor) business group for an OEM project. An OEM typically embeds or bundles such Dell Technologies Products in or with OEM Customer's proprietary hardware, software or other intellectual property, resulting in a specialized system or solution with industry or task-specific functionality (such system or solution an "OEM Solution") and resells such OEM Solution under OEM's own brand. With respect to OEMs, the term "Supported Products" includes Dell Technologies Supported Products that are provided without Dell Technologies branding (i.e. unbranded OEM-ready system), and "End-User" means you, or any entity purchasing an OEM Solution for its own end-use and not for reselling, distributing or sub-licensing to others. It is OEM's responsibility to provide first level troubleshooting to the End User. An appropriate best-effort initial diagnosis should be performed by OEM before the call goes to Dell Technologies. This OEM maintains responsibility for providing the initial troubleshooting even when its End User engages Dell Technologies to request service, and if an End User contacts Dell Technologies for service without contacting their OEM, Dell Technologies will ask the End User to contact their OEM to receive first level troubleshooting before contacting Dell Technologies.

Dell Technologies ProSupport for Infrastructure on Non-Standard Parts in Custom Server Products

The repairs and exchanges of non-standard or unique parts ("Non-Standard Component Support Services") are a value-added exchange service complementing Customer's PowerEdge Product warranty that covers standard Dell Technologies components in a standard configuration, and that require replacement due to defects in workmanship or materials ("Warranty Repairs"). Dell Technologies branded firmware/software for "Non-Standard Components" is NOT available, and the Customer must use manufacturer provided utilities to monitor and/or update the component. The Customer will also work with the manufacturer directly to resolve any quality issues related to software/firmware, utilities, and hardware. Dell Technologies will provide Non-Standard Support Services to replace non-standard or unique parts that Customer forecasted and guaranteed to be available as set forth above, and once Customer has made corresponding arrangements to assist Dell Technologies in placing any orders for service stock in order to facilitate repair activity. Provided Customer has accurately forecasted stocking needs, Dell Technologies will exchange the part that exhibits a defect according to the Customer's applicable response time for Warranty Repairs and install the replacement part in the Customer's Product, but Customer acknowledges and agrees that Dell Technologies is not liable to Customer to ensure part availability. Same day (e.g. 4 hour) parts and field response may not be available for "non-standard" component replacement, and Dell Technologies will default to Next Business Day Service in these cases. Replacement parts may be new or refurbished as permitted by local law, and fulfillment of Non-Standard Component Support Services repairs and exchanges may require Dell Technologies to utilize a third party manufacturer/third party publisher's warranty and/or maintenance services, and Customer agrees to assist Dell Technologies and provide any materials requested by any third party manufacturer or third party publisher to facilitate utilization of the corresponding third party warranty and/or maintenance services.

Dell Technologies' engineering testing of the resulting configuration pursuant to a separate statement of work (SOW) e.g., testing done after installation of the non-standard or unique parts for a configuration that uses software requested by Customer is a point in time activity to be done once rather than on a continuous basis, and the Non-Standard Component Support Services are available only on the specific configuration as defined by Customer and tested by Dell Technologies. Dell Technologies will communicate the exact hardware configuration tested including firmware levels. Once engineering testing is complete Dell Technologies will provide the results via reports with indication of Pass/Fail. Dell Technologies will use commercially reasonable efforts to support recognition and operation of the non-standard component on the Dell Technologies Product, however modification of Dell Technologies standard utilities (including BIOS, IDRAC, and connectivity software) will not be supported. Customer will be responsible for working with the manufacturer directly to resolve any non-standard component issues which arise during engineering testing (including quality issues, software, firmware, or hardware specifications/limitations). Additional Dell Technologies engineering testing after Customer has received a report with an indication of PASS will require a new SOW and associated non-recurring engineering fees, including any engineering testing requested in connection with a repair or replacement of any component of the configuration during the warranty term of the Customer's Equipment.

General Customer Responsibilities

Authority to Grant Access. Customer represents and warrants that it has obtained permission for both Customer and Dell Technologies to access and use, whether remotely or in-person, Customer-owned or licensed software, hardware, systems, the data located thereon, and all hardware and software components included therein, for the purpose of providing these Services. If Customer does not already have that permission, it is Customer's responsibility to obtain it, at Customer's expense, before Customer asks Dell Technologies to perform these Services.

Non-solicitation. Where allowed by law, Customer will not, without Dell Technologies' prior written consent, for a period of two years from the date listed on your Order Form, directly or indirectly solicit for employment any Dell Technologies employee with whom you have come in contact in connection with Dell Technologies' performance of the Service; provided, however, that general advertisements and other similarly broad forms of solicitation will not constitute direct or indirect solicitation hereunder and you are permitted to solicit for employment any employee that has been terminated or has resigned his or her employment with Dell Technologies prior to the commencement of employment discussions with you.

Customer Cooperation. Customer understands that without prompt and adequate cooperation, Dell Technologies will not be able to perform the Service or, if performed, the Service may be materially altered or delayed. Accordingly, Customer will promptly and reasonably provide Dell Technologies with all cooperation necessary for Dell Technologies to perform the Service. If Customer does not provide reasonably adequate cooperation in accordance with the foregoing, Dell Technologies will not be responsible for any failure to perform the Service and Customer will not be entitled to a refund.

On-site Obligations. Where Services require on-site performance, Customer will provide all health and safety information, tools and infrastructure required by local applicable laws and regulations.

Customer will provide (at no cost to Dell Technologies) free, safe and sufficient access to Customer's facilities and environment, including ample working space, electricity, safety equipment (if applicable) such as: server lifts, ladders, hard hats, and ear protection, etc., and a local telephone line. A monitor or display, a mouse (or pointing device), and a keyboard must also be provided (at no cost to Dell Technologies), if the system does not already include these items. For products exceeding 120 lbs. (54 kg), the customer is responsible for providing appropriate lifting equipment for any on-site support or deployment event. For products weighing between 40 lbs. (18 kg) and 120 lbs. (54 kg), the customer may have to remove the product from the rack before Dell will provide service. Failure to meet these conditions may result in additional charges to the customer for the necessary resources to remove the server from the rack safely.

Data Backup. Customer will complete a backup of all existing data, software and programs on all affected systems prior to and during the delivery of this Service. Customer should make regular backup copies of the data stored on all affected systems as a precaution against possible failures, alterations, or loss of data. Dell Technologies will not be responsible for the restoration or reinstallation of any programs or data. Unless prohibited by applicable local laws, Dell Technologies will have no data loss liability for:

1. Any of your confidential, proprietary or personal information;
2. Lost or corrupted data, programs or software;
3. Damaged or lost removable media;
4. The loss of use of a system or network; and/or
5. For any acts or omissions, including negligence, by Dell Technologies or a third-party service provider.

Third Party Warranties. These Services may require Dell Technologies to access hardware or software that is not manufactured or sold by Dell Technologies. Some manufacturers' warranties may become void if Dell Technologies or anyone else other than the manufacturer works on the hardware or software. Customer will ensure that Dell Technologies' performance of Services will not affect such warranties or, if it does, that the effect will be acceptable to Customer. Dell Technologies does not take responsibility for third party warranties or for any effect that the Services may have on those warranties.

Maintain Software and Services Releases. Customer must maintain software and Supported Product(s) at Dell Technologies specified minimum release levels as specified on the Reference Code Document.
Customer must also ensure installation of minimum software or firmware release levels on replacement parts, patches, software updates or subsequent releases as directed by Dell to keep the Supported Product(s) eligible for this Service. Dell Technologies reserves the right, in its sole discretion, to deny support for any software and Supported Product(s) that does not meet Dell Technologies specified minimum release levels as specified on the Reference Code Document.

Services Terms & Conditions

This Service Description is entered between you, the customer ("you" or "Customer"), and Dell Technologies. This Service is provided subject to and governed by Customer's Agreement with Dell Technologies.

Products or Services obtained from any Dell Technologies reseller are governed solely by the agreement between the purchaser and the reseller. That agreement may provide terms that are the same as the terms in this document or in the online terms below. The reseller may make arrangements with Dell Technologies to perform warranty and/or maintenance services for the purchaser on behalf of the reseller. Customers and resellers who perform warranty and/or maintenance services or professional services must be properly trained and certified. Performance of any Services by untrained/uncertified Customers, resellers or third parties may result in additional fees if support from Dell Technologies is required in response to such third parties' performance of services. Please contact the reseller or the local Dell Technologies sales representative for additional information on Dell Technologies performance of warranty and maintenance services on Products obtained from a reseller.

In the absence of an agreement explicitly authorizing this Service, depending on Customer's location, this Service is provided subject to and governed by either Dell's Commercial Terms of Sale or the reseller agreement referenced in the table below. Please see the table below which lists the URL applicable to your Customer location where your agreement can be located. The parties acknowledge having read and agree to be bound by such online terms.

Customer Location	**Terms & Conditions Applicable to Your Purchase of the Services**	
	Customers Purchasing Services Directly	**Customers Purchasing Services Through an Authorized Reseller**
United States	Dell.com/CTS	Dell.com/CTS
Canada	Dell.ca/terms (English) Dell.ca/conditions (French-Canadian)	Dell.ca/terms (English) Dell.ca/conditions (French-Canadian)
Latin America & Caribbean Countries	Local Dell.com country-specific website or Dell.com/servicedescriptions.*	Service Descriptions and other Dell Technologies service documents which you may receive from your seller shall not constitute an agreement between you and Dell Technologies but shall serve only to describe the content of Service you are purchasing from your seller, your obligations as a recipient of the Service and the boundaries and limitations of such Service. As a consequence hereof any reference to "Customer" in this Service Description and in any other Dell Technologies service document shall in this context be understood as a reference to you whereas any reference to the Dell Technologies shall only be understood as a reference to a Dell Technologies as a service provider providing the Service on behalf of your seller. You will not have a direct contractual relationship with the Dell Technologies with regards to the Service described herein. For the avoidance of doubt any payment terms or other contractual terms which are by their nature solely relevant between a buyer and a seller directly shall not be applicable to you and will be as agreed between you and your seller.
Asia-Pacific-Japan	Local Dell.com country-specific website or Dell.com/servicedescriptions.*	Service Descriptions and other Dell Technologies service documents which you may receive from your seller shall not constitute an agreement between you and the Dell Technologies but shall serve only to describe the content of Service you are purchasing from your seller, your obligations as a recipient of the Service and the boundaries and limitations of such Service. As a consequence hereof any reference to "Customer" in this Service Description and in any other Dell Technologies service document shall in this context be understood as a reference to you whereas any reference to the Dell Technologies shall only be understood as a reference to a Dell Technologies as a service provider providing the Service on behalf of your seller. You will not have a direct contractual relationship with the Dell Technologies with regards to the Service described herein. For the avoidance of doubt any payment terms or other contractual terms which are by their nature solely relevant

		between a buyer and a seller directly shall not be applicable to you and will be as agreed between you and your seller.
- Europe, Middle East, & Africa	- Local Dell.com country-specific website or Dell.com/servicedescriptions.* In addition, customers located in France, Germany and the UK can select the applicable URL below: France: Dell.fr/ConditionsGeneralesdeVente Germany: Dell.de/AGB - UK: Dell.co.uk/terms	Service Descriptions and other Dell Technologies service documents which you may receive from your seller shall not constitute an agreement between you and the Dell Technologies but shall serve only to describe the content of Service you are purchasing from your seller, your obligations as a recipient of the Service and the boundaries and limitations of such Service. As a consequence hereof any reference to "Customer" in this Service Description and in any other Dell Technologies service document shall in this context be understood as a reference to you whereas any reference to the Dell Technologies shall only be understood as a reference to a Dell Technologies as a service provider providing the Service on behalf of your seller. You will not have a direct contractual relationship with the Dell Technologies with regards to the Service described herein. For the avoidance of doubt any payment terms or other contractual terms which are by their nature solely relevant between a buyer and a seller directly shall not be applicable to you and will be as agreed between you and your seller.

* Customers may access their local Dell.com website by simply accessing Dell.com from a computer connected to the Internet within their locality or by choosing among the options at Dell's "Choose a Region/Country" website available at Dell.com/content/public/choosecountry.aspx?c=us&l=en&s=gen.

Customer further agrees that by renewing, modifying, extending or continuing to utilize the Service beyond the initial term, the Service will be subject to the then-current Service Description available for review at Dell.com/servicedescriptions.

By placing your order for the Services, receiving delivery of the Services, utilizing the Services or associated software or by clicking/checking the "I Agree" button or box or similar on the Dell.com or DellEMC.com website in connection with your purchase or within a Dell Technologies software or Internet interface, you agree to be bound by this Service Description and the agreements incorporated by reference herein. If you are entering this Service Description on behalf of a company or other legal entity, you represent that you have authority to bind such entity to this Service Description, in which case "you" or "Customer" shall refer to such entity. In addition to receiving this Service Description, Customers in certain countries may also be required to execute a signed Order Form.

Supplemental Terms & Conditions

1. Term of Service. This Service Description commences on the date listed on your Order Form and continues through the term ("**Term**") indicated on the Order Form. As applicable, the number of systems, licenses, installations, deployments, managed endpoints or end-users for which Customer has purchased any one or more Services, the rate or price, and the applicable Term for each Service is indicated on Customer's Order Form. Unless otherwise agreed in writing between Dell Technologies and Customer, purchases of Services under this Service Description must be solely for Customer's own internal use and not for resale or service bureau purposes.

2. Important Additional Information

   a) Rescheduling. Once this Service has been scheduled, any changes to the schedule must occur at least 8 calendar days prior to the scheduled date. If Customer reschedules this service within 7 days or less prior to the scheduled date, there will be a rescheduling fee not to exceed 25% of the price for the Services. Any rescheduling of the Service will be confirmed by Customer at least 8 days prior to commencement of the Service.

   b) Payment for Hardware Purchased with Services. Unless otherwise agreed to in writing, payment for hardware shall in no case be contingent upon performance or delivery of Services purchased with such hardware.

   c) Limits to Scope of Service. Dell may refuse to provide Service if, in its opinion, providing the Service creates an unreasonable risk to Dell or Dell's Service providers or if any requested service is beyond the scope of Service. Dell is not liable for any failure or delay in performance due to any cause beyond its control, including but not limited to Customer's failure to comply with its obligations under this Service Description.

   d) Service Scope Changes. Unless otherwise agreed in writing with Customer, Dell Technologies reserves the right to change the scope of Services upon sixty (60) days' prior written notice to Customer. Other than changes caused by publishers and manufacturers of Third Party Products, the Customer will be notified of any change in the scope of Support Services in the

manner stated in the then current Agreement between Dell Technologies and the Customer.

e) Privacy. Dell Technologies will treat any personal information collected under this Service Description in accordance with the applicable jurisdiction's Dell Technologies Privacy Statement, all of which are available at http://www.dell.com/localprivacy and each of which is hereby incorporated by reference.

f) Optional Services. Optional Services (including point-of–need support, installation, consulting, managed, professional, support or training services) may be available for purchase from Dell Technologies and will vary by Customer location. Optional Services may require a separate agreement with Dell Technologies. In the absence of such agreement, optional Services are provided pursuant to this Service Description.

g) Assignment and Subcontracting. Dell Technologies may subcontract this Service and/or assign this Service Description to qualified third party service providers who will perform the Service on Dell Technologies' behalf.

h) Cancellation. Dell Technologies may cancel this Service at any time during the Term for any of the following reasons:

a. Customer fails to pay the partial or total price for this Service in accordance with the invoice terms;
b. Customer is abusive, threatening, or refuses to cooperate with the assisting analyst or on-site technician
c. Customer fails to abide by all of the Terms and Conditions set forth in this Service Description;
d. Customer requests replacement of components that materially exceed the standard failure rates for the component and system involved, which failure rates are constantly monitored. Please reference exclusion section above.

If Dell Technologies cancels this Service pursuant to this paragraph, Dell Technologies will send Customer written notice of cancellation at the address indicated on Customer's invoice. The notice will include the reason for cancellation and the effective date of cancellation, which will be not less than ten (10) days from the date Dell Technologies sends notice of cancellation to Customer, unless local law requires other cancellation provisions that may not by varied by agreement. If Dell Technologies cancels this pursuant to this paragraph, Customer shall not be entitled to any refund of fees paid or due to Dell Technologies.

i) Geographic Limitations and Relocation.

1. Dell Technologies may not be able to provide 4 hour On-site and replacement parts Support Services with respect to Equipment that is outside the Dell Technologies Service Area. "Dell Technologies Service Area" means a location that is within (i) one hundred (100) drivable miles or one hundred sixty (160) drivable kilometers of a Dell Technologies service location; and (ii) the same country as the Dell Technologies service location, unless otherwise defined in your governing agreement with Dell Technologies, in which case the definition in the governing agreement prevails. For EMEA Customers, unless stated otherwise in this Service Description or the Agreement, on-site service is available within a distance of up to 150 kilometers from nearest Dell Technologies Logistics location (PUDO or Pick-Up/Drop-Off location). Please contact your sales representative for more information about availability of on-site service in EMEA based upon Dell Technogies service locations prior to purchase.

2. This Service is not available at all locations. If your Product is not located in the geographic location that matches the location reflected in Dell Technologies's service records for your Product, of if configuration details have been changed and not reported back to Dell Technologies, then Dell Technologies must first re-qualify your Product for the support entitlement you purchased before applicable response times for the Product can be reinstated. Service options, including service levels, technical support hours, and on-site response times will vary by geography and configuration, and certain options may not be available for purchase in Customer's location, so please contact your sales representative for these details. Dell Technologies obligation to supply the Services to relocated Products is subject to various factors, including without limitations, local Service availability, additional fees, and inspection and recertification of the relocated Products at Dell Technologies then-current time and materials consulting rates. Unless otherwise agreed between Dell Technologies and Customer, in cases where service parts are shipped directly to Customer, the Customer must be able to accept shipment at the location of the Products to be serviced. Dell Technologies will not be held liable for support delays due to the Customer's failure or refusal to accept shipment of parts. Multi-component storage systems require active support option agreements on all hardware and software components of the system in order to receive all of the benefits of the support agreement for the entire solution. Unless otherwise agreed in writing with Customer, Dell Technologies reserves the right to change the scope of Support Services on sixty (60) days' prior written notice to Customer.

j) Order of Precedence. Unless otherwise agreed in an agreement in writing by the parties, if there is a conflict between the terms of any of the documents that comprise this Agreement, the documents will prevail in the following order: (i) this Service Description; (ii) the Agreement. Prevailing terms will be construed as narrowly as possible to resolve the conflict while preserving as much of the non-conflicting terms as possible, including preserving non-conflicting provisions within the same paragraph, section or sub-section.

CONTACT US

To learn more, contact your local representative or authorized reseller.

Rev. January 9, 2024

BROADCOM

Product Brief

Emulex® Gen 7 Fibre Channel HBAs

LPe35000/LPe36000-Series

Emulex LPe35004, LPe35000, and LPe35002

Accelerate Workload Performance for NVMe Data Centers

- Accelerate workloads with up to 3x better latency than the previous generation.
- Speed up applications and AFAs and handle peak workload I/O spikes with up to 10M IOPS—3x more than the previous generation.
- Get faster data transfer speed with the industry's first single- and dual-port PCIe 4.0 HBAs delivering 2x more bandwidth per lane.

Easily Deploy, Manage, and Upgrade SANs

- Save time with no server reboots for firmware updates, queue depth changes, and optics replacements.
- Meet SLAs with industry-leading HBA reliability—10M hours MTBF.
- Upgrade performance easily from 32GFC to 64GFC with Emulex-approved hot-plug optics kits.
- Utilize the industry-standard INCITS/T11 specification, which includes full FPINs and signaling support to collaborate with the fabric to identify and address performance problems.

Next-Gen HBAs for the Modern Data Center

The Emulex® Gen 7 Fibre Channel (FC) host bus adapters (HBAs) by Broadcom are designed for demanding mission-critical workloads and emerging applications. Applications continue to grow in size and scale, and to support them, enterprises are increasingly turning to new server technologies that contain hundreds of processor cores as well as high-performance storage solutions including low-latency NVMe, all-flash arrays (AFAs). NVMe can significantly increase the performance of storage area networks (SANs), making the selection of high-speed networking technology the critical element for achieving maximum system-wide performance. Fibre Channel is purpose-built for storage networks, meeting the requirements for high availability, scalability, predictable performance, and low latency.

Compared to the previous generation, Emulex Gen 7 FC HBAs offer up to 2x higher bandwidth, 3x better latency, enhanced security, and operational efficiency for 32GFC and 64GFC SANs. Emulex LPe35000-series HBAs are available with single, dual, or quad 32GFC optics. The single-port and dual-port models can be upgraded with 64GFC optics to tackle the toughest workloads, including NVMe deployments. Gen 7 32GFC provides seamless backward compatibility to 16GFC and 8GFC networks. Emulex LPe36000-series HBAs are available with single and dual 64GFC optics and provide seamless backward compatibility to 32GFC and 16GFC networks.

Emulex fully supports new industry standards that further enhance Broadcom's autonomous SAN[1] innovations to self-learn, self-optimize, and self-heal, proactively keeping the SAN running at maximum speed and avoiding downtime. The new industry standards supported by Emulex around Fabric Performance Impact Notifications (FPINs) include Link Integrity notification (FPIN-LI), Congestion notification (FPIN-CN), Peer Congestion notification (FPIN-PN), and Delivery notification (FPIN-DN). The Emulex SAN Manager application is the first application in the industry to automatically identify, minimize, and mitigate application performance problems caused by SAN congestion by utilizing the FPIN-CN standard.

Performance

The Emulex Dynamic Multi-core architecture delivers unparalleled performance and the most efficient port utilization with 8 processing cores and 16 threads that dynamically apply ASIC resources to any port that requires them, ensuring that SLAs are met. Compared to Gen 6 HBAs, Emulex Gen 7 HBAs can support 64GFC to deliver up to 2x greater bandwidth. The Gen 7 HBAs deliver 12,800 MB/s (two 32GFC ports) or 25,600 MB/s (two 64GFC ports) full duplex, they deliver 3x better hardware latency, and the 64GFC LPe36000-series HBAs deliver industry-leading performance up to 10 million IOPS.[2]

Emulex Gen 7 solutions have achieved this unprecedented performance by enhancing their Emulex Dynamic Multi-core architecture with fastpath hardware acceleration, reducing latency for each transaction. This

[1] https://docs.broadcom.com/docs/broadcom-autonomous-self-healing-sans

[2] Tolly Test Report LPe36000-series, 2021

Fully Protect Data

- Thwart malicious firmware with a Silicon Root of Trust and digitally signed firmware.
  - Complies with the NIST 800-193 framework.
  - Verifies the digital signature during firmware download and power-on.
- Guarantee driver security with Broadcom digitally signed drivers.
- Secure Boot guarantees UEFI boot code security with digitally signed boot code.
- Data Integrity Field (T10 DIF) protects data from corruption.

Simplify HBA Management and Remediate Network Performance Problems with the new Emulex SAN Manager (ESM)[3]

Emulex Gen 7 HBAs work with the Emulex SAN Manager application to reduce operational cost and complexity via the following:

Visibility into the endpoints of the fabric:

- Captures complete SAN HBA host inventory; host names; and OS, software, and firmware versions.
- Identifies multipath misconfiguration errors via the multipath validation tool.

Centralized in-band access to managed HBAs across the SAN:

- Configures the Adaptive Congestion Management feature.
- Enables optical transceiver statistics to be downloaded for analysis to help detect optic degradation; lists queue depths by port.

Automatic identification and mitigation of application performance problems with direct communication between Emulex HBAs and Brocade fabric switches and directors:

- Visualizes SAN congestion with a dashboard that presents congestion and bandwidth graphs.
- Remediates congestion automatically via the Adaptive Congestion Management feature.

enhancement results in significant increased performance compared to legacy software-based solutions. These performance advances enable Emulex Gen 7 HBAs to handle demanding workloads and I/O spikes experienced under peak workload conditions like no other Fibre Channel HBA in the industry.

Emulex Gen 7 HBAs support NVMe over Fibre Channel (NVMe/FC), providing significantly lower latency versus the traditional Fibre Channel SCSI protocol (SCSI FCP). Testing by independent performance labs has shown that NVMe/FC can deliver up to 50% more IOPS, 30% lower latency,[4] and up to 3.4x higher online transaction processing (OLTP) transactions per minute[5] than traditional SCSI FCP. Emulex Gen 7 HBAs also support NVMe/FC and SCSI FCP concurrently, providing investment protection and allowing data centers to transition to end-to-end NVMe over FC SANs at their own pace.

Emulex Gen 7 HBA port aggregation (also known as trunking) provides a method to aggregate physical ports to form a single logical port. Aggregating physical ports to make a single high-bandwidth datapath increases the logical connection bandwidth for applications that need it, such as data warehousing and virtual machine migration.

Operational Efficiency

Emulex Gen 7 HBAs offer enhanced reliability, availability, and serviceability (RAS) including port isolation and port-based error isolation that enables users to easily detect, isolate, and recover from errors.

Emulex Gen 7 HBAs are managed HBAs—intelligent adapters designed to work with Emulex SAN Manager[3] to reduce the complexity of managing enterprise-class SANs. Unlike other adapters, managed HBAs are designed to perform many operational tasks without the intervention of the host on which they reside. Managed HBAs differ from other adapters because they:

- Communicate to the Emulex SAN Manager application and register as a managed HBA.
- Utilize the industry-standard INCITS/T11 specification, which includes full FPINs and signaling support to collaborate with the fabric to identify and address performance problems.
- Monitor and record performance data and fabric notifications for analysis.

Emulex Gen 7 HBAs are easy to manage and save administrators time and operating costs with features such as no reboots for firmware updates, queue depth changes, or optics replacements. Emulex Gen 7 hot-plug (hot-swappable) optics enable optics to be removed and replaced without shutting down the system, allowing for uninterrupted service.

The Emulex HBA Manager application, formerly known as Emulex OneCommand™ Manager, provides centralized management of current and previous generations of Emulex FC HBAs. Emulex HBA troubleshooting is simplified with Emulex HBA Capture, an Emulex utility that gathers system, adapter, and device driver information. Data collected by HBA Capture is compressed into a single file and can be sent to Broadcom Technical Support for analysis when debugging system issues or for diagnostic purposes.

Emulex HBAs fully support the Brocade® Fabric Vision® suite of features, facilitating a solution from the switch to the server endpoints that have Emulex HBAs installed. Supported features include ClearLink™ (D_Port), Link Cable Beaconing, Host Name Registration, Read Diagnostic Parameters, VMID, BB_Credit Recovery,

[3] The Emulex SAN Manager application is available separately. Contact Broadcom sales for information.
[4] *Emulex labs/Demartek, 2018*
[5] Tolly Test Report # 220122, 2020

Fabric-assigned Boot LUN, Fabric-assigned PWWN, FC Trace Route, FC Ping, Rest APIs, and more.

Visit www.broadcom.com for additional information on supported Fabric Vision features.

Security

One of the key initiatives for enterprises is to safeguard their infrastructure from network attacks. Fibre Channel has field-proven security in protecting the world's most sensitive data in banking, finance, health care, government, and military for over 20 years. Fibre Channel offers "air gap" protection with no connectivity to vulnerable IP networks. For this reason, IT managers continue to rely on FC for their most sensitive data.

Emulex Gen 7 HBAs provide unmatched security features for Fibre Channel environments. They feature Silicon Root of Trust security embedded into the hardware itself. Firmware digital signatures are verified each time the system is booted as well as before installing any new firmware, providing a tamper-proof solution.

The Emulex digitally signed drivers are integrated with all the major enterprise operating systems. Drivers are digitally signed and are verified to be authentic code written by Broadcom before they can be installed.

Standards

General Specifications

- The Gen 7 FC HBAs are powered by the XE601 controller and use an eight-lane (x8) PCIe 4.0 bus on the single-port and dual-port models (with backward compatibility to PCIe 3.0 supported) and a PCIe 3.0 x 16 bus on the quad-port model. The architecture enables resources to be applied to any port that needs them, delivering up to 10M IOPS for Gen 7 64GFC HBAs.

Industry Standards

- Current ANSI/INCITS standards: FC-PI-7; FC-FS-5 (Class 3); FC-LS-5 INCITS 569-202x rev 5.0; FC-LS-4; FC-GS-8; FCP-4; FC-SP-2; SPC-4; SBC-3; SSC-4; FC-NVMe-2
- Legacy ANSI/INCITS standards: FC-PI-1/2/3/4/5/6; FC-FS-1/2/3/4; FC-LS-1/2/3; FC-GS-1/2/3/4/5/6/7; FC-PH-1/2/3; FC-DA-1/2; FCP-2/3; FC-HBA; FC-TAPE; FC-MI; SPC-3; SBC-2; SSC-2/3; FC-NVMe with AM1
- PCIe base spec 4.0
- PCIe card electromechanical spec 4.0
- PCI Hot Plug (PHP)
- UEFI 2.7

HBA Port Virtualization

- NPIV, SR-IOV

Logins

- Supports 12,288 concurrent logins and active exchanges per port.

Architecture

Single-Port LPe35000, Dual-Port LPe35002, and Quad-Port LPe35004

- Supports 32GFC, 16GFC, and 8GFC link speeds, automatically negotiated.

Single-Port LPe36000, Dual-Port LPe36002

- Supports 64GFC, 32GFC, and 16GFC link speeds, automatically negotiated.

Comprehensive OS and Hypervisor Support

- Microsoft Windows
- Red Hat Enterprise Linux
- SUSE Linux Enterprise Server
- VMware vSphere
- Oracle Linux; Oracle Linux with the Unbreakable Enterprise Kernel (UEK)
- Oracle Solaris
- Citrix
- Ubuntu
- OpenEuler

For the latest operating system support, visit www.broadcom.com/support. Additional support is available from OEMs and partners.

Hardware Environments

- AMD, Intel x64; AMD, Intel x86; ARMv8 64-bit; and PowerPC

Throughput

- 32GFC: 6,400MB/s full duplex line rate per port
- 64GFC: 12,800MB/s full duplex line rate per port

Optical

- Data rates: 64GFC (28.9 GBaud PAM4), 32GFC (28.05 GBaud NRZ), 16GFC (14.025 GBaud NRZ), 8GFC (8.5 GBaud NRZ), automatically detected (8GFC supported for LPe35000-series HBAs only)
- Optics: Short-wave lasers with LC-type connector
- Cable:
  - 0.5m to 70m at 64GFC/32GFC on 50/125-µm OM3 MMF
  - 0.5m to 100m at 64GFC/32GFC on 50/125-µm OM4 MMF
  - 0.5m to 100m at 64GFC/32GFC on 50/125-µm OM5 MMF
  - 10 km at 32GFC/16GFC on 9/125-µm single-mode fiber when long-wave transceivers approved by Emulex are used

Physical Dimensions

- Short, low-profile PCIe card
- 167.64 mm x 68.91 mm (6.60 in. x 2.71 in.)
- Standard bracket (low-profile bracket ships in box)
- LPe35004: 167.64 mm x 111.15 mm (6.60 in. x 4.37 in.) with a standard bracket

Environmental Requirements

- Operating temperature: 0°C to 55°C (32°F to 131°F)
- Airflow requirements:
  - 150 LFM for PCIe 3.0
  - 200 LFM for PCIe 4.0
  - 250 LFM for 64GFC operation of HBAs
  - 275 LFM for the LPe35004-M2 (4-port 32G)
- Storage temperature: –20°C to 85°C (–4°F to 185°F)
- Relative humidity: 5% to 95% non-condensing

Agency and Safety Approvals

North America

- FCC/ICES Class A
- UL/CSA Recognized

Europe

- CE Mark
- UKCA Mark

- EU RoHS Compliant
- EU Low Voltage Directive

Australia
- RCM Class A

Japan
- VCCI Class A

Korea
- KCC Class A

China
- China RoHS Compliant

Taiwan
- BSMI Class A
- BSMI RoHS Compliant

Ordering Information

LPe35000-M2 (Upgradeable to 64GFC)[6]
- 1-Port 32GFC Short Wave Optical LC SFP+, low profile

LPe35002-M2 (Upgradeable to 64GFC)[6]
- 2-Port 32GFC Short Wave Optical LC SFP+, low profile

LPe35004-M2 (Not upgradeable to 64GFC; OEM models may differ)
- 4-Port 32GFC Short Wave Optical LC SFP+, full height

LPe36000-M64
- 1-Port 64GFC Short Wave Optical LC SFP+, low profile

LPe36002-M64
- 2-Port 64GFC Short Wave Optical LC SFP+, low profile

Options

Only options approved by Emulex are warranted and fully supported by Technical Support. Emulex options are denoted by a "-ELX", "-EM", "-EL1", or "-EL5" in the transceiver part number.

LP32-SW-OPT-1
- 32GFC Optic (short-wave laser with LC connector SFP+ transceiver): 1 piece

LP32-SW-OPT-2
- 32GFC Optics (short-wave laser with LC connector SFP+ transceiver): 2 pieces

LP32-LW-OPT-1
- 32GFC Optic (long-wave laser with LC connector SFP+ transceiver): 1 piece

LP32-LW-OPT-2
- 32GFC Optics (long-wave laser with LC connector SFP+ transceiver): 2 pieces

LP64-SW-OPT-1
- 64GFC Optic (short-wave laser with LC connector SFP+ transceiver): 1 piece

LP64-SW-OPT-2
- 64GFC Optics (short-wave laser with LC connector SFP+ transceiver): 2 pieces

LP64-LW-OPT-1
- 64GFC Optic (long-wave laser with LC connector SFP+ transceiver): 1 piece

Additional Features

Performance Features
- The LPe35000-series HBAs double the maximum FC link rate from 16GFC to 32GFC and again to 64GFC with a 64GFC optics upgrade.[6]
- Support for NVMe/FC for low-latency, high-performance, end-to-end NVMe/FC storage networks.
- Registration and support for FPINs and congestion signaling.
- Buffer-to-buffer credit recovery—automatic buffer credit loss detection and recovery for reliable performance.
- Frame-level multiplexing increases link efficiency and maximizes HBA performance.
- N_Port ID Virtualization (NPIV) increases network scalability by enabling a single FC adapter port to provide multiple virtual ports.

Data Protection Features
- End-to-end data protection using hardware parity, CRC, ECC, and other advanced error checking and correction algorithms ensures that data is safe from corruption.
- Enhanced data protection is provided by T10 PI with high-performance offload. T10 PI provides additional data protection in environments such as Oracle Unbreakable Linux.

Deployment and Management Features
- Universal boot capability allows the appropriate boot environment to be automatically selected for any given hardware.
- Boot from SAN capability reduces system management costs and increases uptime.
- Detailed, real-time event logging and tracing enables quick diagnosis of SAN problems.
- The beaconing feature flashes the HBA LEDs, simplifying their identification within server racks.
- The environmental monitoring feature helps optimize SAN availability.

Management Features
- The Emulex HBA Manager application[7] enables centralized discovery, monitoring, reporting, and administration of HBAs provided by Emulex on local and remote hosts. Powerful automation capabilities facilitate remote driver parameter, firmware, and boot code upgrades.
- Advanced diagnostic features, such as adapter port beaconing and adapter statistics, help optimize management and network performance, while the environmental monitoring feature helps to maintain optimum host-to-fabric connections. In addition to the GUI interface, management functions can also be performed via a scriptable command line interface (CLI).
- Troubleshoot optics and cables before critical errors affect your system with Brocade ClearLink-supported switches and Emulex HBAs.
- Emulex HBA Manager supports role-based management to facilitate administration of adapters throughout the data center without compromising security. Management privileges can be assigned based on LDAP and AD group memberships.
- The Emulex management instrumentation complies to open management standards, such as SMI-S and common HBA API support, which enables seamless upward integration into enterprise storage and server management solutions.

[6] Only Emulex-approved options are warranted and fully supported by Technical Support.

[7] The Emulex OneCommand Manager application has been renamed the Emulex HBA Manager application.

Emulex® GEN7 FIBRE CHANNEL

BROADCOM® connecting everything®

For more product information: broadcom.com

LPe35000-LPe36000-PB110 October 21, 2022

PROPOSTA TÉCNICA – LOTE ÚNICO
COMPANHIA DE PROCESSAMENTO DE DADOS DO MUNICÍPIO DE PORTO ALEGRE – PROCEMPA
EDITAL LICITAÇÃO ELETRÔNICA 055/2025

Proposta técnica forma e nas condições estabelecidas na Especificação Técnica, constante no referido pregão eletrônico, a empresa: DECISION SERVICOS DE TECNOLOGIA DA INFORMACAO LTDA, RUA HOLDERCIM, 1308 - SETOR II - CIVIT II - 29168-066 - SERRA/ES, inscrita no CNPJ-MF sob nº 03.535.902/0009-78 e Inscrição Estadual nº 83791531, neste ato representada pelo seu/sua representante legal, Sr(a). Neusa Maristela Vargas, conforme especificações estabelecidas neste Edital e anexos:

SOLUÇÃO PROPOSTA

ITEM	DESCRIÇÃO	MARCA/MODELO	UND.	QTD.
1	Aquisição Servidor com novo ambiente de virtualização, conforme edital, Anexo I. Servidores Dell PowerEdge R760 5 Years ProSupport and 4-Hour Onsite Service. (Não contempla serviços de Instalação)	Dell PowerEdge R760	UN	24

DETALHES ADICIONAL DA PROPOSTA TÉCNICA

24x Servidores Dell PowerEdge R760:

Imagem Ilustrativa

Servidor Rack PowerEdge R760 - Quantidade: 1	QTD	Part Number
Trusted Platform Module 2.0 V3	1	[461-AAIG]
Intel® Xeon® Gold 6548Y+ 2.5G, 32C/64T, 20GT/s, 60M Cache, Turbo, HT (250W) DDR5-5200	1	[338-CPCB]
Intel® Xeon® Gold 6548Y+ 2.5G, 32C/64T, 20GT/s, 60M Cache, Turbo, HT (250W) DDR5-5200	1	[338-CPCB][379-BDCO]
Dissipador de calor para configuração de 2 CPU (CPU maior que 165 W)	1	[412-ABCP]
Performance otimizada	1	[370-AAIP]
5600MT/s RDIMMs	1	[370-BBRX]
128GB RDIMM, 5600MT/s, Dual Rank x4, 32Gb BASE	32	[370-BCSR]
Configuração de performance do BIOS	1	[384-BBBL]
Modo de boot do BIOS UEFI com partição GPT	1	[800-BBDM]
Ventilador de alto desempenho x6	1	[750-ADRE]
Dual, Fully Redundant (1+1),Hot-Plug Power Supply 1400W, Mixed Mode	1	[450-AKYB]
Configuração do riser 1, 6x8 slots FH (4ª geração), 2x16 slots LP (4ª geração)	1	[330-BBYK]
Motherboard supports ALL CPUs (required for CPUs 250W and above), MLK	1	[329-BKCD]
Broadcom 57414 de duas portas de 10/25 GbE SFP28, OCP NIC 3.0	1	[540-BCOC]
Adaptador Broadcom 57414 de duas portas 10/25 GbE SFP28, PCIe de baixo perfil, V2	1	[540-BDGV]
HBA Fibre Channel FC32 Emulex LPe35002 de duas portas, altura completa PCIe (Transceivers 32GB inclusos)	2	[406-BBTL]
Tampa frontal padrão de 2U do PowerEdge	1	[321-BHMY][325-BEVI]
Placa controladora BOSS-N1 + com 2 M.2 480 GB (RAID 1)	1	[403-BCRU][470-AFMF]
Transceptor óptico SFP28 SR, 25 GbE, 85 °C, para todas as portas SFP28	4	[407-BCGJ]
Datacenter iDRAC9 16G com OpenManage Enterprise Advanced Plus	1	[528-CTID][528-CTZH]
Trilhos deslizantes ReadyRails™	1	[770-BEKK]
5 Years ProSupport and 4-Hour Onsite Service	1	[705-3666][705-3690] [705-3693][705-3705] [911-6619][963-5505]

Materiais para Instalação:

- Será fornecido todo cabeamento de energia necessário padrão de conector ABNT de 20A de 3m de comprimento conforme o item 8.5 da Especificação Técnica.

- Será Fornecido os cordões de fibra MMF, categoria OM3, conectores LC/LC (ambas as pontas) de 5 m conforme o item 4.1.5 da Especificação Técnica.

PRAZO DE ENTREGA: Até 90 dias corridos a partir da assinatura do contrato.

Declaro que cumpro todas as demais condições e requisitos estabelecidos no edital e seus anexos que os integram.

Porto Alegre, 18 de setembro de 2025.

NEUSA MARISTELA VARGAS:89659619987

Assinado de forma digital por NEUSA MARISTELA VARGAS:89659619987
Dados: 2025.09.19 16:25:32 -03'00'

DECISION SERVICOS DE TECNOLOGIA DA INFORMACAO LTDA
Neusa Maristela Vargas
Gerente de Vendas – Regional Sul
896.596.199-87

Ref. Certif. No

NO124711/A1/M2

IEC SYSTEM FOR MUTUAL RECOGNITION OF TEST CERTIFICATES FOR ELECTRICAL EQUIPMENT (IECEE) CB SCHEME

CB TEST CERTIFICATE

Product	Server (Work Station)
Name and address of the applicant	Dell Inc. One Dell Way Round Rock Texas 78682 United States of America
Name and address of the manufacturer	Dell Inc. One Dell Way Round Rock Texas 78682 United States of America
Name and address of the factory	See next page(s)
Note: *When more than one factory,please report on page 2*	☑ Additional Information on Page 2
Ratings and Principal characteristics	9.2A-4.7A (X2) 100-240Vac 50/60Hz or 3.8A (X2) 240Vdc for 800W PSU; more ratings see the additional information. Cl. I.
Trademark /Brand (If any)	DELL EMC or DELL
Customer's Testing Facility (CTF) Stage used	
Model/Type Ref	E82S; E82S…; PowerEdge R760; Dell Precision 7960 Rack
Additional information(If necessary may also be reported on Page 2)	☑ Additional Information on Page 2
A sample of the product was tested and found to be in conformity with	IEC 60950-1:2005, IEC 60950-1:2005/AMD1:2009, IEC 60950-1:2005/AMD2:2013
As shown in the Test Report Ref. No. which forms part of this Certificate	REP013873 This certificate replaces the certificate NO124711/M1, due to updating factory list and technical modification

This CB Test Certificate is issued by the National Certification Body

Nemko

Philip Pedersen vei 11,
NO-1366 Lysaker, Norway
Date: 19-09-2023

Signature: Sweet Yuan
Certification department

Ref. Certif. No

NO124711/A1/M2

Dell Computadores do Brasil Ltda.
Av. Emancipação, 5000
Hortolândia–SP 13184-654
Brazil

Dell Products (Poland) Sp. z o.o.
ul. Informatyczna 1
92-410 Lodz
Poland

Dell (China) Company Limited
No. 2388 Jinshang Road, Information Photo-Electronic Park, Xiamen Torch Hi-tech Zone
361000
China

Dell (Xiamen) Company Limited
No. 2366 Jinshang Road, Information Photo-Electronic Park, Xiamen Torch Hi-tech Zone 361000
China

Dell Global Business Center Sdn. Bhd.
Plot 76, Mukim 11, Bukit Tengah Industrial Park, 14000
Bukit Mertajam, Penang
Malaysia

Dell International Services India Private Limited.
M-4, SIPCOT Industrial Park, Sunguvarchatram Post,
Sriperumbudur Taluk, Kancheepuram District, Tamil Nadu
602106
India

PCE TECHNOLOGY DE JUAREZ S.A. DE C.V.
Blvd. Internacional #888, San Jeronimo
CD Juarez Chihuahua C.P. 32505
Mexico

Dell (Chengdu) Company Limited
No. 800 of Tianqin Road Western Hi-tech Zone, Chengdu 611731
China

Additional Information (if necessary)

12A-6.3A (X2) 100-240Vac 50/60Hz or 5.2A (X2) 240Vdc for 1100W PSU;
12A-8A (X2) 100-240Vac 50/60Hz or 6.6A (X2) 240Vdc for 1400W PSU;
16A-13.5A (X2) 100-240Vac 50/60Hz or 11.2A (X2) 240Vdc for 2400W PSU;
13A (X2) 277Vac 50/60Hz or 11.5A (X2) 336Vdc for 3200W PSU;
27A (x2) -48Vdc - -60Vdc for 1100W DC PSU;
4.1A (X2) 200-240Vac 50/60Hz or 3.4A (X2) 240Vdc for 700W PSU;
10.0A (X2) 200-240Vac 50/60Hz or 8.2A (X2) 240Vdc for 1800W PSU;
15.6A (X2) 200-240Vac 50/60Hz or 13.6A (X2) 240Vdc for 2800W PSU
5.8A (X2) 277V~ 50/60Hz, or 5.17A (X2) 336Vdc for 1400W PSU

The dots '.' in model name can be 0 to 9, A to Z or blank, for marketing purpose only.

Nemko

Philip Pedersen vei 11,
NO-1366 Lysaker, Norway
Date: 19-09-2023

Signature: Sweet Yuan
Certification department

Ref. Certif. No

NO121450/A2/M2

IEC SYSTEM FOR MUTUAL RECOGNITION OF TEST CERTIFICATES FOR ELECTRICAL EQUIPMENT (IECEE) CB SCHEME

CB TEST CERTIFICATE

Product	Server (Work Station)
Name and address of the applicant	Dell Inc. One Dell Way Round Rock Texas 78682 United States of America
Name and address of the manufacturer	Dell Inc. One Dell Way Round Rock Texas 78682 United States of America
Name and address of the factory	See next page(s)
Note: *When more than one factory,please report on page 2*	☑ Additional Information on Page 2
Ratings and Principal characteristics	I/P: 9.2A-4.7A (X2) 100-240Vac 50/60Hz or 3.8A (X2) 240Vdc for 800W PSU; more ratings see the additional information. Cl. I.
Trademark /Brand (If any)	DELL EMC or DELL
Customer's Testing Facility (CTF) Stage used	
Model/Type Ref	E82S; E82S…; PowerEdge R760; Dell Precision 7960 Rack
Additional information(If necessary may also be reported on Page 2)	☑ Additional Information on Page 2
A sample of the product was tested and found to be in conformity with	IEC 62368-1:2018 IEC 62368-3:2017
As shown in the Test Report Ref. No. which forms part of this Certificate	REP006434 This certificate replaces the certificate NO121450/A2/M1, due to technical modification

This CB Test Certificate is issued by the National Certification Body

Nemko

Philip Pedersen vei 11,
NO-1366 Lysaker, Norway
Date: 01-03-2023

Signature: Sweet Yuan
Certification department

Ref. Certif. No

NO121450/A2/M2

Dell Computadores do Brasil Ltda.
Av. Emancipação, 5000
Hortolândia–SP 13184-654
Brazil

Dell Products (Poland) Sp. z o.o.
ul. Informatyczna 1
92-410 Lodz
Poland

Dell (China) Company Limited
No. 2388 Jinshang Road, Information Photo-Electronic Park, Xiamen Torch Hi-tech Zone
361000
China

Dell (Xiamen) Company Limited
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Dell Global Business Center Sdn. Bhd.
Plot 76, Mukim 11, Bukit Tengah Industrial Park, 14000
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Malaysia

Dell International Services India Private Limited.
M-4, SIPCOT Industrial Park, Sunguvarchatram Post,
Sriperumbudur Taluk, Kancheepuram District, Tamil Nadu
602106
India

PCE TECHNOLOGY DE JUAREZ S.A. DE C.V.
Blvd. Internacional #888, San Jeronimo
CD Juarez Chihuahua C.P. 32505
Mexico

Additional Information (if necessary)

12A-6.3A (X2) 100-240Vac 50/60Hz or 5.2A (X2) 240Vdc for 1100W PSU;
12A-8A (X2) 100-240Vac 50/60Hz or 6.6A (X2) 240Vdc for 1400W PSU;
16A-13.5A (X2) 100-240Vac 50/60Hz or 11.2A (X2) 240Vdc for 2400W PSU;
13A (X2) 277Vac 50/60Hz or 11.5A (X2) 336Vdc for 3200W PSU;
27A (x2) -48Vdc - -60Vdc for 1100W DC PSU;
4.1A (X2) 200-240Vac 50/60Hz or 3.4A (X2) 240Vdc, for 700W PSU;
10.0A (X2) 200-240Vac 50/60Hz or 8.2A (X2) 240Vdc for 1800W PSU;
15.6A (X2) 200-240Vac 50/60Hz or 13.6A (X2) 240Vdc for 2800W PSU
The dots '.' in model name can be 0 to 9, A to Z or blank, for marketing purpose only.

Nemko

Philip Pedersen vei 11,
NO-1366 Lysaker, Norway
Date: 01-03-2023

Signature: Sweet Yuan
Certification department

DELL Technologies

Specification Sheet

PowerEdge R760

Provides performance and versatility as needed to address your most demanding applications

The new Dell PowerEdge R760 is a 2U, two-socket rack server. Gain the performance you need with this full-featured enterprise server, designed to optimize even the most demanding workloads like Artificial Intelligence and Machine Learning.

Max Performance

- Add up to two 4th Generation Intel Xeon Scalable or Intel Xeon Max processors with up to 56 cores or two 5th Generation Intel Xeon Scalable processors with up to 64 cores for faster and more accurate processing performance.
- Accelerate in-memory workloads with up to 32 DDR5 RDIMMS up to 4800 MT/sec for 1DPC when using 4th Gen Intel Xeon Scalable processors of 32 DDR5 RDIMMS up to 5600 MT/sec for 1DPC when using 5th Gen Intel Xeon Scalable processors.
- Support for GPUs including 2 x double-wide or 6 x single-wide for workloads requiring acceleration.

Air cooled at peak performance

- New Smart Flow chassis optimizes airflow to support the highest core count CPUs in an air-cooled environment within the current IT infrastructure.
- Support for up to 16 x 2.5” drives and 2 x 350 watt processors.

Gain agility

- Achieve maximum efficiency with multiple chassis designs that tailor to your desired workloads and business objectives.
- Storage options include up to 12 x 3.5” SAS3/SATA; or up to 24 x 2.5” SAS4/SATA, plus up to 24 x NVMe U.2 Gen4, 16 x NVMe E3.S Gen5.
- Multiple Gen4 and Gen5 riser configurations (up to 8 x PCIe slots) with interchangeable components that seamlessly integrate to address customer needs over time.

Cyber Resilient Architecture for Zero Trust IT environment & operations

Security is integrated into every phase of the PowerEdge lifecycle, including protected supply chain and factory-to-site integrity assurance. Silicon-based root of trust anchors end-to-end boot resilience while Multi-Factor Authentication (MFA) and role-based access controls ensure trusted operations.

Increase efficiency and accelerate operations with autonomous collaboration

The Dell OpenManage™ systems management portfolio delivers a secure, efficient, and comprehensive solution for PowerEdge servers. Simplify, automate and centralize one-to-many management with the OpenManage Enterprise console and iDRAC.

Sustainability

From recycled materials in our products and packaging, to thoughtful, innovative options for energy efficiency, the PowerEdge portfolio is designed to make, deliver, and recycle products to help reduce the carbon footprint and lower your operation costs. We even make it easy to retire legacy systems responsibly with Dell Technologies Services.

Rest easier with Dell Technologies Services

Maximize your PowerEdge Servers with comprehensive services ranging from Consulting, to ProDeploy and ProSupport suites, Data Migration and more – available across 170 locations and backed by our 60K+employees and partners.

PowerEdge R760

The Dell PowerEdge R760 offers powerful performance in a purpose-built, cyber resilient, mainstream server. Ideal for:

- Mixed Workload Standardization
- Database and Analytics
- Virtual Desktop Infrastructure

Feature	Technical Specifications
Processor	• Up to two 4th Generation Intel Xeon Scalable or Intel Xeon Max processors with up to 56 cores per processor and with optional Intel® QuickAssist Technology • Up to two 5th Generation Intel Xeon Scalable processors with up to 64 cores per processor
Memory	• 32 DDR5 DIMM slots, supports RDIMM 8 TB max, • Speeds up to 4800 MT/s on the 4th Generation Intel Xeon Scalable or Intel Xeon Max processors • Speeds up to 5600 MT/s on the 5th Generation Intel Xeon Scalable processors • Supports registered ECC DDR5 DIMMs only
Storage controllers	• Internal Controllers: PERC H965i, PERC H755, PERC H755N, PERC H355 • External Controller: PERC H965e • Internal Boot: Boot Optimized Storage Subsystem (BOSS-N1): HWRAID 2 x M.2 NVMe SSDs or USB • SAS HBA (non-RAID): HBA355e, HBA355i, HBA465i • Software RAID: S160
Drive Bays	Front bays: • Up to 12 x 3.5-inch SAS/SATA (HDD/SSD) max 240 TB • Up to 8 x 2.5-inch SAS/SATA/NVMe (HDD/SSD) max 122.88 TB • Up to 16 x 2.5-inch SAS/SATA/NVMe (HDD/SSD) max 245.76 TB • Up to 16 x EDSFF E3.S Gen5 NVMe (SSD) max 122.88 TB • Up to 24 x 2.5-inch SAS/SATA/NVMe (HDD/SSD) max 368.64 TB Rear bays: • Up to 2 x 2.5-inch SAS/SATA/NVMe (HDD/SSD) max 30.72 TB • Up to 4 x 2.5-inch SAS/SATA/NVMe (HDD/SSD) max 61.44 TB • Up to 4 x EDSFF E3.S Gen5 NVMe (SSD) max 30.72 TB
Power Supplies	• 3200 W Titanium 277 VAC or 336 HVDC, hot swap redundant • 2800 W Titanium 200—240 HLAC or 240 HVDC, hot swap redundant • 2400 W Platinum 100—240 VAC or 240 HVDC, hot swap redundant • 1800 W Titanium 200—240 HLAC or 240 HVDC, hot swap redundant • 1400 W Titanium 277 VAC or 336 HVDC, hot swap redundant • 1400 W Platinum 100—240 VAC or 240 HVDC, hot swap redundant • 1100 W Titanium 100—240 VAC or 240 HVDC, hot swap redundant • 1100 W -(48—60) VDC, hot swap redundant • 800 W Platinum 100—240 VAC or 240 HVDC, hot swap redundant • 700 W Titanium 200—240 HLAC or 240 HVDC, hot swap redundant
Cooling Options	• Air cooling • Optional Direct Liquid Cooling (DLC) Note: DLC is a rack solution and requires rack manifolds and a cooling distribution unit (CDU) to operate.
Fans	• Standard (STD) fans/High performance Silver (HPR Silver) fans/ High performance Gold (HPR Gold) fans • Up to 6 hot plug fans
Dimensions	• Height – 86.8 mm (3.41 inches) • Width – 482 mm (18.97 inches) • Depth – 772.13 mm (30.39 inches) with bezel 758.29 mm (29.85 inches) without bezel
Form Factor	2U rack server
Embedded Management	• iDRAC9 • iDRAC Direct • iDRAC RESTful API with Redfish • iDRAC Service Module • Quick Sync 2 wireless module
Bezel	Optional LCD bezel or security bezel
OpenManage Software	• CloudIQ for PowerEdge plug in • OpenManage Enterprise • OpenManage Enterprise Integration for VMware vCenter • OpenManage Integration for Microsoft System Center • OpenManage Integration with Windows Admin Center • OpenManage Power Manager plugin • OpenManage Service plugin • OpenManage Update Manager plugin
Mobility	OpenManage Mobile
OpenManage Integrations	• BMC Truesight • Microsoft System Center • OpenManage Integration with ServiceNow • Red Hat Ansible Modules • Terraform Providers • VMware vCenter and vRealize Operations Manager
Security	• Cryptographically signed firmware • Data at Rest Encryption (SEDs with local or external key mgmt) • Secure Boot • Secure Erase • Secured Component Verification (Hardware integrity check) • Silicon Root of Trust • System Lockdown (requires iDRAC9 Enterprise or Datacenter) • TPM 2.0 FIPS, CC-TCG certified, TPM 2.0 China NationZ
Embedded NIC	2 x 1 GbE LOM card (optional)

Feature	Technical Specifications	
Network options	• 1 x OCP card 3.0 (optional) Note: The system allows either LOM card or an OCP card or both to be installed in the system. • 1 x Management Interface Card (MIC) to support Dell Data Processing Unit (DPU) card (optional) Note: The system allows either LOM card or MIC card to be installed in the system.	
GPU Options	Up to 2 x 350 W DW and 6 x 75 W SW	
Ports	Front Ports • 1 x iDRAC Direct (Micro-AB USB) port • 1 x USB 2.0 • 1 x VGA	Rear Ports • 1 x Dedicated iDRAC Ethernet port • 1 x USB 2.0 • 1 x USB 3.0 • 1 x VGA • 1 x Serial (optional) • 1 x VGA (optional for Direct Liquid Cooling configuration)
	Internal Ports • 1 x USB 3.0 (optional)	
PCIe	Up to eight PCIe slots: • Slot 1: 1 x8 Gen5 or 1 x8/1 x16 Gen4 Full height, Half length or 1 x16 Gen4 Full height, Full length • Slot 2: 1 x8/1 x16 Gen5 or 1 x8 Gen4 Full height, Half length or 1 x16 Gen5 Full height, Full length • Slot 3: 1 x16 Gen4 Low profile, Half length • Slot 4: 1 x8 Gen4 Full height, Half length • Slot 5: 1 x8/1 x16 Gen4 Full height, Half length or 1 x16 Gen4 Full height, Full length • Slot 6: 1 x16 Gen4 Low profile, Half length • Slot 7: 1 x8/1 x16 Gen5 or 1 x8 Gen4 Full height, Half length or 1 x16 Gen5 Full height, Full length • Slot 7 SNAPI: 1 x16 Gen5 Full height, Half length • Slot 8: 1 x8 Gen5 or 1 x8 Gen4 Full height, Half length	
Operating System and Hypervisors	• Canonical Ubuntu Server LTS • Microsoft Windows Server with Hyper-V • Red Hat Enterprise Linux • SUSE Linux Enterprise Server • VMware ESXi For specifications and interoperability details, see Dell.com/OSsupport.	
OEM-ready version available	From bezel to BIOS to packaging, your servers can look and feel as if they were designed and built by you. For more information, visit Dell.com -> Solutions -> OEM Solutions.	

APEX Flex on Demand

Acquire the technology you need to support your changing business with payments that scale to match actual usage. For more information, visit https://www.delltechnologies.com/en-us/payment-solutions/flexible-consumption/flex-on-demand.htm.

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June 2024

Dell PowerEdge R760

Technical Guide

Regulatory Model: E82S Series
Regulatory Type: E82S001
June 2025
Rev. A03

DELL Technologies

Notes, cautions, and warnings

NOTE: A NOTE indicates important information that helps you make better use of your product.

CAUTION: A CAUTION indicates either potential damage to hardware or loss of data and tells you how to avoid the problem.

WARNING: A WARNING indicates a potential for property damage, personal injury, or death.

Contents

1

System overview

The Dell PowerEdge R760 is Dell's latest two-socket, rack server that is designed to run complex workloads using highly scalable memory, I/O, and network options.

The system features:

- Up to 2 x 4th Gen Intel® Xeon® Scalable or Intel® Xeon® Max Processors with up to 56 cores
- Up to 2 x 5th Gen Intel® Xeon® Scalable Processors with up to 64 cores
- Optional Direct Liquid Cooling for required CPU SKU and/or configurations
- 32 DDR5 DIMM slots
- Two redundant AC or DC power supply units
- Up to 12 x 3.5-inch SAS/SATA, or 24 x 2.5-inch, 16 x 2.5-inch, 8 x 2.5-inch, or 2 x 2.5-inch (rear), 4 x 2.5-inch (rear), 4 x EDSFF E3.S (rear) SAS, SATA, or NVMe (HDD/SSD) drives
- Up to 16 x EDSFF E3.S Gen5 NVMe (SSD) drives
- PCI Express® (PCIe) 5.0 enabled expansion slots
- Network interface technologies to cover Network Interface Card (NIC)

Topics:

Key workloads

The Dell PowerEdge R760 offers powerful performance in a purpose-built, cyber resilient, mainstream server. Ideal for:

- Mixed Workload Standardization
- Database and Analytics
- Virtual Desktop Infrastructure
- Artificial Intelligence and Machine Learning

New technologies

Table 1. New technologies

Technology	Detailed Description
5th Gen Intel® Xeon® Scalable Processors	Core count: Up to 64 core processor
	UPI speed: Up to 4 links per CPU, speed: 12.8 GT/s, 14.4 GT/s, 16 GT/s, 20 GT/s
	Maximum number of PCIe lanes per CPU: Integrated 80 PCIe 5.0 lanes @ 32 GT PCIe Gen5
	Maximum TDP: 350 W
5600 MT/s DDR5 Memory	Max 16 DIMMs per processor and 32 DIMMs per system
	Supports DDR5 ECC RDIMM
4th Gen Intel® Xeon® Scalable or Intel® Xeon® Max Processors	Core count: Up to 56 core processor
	UPI speed: Up to 4 links per CPU, speed: 12.8 GT/s, 14.4 GT/s, 16 GT/s
	Maximum number of PCIe lanes per CPU: Integrated 80 PCIe 5.0 lanes @ 32 GT PCIe Gen5

Table 1. New technologies (continued)

Technology	Detailed Description
	Maximum TDP: 350 W
4800 MT/s DDR5 Memory	Max 16 DIMMs per processor and 32 DIMMs per system
	Supports DDR5 ECC RDIMM
Flex I/O	Optional LOM board, 2x1Gb with BCM5720 LAN controller
	Rear I/O with: ● 1x Dedicated iDRAC Ethernet port ● 1 x USB 3.0 ● 1 x USB 2.0 ● 1 x VGA port (optional for Direct Liquid Cooling configuration)
	Serial Port Option with STD RIO board
	Optional OCP Mezz 3.0 (supported by x8 PCIe lanes)
	Front I/O with: ● 1 x USB 2.0 ● 1x iDRAC Direct (Micro-AB USB) port ● 1 x VGA port
CPLD 1-wire	Support payload data of Front PERC, Riser, BP, and Rear IO to BOSS-N1 and iDRAC
Dedicated PERC	Front Storage module PERC with Front PERC11 & PERC12
Software RAID	OS RAID/S160
Power Supplies	60 mm dimension is the new PSU form factor on a 15G design
	Titanium 700 W mixed mode HLAC
	Platinum 800 W mixed mode
	Titanium 1100 W mixed mode
	Platinum 1400 W mixed mode
	Titanium 1400 W mixed mode 277 Vac and HVDC
	1100 W -48 V DC
	Titanium 1800 W mixed mode HLAC
	86 mm dimension PSU
	Platinum 2400 W mixed mode
	Titanium 2800 W mixed mode HLAC
	Titanium 3200 W mixed mode 277 Vac and HVDC

2

System features and generational comparison

The following table shows the comparison between the PowerEdge R760 with the PowerEdge R750.

Table 2. Features comparison

Features	PowerEdge R760	PowerEdge R750
Processors	• 2 x 4th Gen Intel® Xeon® Scalable or Intel® Xeon® Max Processors • 2 x 5th Gen Intel® Xeon® Scalable Processors	2 x 3rd Generation Intel® Xeon® Processor Scalable Family
CPU interconnect	Intel Ultra Path Interconnect (UPI)	Intel Ultra Path Interconnect (UPI)
Memory	• 32 x DDR5 RDIMM • Up to 4800 MT/s (1 DPC) / 4400 MT/s (2 DPC) • Up to 5600 MT/s (1DPC) / 4400 MT/s (2 DPC) *	• 32 x DDR4 RDIMM, LRDIMM • 16 x PMem (Intel Optane Persistent Memory 200 Series)
Storage Controllers	• PERC 11G: H755, H755N, H355 • PERC 12G: H965i, H965e • HBA 11: HBA355i, HBA355e • HBA 12: HBA465i, • BOSS-N1 • Software RAID: S160	• PERC 10G: H345, H745, H840 • PERC 11G: H755, H755N, H355 • HBA 11: HBA355i, HBA355e • BOSS-S1 adapter • BOSS-S2 • Software RAID: S150
Drive Bays	Front bays: • 3.5 inches, 2.5 inches - 24 Gb SAS, 6 Gb SATA • 2.5 inches - Gen3/4 NVMe • EDSFF E3.S - Gen5 NVMe Rear bay: • 2.5 inches - 24 Gb SAS, 6 Gb SATA, Gen3/4 NVMe • EDSFF E3.S - Gen5 NVMe	Front bays: • 3.5 inches, 2.5 inches - 12 Gb SAS, 6 Gb SATA • 2.5 inches - Gen3/4 NVMe Rear bay: • 2.5 inches - 12 Gb SAS, 6 Gb SATA, Gen3/4 NVMe
Power Supplies	• AC (Platinum): 800 W, 1400 W, 2400 W • AC (Titanium): 700 W, 1100 W, 1400 W, 1800 W, 2800 W, 3200 W • LVDC @-48 VDC Input: 1100 W	• AC (Platinum): 800 W, 1400 W, 2400 W • AC (Titanium): 700 W, 1100 W • LVDC @-48 VDC Input: 1100 W
Cooling Options	• Air Cooling • Optional Direct Liquid Cooling (DLC)	• Air Cooling • Optional Direct Liquid Cooling (DLC)
	NOTE: DLC is a rack solution and requires rack manifolds and a cooling distribution unit (CDU) to operate.	**NOTE:** DLC is a rack solution and requires rack manifolds and a cooling distribution unit (CDU) to operate.
Fans	Standard (STD) fans /High performance Silver (HPR Silver) fans/ High performance Gold (HPR Gold) fans	Standard (STD) fans /High performance Silver (HPR Silver) fans/ High performance Gold (HPR Gold) fans
	Up to six hot swap fans	Up to six hot swap fans

Table 2. Features comparison (continued)

Features	PowerEdge R760	PowerEdge R750
Dimension	Height: 86.8 mm (3.41 inches)	Height: 86.8 mm (3.41 inches)
	Width: 482 mm (18.97 inches)	Width: 482 mm (18.97 inches)
	Depth: 772.13 mm (30.39 inches) with bezel	Depth: 772.13 mm (30.39 inches) with bezel
	758.29 mm (29.85 inches) without bezel	758.29 mm (29.85 inches) without bezel
Form Factor	2U rack server	2U rack server
Embedded Management	• iDRAC9 • iDRAC Direct • iDRAC RESTful API with Redfish • iDRAC Service Module • Quick Sync 2 wireless module	• iDRAC9 • iDRAC Direct • iDRAC Service Module • Quick Sync 2 wireless module
Bezel	Optional LCD bezel or security bezel	Optional LCD bezel or security bezel
OpenManage Software	• OpenManage Enterprise • OpenManage Power Manager plugin • OpenManage Service plugin • OpenManage Update Manager plugin • CloudIQ for PowerEdge plug in • OpenManage Enterprise Integration for VMware vCenter • OpenManage Integration for Microsoft System Center • OpenManage Integration with Windows Admin Center	• OpenManage Enterprise • OpenManage Power Manager plugin • OpenManage SupportAssist plugin • OpenManage Update Manager plugin
Mobility	OpenManage Mobile	OpenManage Mobile
Integrations	• BMC Truesight • Microsoft System Center • OpenManage Integration with ServiceNow • Red Hat Ansible Modules • Terraform Providers • VMware vCenter and vRealize Operations Manager	• BMC TrueSight • Microsoft System Center • Red Hat Ansible Modules • VMware vCenter
Connections	• IBM Tivoli Netcool/OMNIbus • IBM Tivoli Network Manager IP Edition • Micro Focus Operations Manager • Nagios Core • Nagios XI	• IBM Tivoli Netcool/OMNIbus • IBM Tivoli Network Manager IP Edition • Micro Focus Operations Manager • Nagios Core • Nagios XI
Security	• Cryptographically signed firmware • Data at Rest Encryption (SEDs with local or external key mgmt) • Secure Boot • Secured Component Verification (Hardware integrity check) • Secure Erase • Silicon Root of Trust • System Lockdown (requires iDRAC9 Enterprise or Datacenter) • TPM 2.0 FIPS, CC-TCG certified, TPM 2.0 China NationZ	• Cryptographically signed firmware • Secure Boot • Secure Erase • Silicon Root of Trust • System Lockdown (requires iDRAC9 Enterprise or Datacenter) • TPM 1.2/2.0 FIPS, CC-TCG certified, TPM 2.0 China NationZ
Embedded NIC	2 x 1 GbE LOM (optional)	2 x 1 GbE LOM
Networking Options	OCP x16 (optional) Mezz 3.0	OCP x8 Mezz 3.0

Table 2. Features comparison (continued)

Features	PowerEdge R760		PowerEdge R750	
	NOTE: The system allows either LOM card or an OCP card or both to be installed in the system.			
GPU Options	Up to two double wide 350 W, or six single wide 75 W accelerators		Up to two double wide 300 W, or six single wide 75 W accelerators	
Ports	Front Ports • 1 x USB 2.0 • 1 x VGA • 1 x iDRAC Direct (Micro-AB USB) port	Rear Ports • 1 x USB 2.0 • 1 x Dedicated iDRAC Ethernet port • 1 x USB 3.0 • 1 x Serial port (optional) • 1 x VGA (optional for Direct Liquid Cooling configuration)	Front Ports • 1 x USB 2.0 • 1 x VGA • 1 x iDRAC Direct (Micro-AB USB) port	Rear Ports • 1 x USB 2.0 • 1 x Dedicated iDRAC Ethernet port • 1 x USB 3.0 • 1 x Serial port (optional) • 1 x VGA (optional for Direct Liquid Cooling configuration)
	Internal Port: 1 x USB 3.0 (optional)		Internal Port: 1 x USB 3.0 (optional)	
PCIe	Up to 8 x PCIe Gen4 or up to 4 x PCIe Gen5 slots		UP to 8 x PCIe Gen4 slots	
Operating System and Hypervisors	• Canonical Ubuntu Server LTS • Microsoft Windows Server with Hyper-V • Red Hat Enterprise Linux • SUSE Linux Enterprise Server • VMware ESXi For specifications and interoperability details, see Dell Enterprise Operating Systems on Servers, Storage, and Networking page at Dell.com/OSsupport.		• Canonical Ubuntu Server LTS • Citrix Hypervisor • Windows Server LTSC with Hyper-V • Red Hat Enterprise Linux • SUSE Linux Enterprise Server • VMware ESXi For specifications and interoperability details, see Dell Enterprise Operating Systems on Servers, Storage, and Networking page at Dell.com/OSsupport.	

NOTE: * Applicable for 5th Gen Intel® Xeon® Scalable Processors.

3

Chassis views and features

Topics:

Front view of the system

Figure 1. Front view of 24 x 2.5-inch drive system

Figure 2. Front view of 16 x 2.5-inch drive system (Smart Flow)

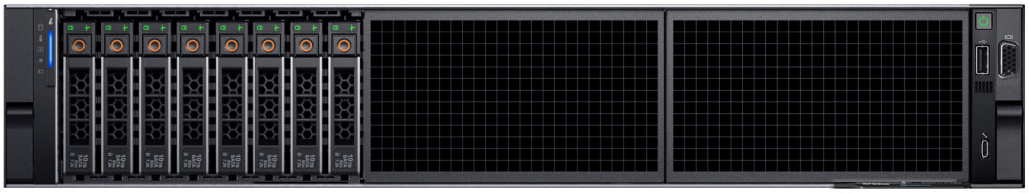

Figure 3. Front view of 8 x 2.5-inch drive system

Figure 4. Front view of 12 x 3.5-inch drive system

Figure 5. Front view of 16 x EDSFF E3.S Gen5 NVMe drive system

Figure 6. Front view of 16 x EDSFF E3.S Gen5 NVMe Raid drive system

Rear view of the system

Figure 7. Rear view of the system

Figure 8. Rear view of the system with optional liquid cooling

Figure 9. Rear view of the system with 2 x 2.5-inch rear drive module

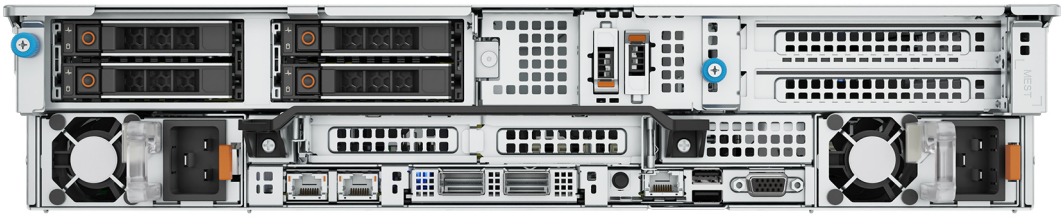

Figure 10. Rear view of the system with 4 x 2.5-inch rear drive module

Figure 11. Rear view of the system with 4 x EDSFF E3.S rear drive module

Inside the system

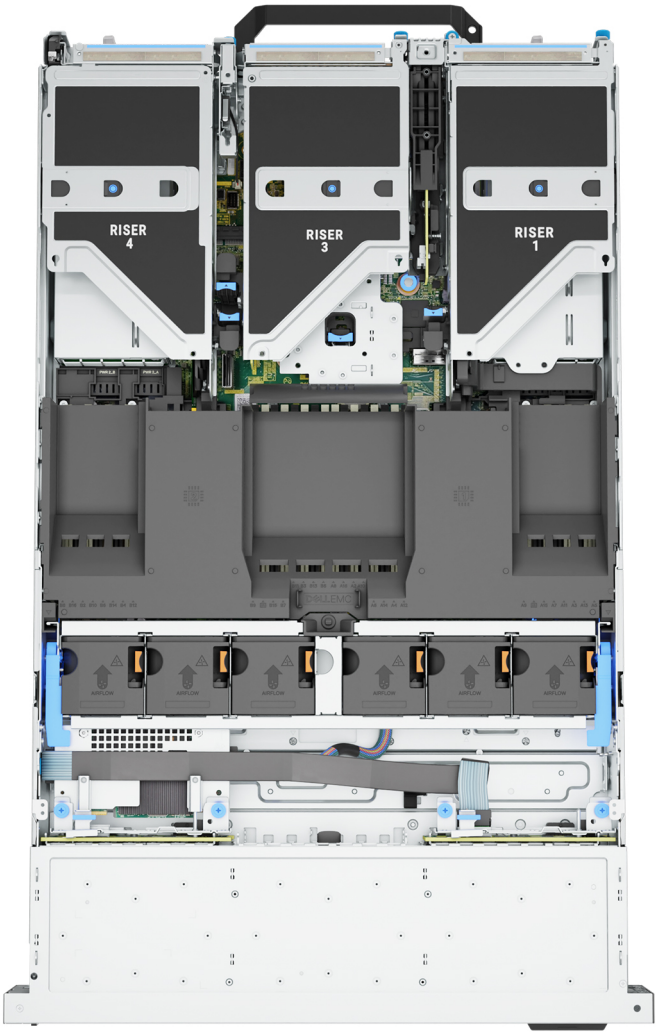

Figure 12. Inside the system

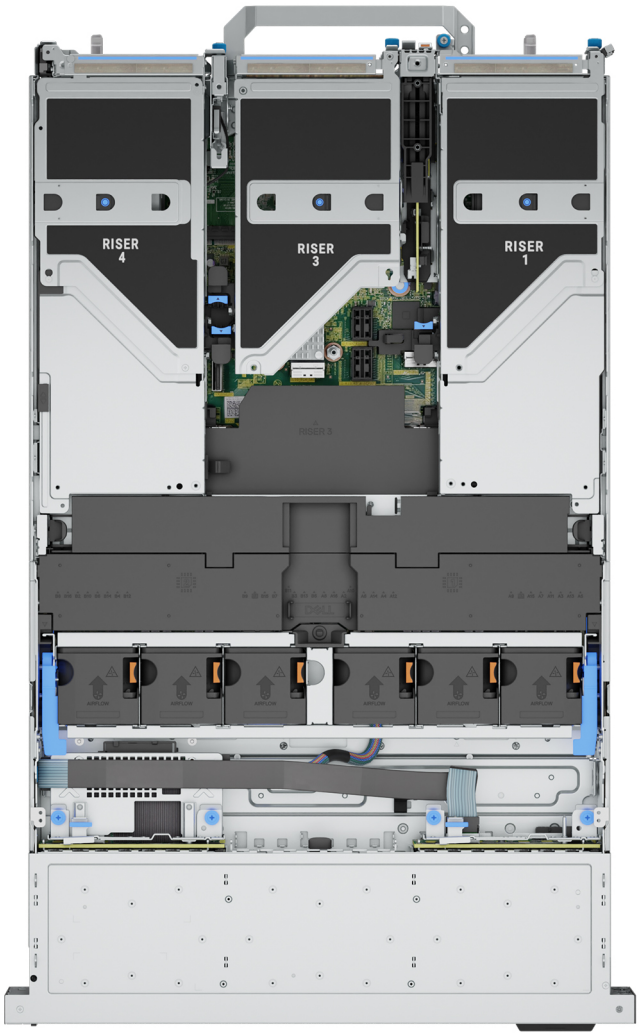

Figure 13. Inside the system with full length risers and GPU shroud

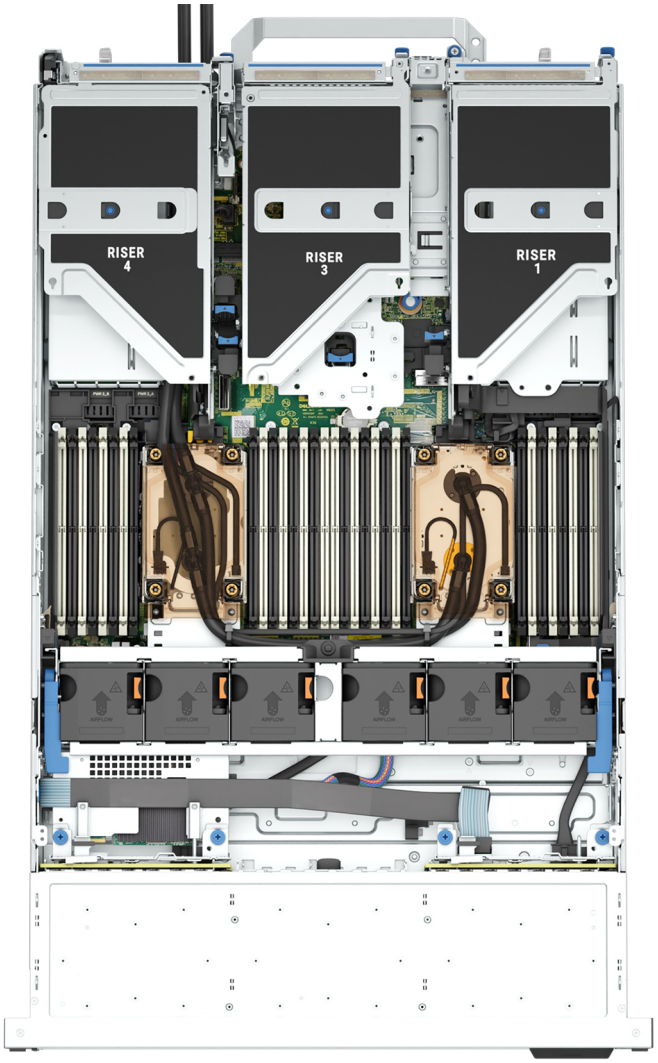

Figure 14. Inside the system with processor liquid cooling module

NOTE: Air shroud is hidden in the above image to show the processor liquid cooling configuration.

4

Processor

Topics:

- Processor features

Processor features

The 4th Generation Intel® Xeon® Processors stack is the next generation data center processor offering with significant performance increases, integrated acceleration, and next generation memory and I/O. Sapphire Rapids accelerate customer usages with unique workload optimizations.

The following lists the features and functions that are in the 4th Generation Intel® Xeon® Scalable Processor offering:

- Faster UPI with up to four Intel Ultra Path Interconnect (Intel UPI) at up to 16 GT/s, increasing multisocket bandwidth
- More, faster I/O with PCI Express 5 and up to 80 lanes (per socket)
- Enhanced Memory Performance with DDR5 support and memory speed up to 4800 MT/s in one DIMM per channel (1DPC) and 4400 MT/s in two DIMM per channel (2DPC)
- New built-in accelerators for data analytics, networking, storage, crypto, and data compression
- New Xeon Max processor with integrated 64 GB High Bandwidth Memory (HBM) to increase performance in memory-bound applications

Xeon Max processor modes

1. Xeon Max only mode: Provides best performance when workloads fit into 1 GB/core of capacity and no software changes or DDR required.
2. Flat mode: DDR can be added for workloads needing capacity >1 GB/core with Xeon Max processor and DDR exposed as separate regions and software updates that are needed to optimize performance (higher performance than cache mode).
3. Cache mode: Provides improved performance when workloads need >1 GB/core of capacity with no change to software required and Xeon Max processor caches DDR (symmetric DDR population required).

The 5th Generation Intel® Xeon® Scalable Processor stack is the next generation data center processor offering improved performance, standard increased memory speeds, expanded UPI speeds and enhanced security.

The following lists the features and functions that are in the 5th Generation Intel® Xeon® Scalable Processor offering:

- Increased core counts with up to 64 cores
- Enhanced memory performance with DDR5 and memory speed up to 5600 MT/s in one DIMM per channel (1DPC) and up to 4400 MT/s in two DIMM per channel (2DPC), 24 Gb and 16 Gb DRAM
- Faster UPI with up to four Intel Ultra Path Interconnect (Intel® UPI) at up to 20 GT/s, increasing multi-socket bandwidth
- Enhanced security for virtualized environments with Intel Trust Domain Extensions (Intel® TDX) for confidential computing

Supported processors

The following table shows the Intel Sapphire Rapids (4th Gen Intel® Xeon® Scalable or Intel® Xeon® Max Processors) and Intel Emerald Rapids (5th Gen Intel® Xeon® Scalable Processors) SKUs that are supported on the R760.

Table 3. 4th Gen Intel® Xeon® Scalable or Intel® Xeon® Max Processors supported in R760

Processor	Clock Speed (GHz)	Cache (M)	UPI (GT/s)	Cores	Threads	Turbo	Memory Speed (MT/s)	Memory Capacity	TDP
9480[1]	1.9	113	16	56	112	Turbo	4800	64 GB	350 W

Table 3. 4th Gen Intel® Xeon® Scalable or Intel® Xeon® Max Processors supported in R760 (continued)

Processor	Clock Speed (GHz)	Cache (M)	UPI (GT/s)	Cores	Threads	Turbo	Memory Speed (MT/s)	Memory Capacity	TDP
9470[1]	2	105	16	52	104	Turbo	4800	64 GB	350 W
9460[1]	2.2	98	16	40	80	Turbo	4800	64 GB	350 W
9462[1]	2.7	75	16	32	64	Turbo	4800	64 GB	350 W
8480+[1]	2	105	16	56	112	Turbo	4800	4 TB	350 W
8471N[1]	1.8	98	16	52	104	Turbo	4800	4 TB	300 W
8470Q[1]	2.1	105	16	52	104	Turbo	4800	4 TB	350 W
8470N[1]	1.7	98	16	52	104	Turbo	4800	4 TB	300 W
8470[1]	2	105	16	52	104	Turbo	4800	4 TB	350 W
8468[1]	2.1	105	16	48	96	Turbo	4800	4 TB	350 W
8460Y+[1]	2	105	16	40	80	Turbo	4800	4 TB	300 W
8452Y[1]	2	68	16	36	72	Turbo	4800	4 TB	300 W
6454S[1]	2.2	60	16	32	64	Turbo	4800	4 TB	270 W
6430[1]	2.1	60	16	32	64	Turbo	4800	4 TB	270 W
6414U[1]	2	60	16	32	64	Turbo	4800	4 TB	250 W
8462Y+[1]	2.8	60	16	32	64	Turbo	4800	4 TB	300 W
6458Q[1]	3.1	60	16	32	64	Turbo	4800	4 TB	350 W
6448Y[2]	2.2	60	16	32	64	Turbo	4800	4 TB	225 W
6444Y[1]	3.5	45	16	16	32	Turbo	4800	4 TB	270 W
6442Y[2]	2.6	60	16	24	48	Turbo	4800	4 TB	225 W
6438Y+[2]	2	60	16	32	64	Turbo	4800	4 TB	205 W
6438N[2]	2	60	16	32	64	Turbo	4800	4 TB	205 W
6438M[2]	2.2	60	16	32	64	Turbo	4800	4 TB	205 W
6434[2]	3.7	23	16	8	16	Turbo	4800	4 TB	205 W
6428N[2]	1.8	60	16	32	64	Turbo	4800	4 TB	185 W
6426Y[2]	2.6	38	16	16	32	Turbo	4800	4 TB	185 W
6421N[2]	1.8	60	16	32	64	Turbo	4800	4 TB	185 W
5420+[2]	2	53	16	28	56	Turbo	4400	4 TB	205 W
5418Y[2]	2	45	16	24	48	Turbo	4400	4 TB	185 W
5418N[2]	1.8	45	16	24	48	Turbo	4400	4 TB	165 W
5416S[2]	2	30	16	16	32	Turbo	4400	4 TB	150 W
5415+[2]	2.9	23	16	8	16	Turbo	4400	4 TB	150 W
5412U[2]	2.1	45	16	24	48	Turbo	4400	4 TB	185 W
5411N[2]	1.9	45	16	24	48	Turbo	4400	4 TB	165 W
4416+[2]	2	38	16	20	40	Turbo	4000	4 TB	165 W
4410Y[2]	2	30	16	12	24	Turbo	4000	4 TB	150 W
3408U[2]	1.8	23	16	8	16	No Turbo	4000	4 TB	125 W

NOTE: 9480, 9470, 8470Q and 6458Q are supported only in liquid cooling configuration.

Table 4. 5th Gen Intel® Xeon® Scalable Processors supported in R760

Processor	Clock Speed (GHz)	Cache (M)	UPI (GT/s)	Cores	Threads	Turbo	Memory Speed (MT/s)	Memory Capacity	TDP
8592+[1]	1.9	320	20	64	128	Turbo	5600	4 TB	350 W
8580[1]	2.0	300	20	60	120	Turbo	5600	4 TB	350 W
8568Y+[1]	2.3	300	20	48	96	Turbo	5600	4 TB	350 W
8562Y+[1]	2.8	60	20	32	64	Turbo	5600	4 TB	300 W
8558U[1]	2.0	260	N/A	48	96	Turbo	4800	4 TB	300 W
6548N [1]	2.8	60	20	32	64	Turbo	5200	4 TB	250 W
6548Y+[1]	2.5	60	20	32	64	Turbo	5200	4 TB	250 W
6542Y[1]	2.9	60	20	24	48	Turbo	5200	4 TB	250 W
6534[2]	3.9	22.5	20	8	16	Turbo	4800	4 TB	195 W
6526Y[2]	2.8	37.5	20	16	32	Turbo	5200	4 TB	195 W
5512U[2]	2.1	52.5	N/A	28	56	Turbo	4800	4 TB	185 W
4514Y[2]	2.0	30	16	16	32	Turbo	4400	4 TB	150 W
4510[2]	2.4	30	16	12	24	Turbo	4400	4 TB	150 W
4509Y[2]	2.6	23	16	8	16	Turbo	4400	4 TB	125 W

NOTE: The platform supports Maximum (MAX) and Mainstream (MS) system boards.

- [1] supports MAX system board
- [2] supports MS system board

For more information, see System board jumpers and connectors section.

5

Memory subsystem

Topics:

- Supported memory

Supported memory

Table 5. Memory technology comparison

Feature	PowerEdge R760 (DDR5)
DIMM type	RDIMM
Transfer speed	4800 MT/s (1DPC), 4400 MT/s (2DPC)
	5600 MT/s (1DPC), 4400 MT/s (2DPC)*
Voltage	1.1 V

NOTE: *Applicable for 5th Gen Intel® Xeon® Scalable Processors.

Table 6. Supported memory matrix

DIMM type	Rank	Capacity	DIMM rated voltage and speed	Operating Speed	
				1 DIMM per channel (DPC)	2 DIMMs per channel (DPC)
RDIMM	1 R	16 GB	DDR5 (1.1 V), 4800 MT/s	4800 MT/s	4400 MT/s
	2 R	32 GB, 64 GB	DDR5 (1.1 V), 4800 MT/s	4800 MT/s	4400 MT/s
	4 R	128 GB	DDR5 (1.1 V), 4800 MT/s	4800 MT/s	4400 MT/s
	8 R	256 GB	DDR5 (1.1 V), 4800 MT/s	4800 MT/s	4400 MT/s
	1 R	16 GB	DDR5 (1.1 V), 5600 MT/s	5600 MT/s	4400 MT/s
	2 R	32 GB, 64 GB, 96 GB	DDR5 (1.1 V), 5600 MT/s	5600 MT/s	4400 MT/s
	4 R	128 GB	DDR5 (1.1 V), 5600 MT/s	5600 MT/s	4400 MT/s
	8 R	256 GB*	DDR5 (1.1 V), 5600 MT/s	5600 MT/s	4400 MT/s

NOTE: 5600 MT/s RDIMMs are applicable for 5th Gen Intel® Xeon® Scalable Processors.

NOTE: The processor may reduce the performance of the rated DIMM speed.

NOTE: *256 GB RDIMM with 5th Gen Intel® Xeon® Scalable Processors will be supported in the future release.

6

Storage

Topics:

Storage controllers

Dell RAID controller options offer performance improvements, including the fPERC solution. fPERC provides a base RAID HW controller without consuming a PCIe slot by using a small form factor and high-density connector to the base planar.

16G PERC Controller offerings are a heavy leverage of the 15G PERC family. The Value and Value Performance levels carry over to 16G from 15G. New to 16G is the Avenger-based Premium Performance tier offering. This high-end offering drives IOPs performance and enhanced SSD performance.

NOTE: The size of the RAID 1 drives must be less than that of the second RAID container.

Table 7. PERC Series controller offerings

Performance Level	Controller and Description
Entry	S160
Value	H355, HBA355 (internal/external), HBA465 (internal/external)
Value Performance	H755, H755N
Premium Performance	H965i, H965e Avenger 1 Memory: 8GB DDR4 NV cache 72-bit memory 2133 MHz Low profile form factors Dual A15 1.2 GHz CPU X8PCIe 3.0, x8 12Gb SAS

NOTE: PowerEdge does not support Tri-Mode, the mixing of SAS, SATA, and NVMe behind the same controller.

NOTE: For more information about the features of the Dell PowerEdge RAID controllers (PERC), Software RAID controllers, or BOSS card, and on deploying the cards, see the storage controller documentation at Storage Controller Manuals.

NOTE: From December 2021, H355 replaces H345 as the entry raid controller. H345 is deprecated in January 2022.

NOTE: HBA465e is available post-RTS.

Supported Drives

The table that is shown below lists the internal drives that are supported in R760.

Table 8. Supported drives

Form Factor	Type	Speed	Rotational Speed	Capacities
2.5 inches	vSAS	12 Gb	SSD	1.92 TB, 3.84 TB, 960 GB, 7.62 TB
2.5 inches	SAS	24 Gb	SSD	1.92 TB, 1.6 TB, 800 GB, 3.84 TB, 960 GB, 7.68 TB
2.5 inches	SATA	6 Gb	SSD	1.92 TB, 480 GB, 960 GB, 3.84 TB
2.5 inches	NVMe	Gen4	SSD	1.6 TB, 3.2 TB, 6.4 TB, 1.92 TB, 3.84 TB, 15.63 TB, 7.68 TB, 800 GB, 400 GB
2.5 inches	DC NVMe	Gen4	SSD	3.84 TB, 960 GB
2.5 inches	SAS	12 Gb	10 K	600 GB, 1.2 TB, 2.4 TB
EDSFF E3.S	NVMe	Gen5	SSD	3.84 TB, 7.68 TB
3.5 inches	SATA	6 Gb	7.2 K	2 TB, 4 TB, 8 TB, 12 TB, 16 TB, 20 TB
3.5 inches	SAS	12 Gb	7.2 K	2 TB, 4 TB, 8 TB, 12 TB, 16 TB, 20 TB

Internal storage configuration

R760 available internal storage configurations:

- Zero drive (no backplane)
- 12 x 3.5" (SAS/SATA)
- 12 x 3.5" (SAS/SATA) w/ rear 2 x 2.5" (SAS/SATA)
- 12 x 3.5" (SAS/SATA) w/ rear 2 x 2.5" NVMe Direct
- 12 x 3.5" (SAS/SATA) + 4 x 2.5" (SAS/SATA)
- 12 x 3.5" (SAS/SATA) + 4 x 2.5" (NVMe Direct)
- 12 x 3.5" (SAS/SATA) + 4 x EDSFF E3.S (Gen5 x 4 NVMe Direct)
- 8 x 2.5" NVMe Direct
- 8 x 2.5" (NVMe RAID)
- 8 x 2.5" Universal (SAS/SATA HWRAID + NVMe Direct)
- 16 x 2.5" (NVMe RAID) Smart Flow
- 16 x 2.5" (NVMe Direct) Smart Flow
- 16 x 2.5" (SAS4/SATA) Smart Flow
- 16 x 2.5"(SAS4/SATA)+ 8 x 2.5" NVMe Direct
- 24 x 2.5" (SAS4/SATA) with 8 x Universal slots (SAS/SATA HWRAID + NVMe Direct)
- 24 x 2.5" (SAS4/SATA)
- 24 x 2.5" (SAS4/SATA) + 2 x 2.5" (NVMe Direct)
- 24 x 2.5"(SAS4/SATA) + 2 x 2.5" (SAS/SATA)
- 24 x 2.5"(SAS4/SATA) + 4 x 2.5" (SAS/SATA)
- 24 x 2.5" (SAS4/SATA) + 4 x 2.5" (NVMe Direct)
- 24 x 2.5" (SAS4/SATA) - Dual Controller
- 24 x 2.5" + 2 x 2.5" (SAS4/SATA) - Dual Controller
- 24 x 2.5" (SAS4/SATA) with 8 x Universal slots (SAS/SATA HWRAID + NVMe Direct)
- 24 x 2.5" (SAS4/SATA)
- 24 x 2.5" (SAS4/SATA) - Dual Controller
- 24 x 2.5" (SAS4/SATA) with 4 x Universal slots (SAS/SATA HWRAID + NVMe Direct) + 4 x 2.5" (SAS4/SATA)
- 24 x 2.5 inches (SAS4/SATA) + 4 x EDSFF E3.S (Gen5 x 4 NVMe Direct)
- 16 x 2.5" (8 x SAS4/SATA + 8 x NVMe RAID)

- 16 x EDSFF E3.S (Gen5 x 4 NVMe Direct)
- 16 x EDSFF E3.S (NVMe RAID) - Dual Controller
- 24 x 2.5 inches (NVMe Gen5 switched)
- 24 x 2.5 inches (NVMe RAID - Gen5 Switched) - Dual Controller
- 16 x 2.5" (8 x NVMe RAID + 8 x SAS4/SATA) Smart Flow
- 24 x 2.5" (NVMe Gen4 Direct) Passive
- 8 x 2.5" Universal (SAS/SATA HWRAID + NVMe Direct)

NOTE: The Universal backplane (with universal slot supports SAS/SATA/NVMe drives) supports HW RAID for SAS/SATA with direct attach NVMe, and does not support HW RAID for NVMe.

External Storage

The R760 supports the external storage device types that are listed in the table below.

Table 9. Support external storage devices

Device Type	Description
External Tape	Supports connection to external USB tape products
NAS/IDM appliance software	Supports NAS software stack
JBOD	Supports connection to 12 Gb MD-series JBODs

7

Networking

Topics:

Overview

PowerEdge offers a wide variety of options to get information moving to and from our servers. Industry best technologies are chosen, and systems management features are added by our partners to firmware to tie in with iDRAC. These adapters are rigorously validated for worry-free, fully supported use in Dell servers.

OCP 3.0 support

Table 10. OCP 3.0 feature list

Feature	OCP 3.0
Form factor	SFF
PCIe Gen	Gen4
Max PCIe width	x8, x16 (with OCP cable)
Max number of ports	4
Port type	BT/SFP/SFP+/SFP28/QSFP56
Max port speed	25 GbE, 100 GbE (with OCP cable)
NC-SI	Yes
SNAPI	Yes
WoL	Yes
Power consumption	15 W–35 W

Supported OCP cards

Table 11. Supported OCP cards

Form factor	Vendor	Port type	Port speed	Port count
OCP 3.0	Broadcom	QSFP56	100 GbE	2
	Mellanox	QSFP56	100 GbE	2
	Intel	SFP28	25 GbE	4
	Broadcom	SFP28	25 GbE	4
	Intel	SFP28	25 GbE	2
	Broadcom	SFP28	25 GbE	2

Table 11. Supported OCP cards (continued)

Form factor	Vendor	Port type	Port speed	Port count
	Mellanox	SFP28	25 GbE	2
	Broadcom	BT	10 GbE	4
	Intel	BT	10 GbE	2
	Intel	BT	10 GbE	4
	Broadcom	BT	10 GbE	2
	Broadcom	BT	1 GbE	4
	Intel	BT	1 GbE	4

NOTE: A 100 GbE OCP card of PCIe width x16 can be used by connecting the OCP cable from SL11_CPU1_PB7 to SL13_CPU1_PB7 on the MAX system board.

NOTE: For storage configurations that already use the SL11_CPU1_PB7 or SL13_CPU1_PB7 connector on the Max system board, there is a restriction on supporting OCP cable.

OCP NIC 3.0 vs. rack Network Daughter Card comparisons

Table 12. OCP 3.0, 2.0, and rNDC NIC comparison

Form Factor	Dell rNDC	OCP 2.0 (LOM Mezz)	OCP 3.0	Notes
PCIe Gen	Gen 3	Gen 3	Gen 4	Supported OCP3 is SFF (small form factor).
Max PCIe Lanes	x8	Up to x16	Up to x16	See server slot priority matrix.
Shared LOM	Yes	Yes	Yes	This is iDRAC port redirect.
Aux Power	Yes	Yes	Yes	Used for Shared LOM

8

PCIe subsystem

Topics:

- PCIe risers

PCIe risers

Shown below are the riser offerings for the platform.

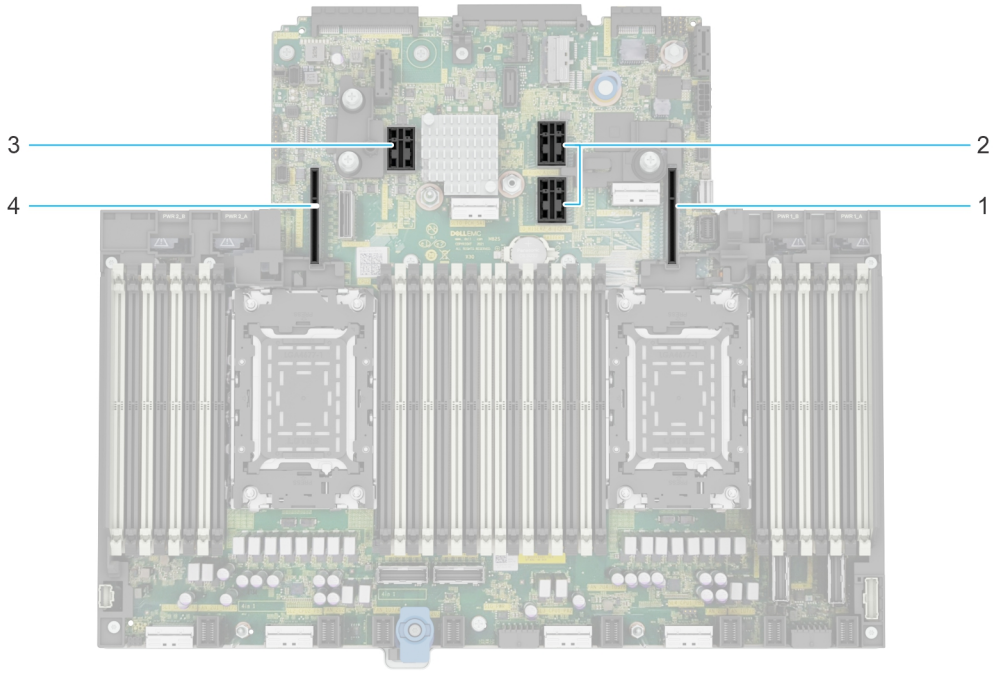

Figure 15. Riser connector location on system board

1. Riser 1
2. Riser 2
3. Riser 3
4. Riser 4

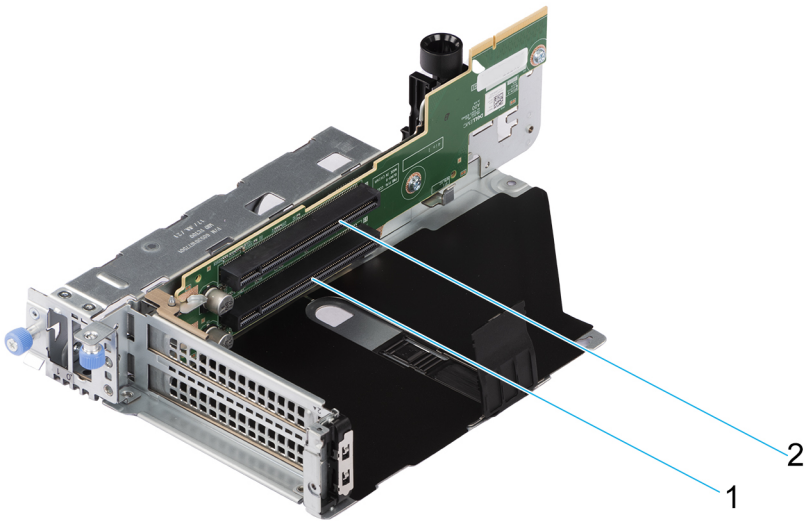

Figure 16. Riser 1B

1. Slot 1
2. Slot 2

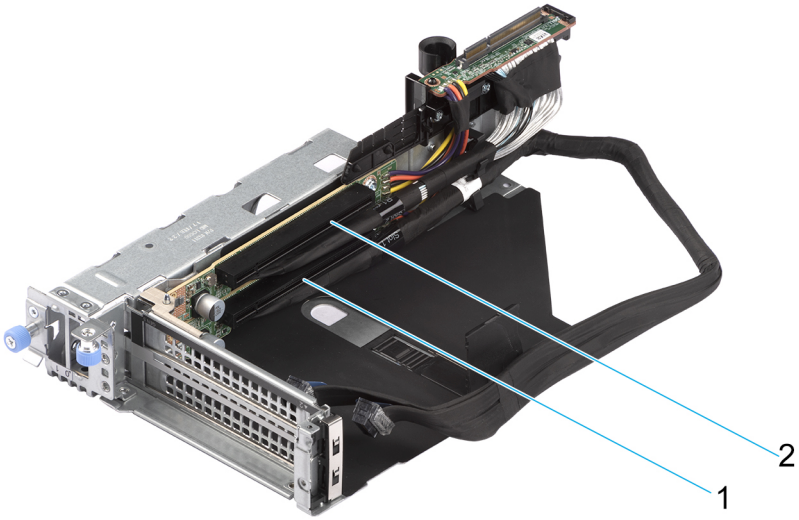

Figure 17. Riser 1R

1. Slot 1
2. Slot 2

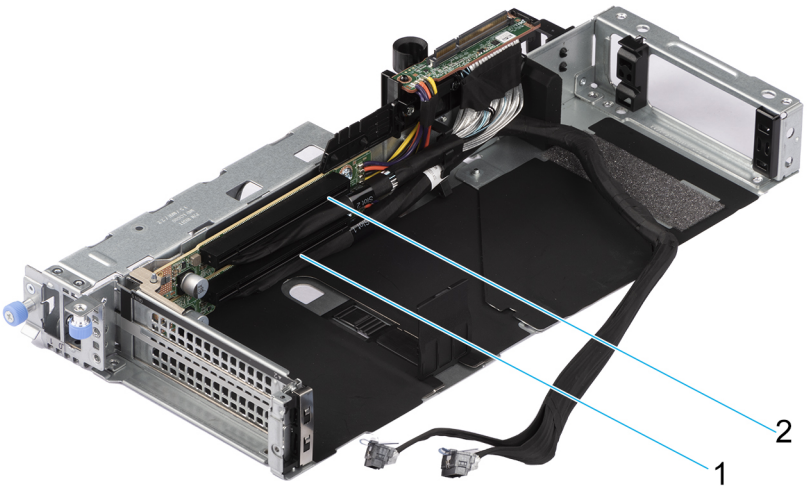

Figure 18. Riser 1R FL

1. Slot 1
2. Slot 2

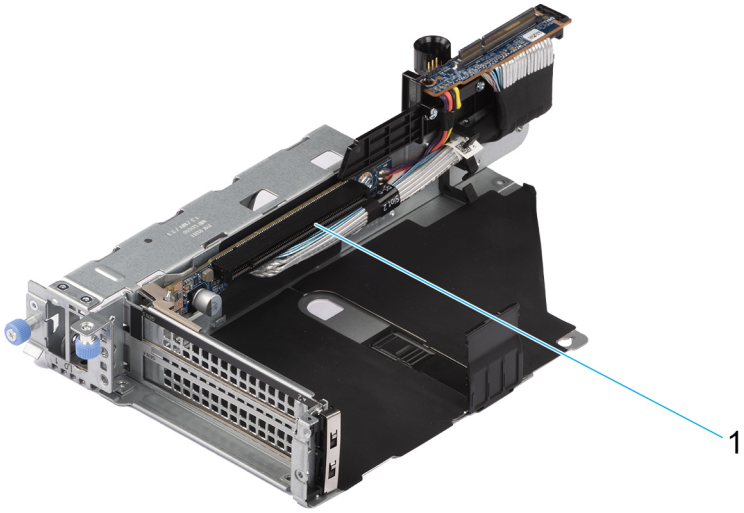

Figure 19. Riser 1P

1. Slot 2

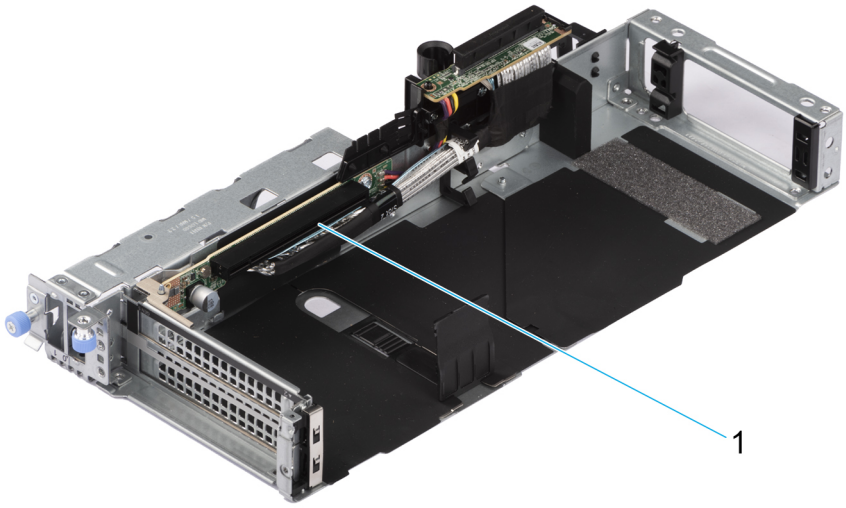

Figure 20. Riser 1P FL

1. Slot 2

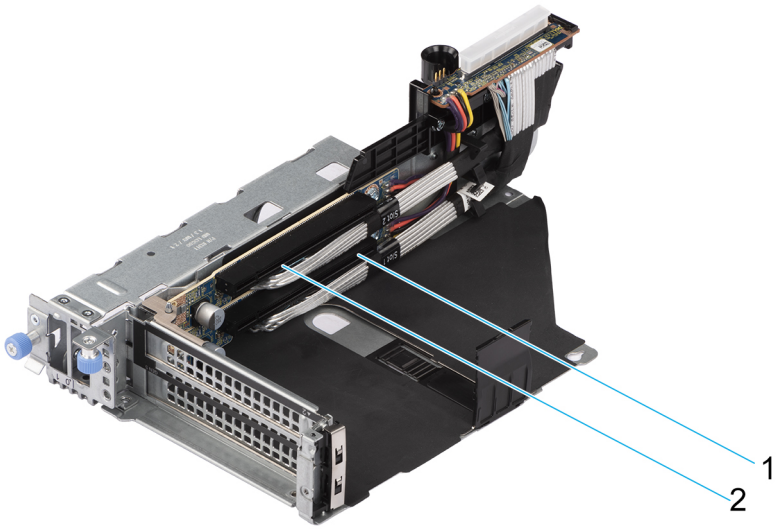

Figure 21. Riser 1Q

1. Slot 1
2. Slot 2

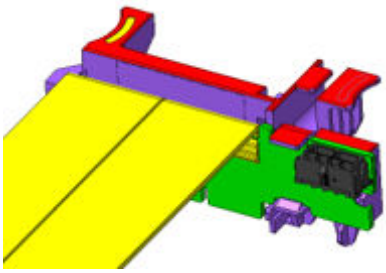

Figure 22. Riser R1 Paddle

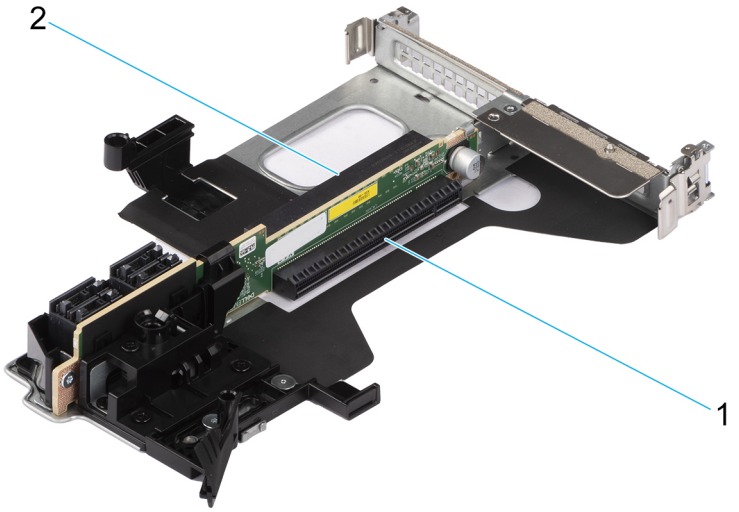

Figure 23. Riser 2A

1. Slot 6
2. Slot 3

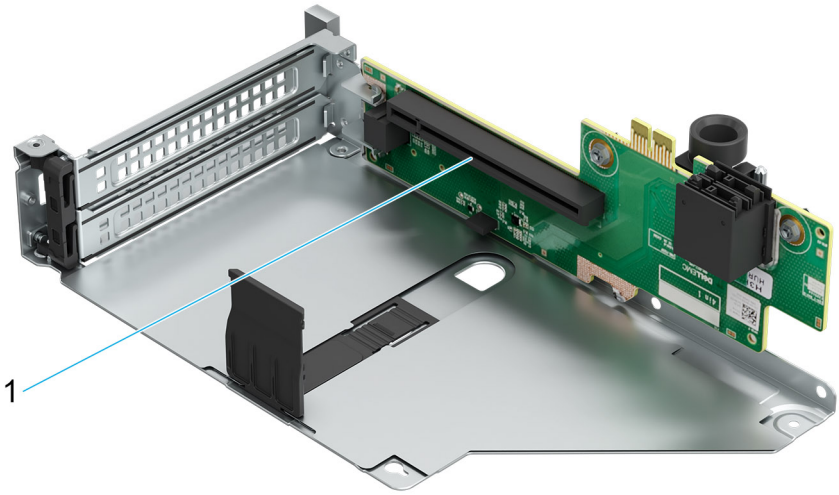

Figure 24. Riser 3A

1. Slot 5

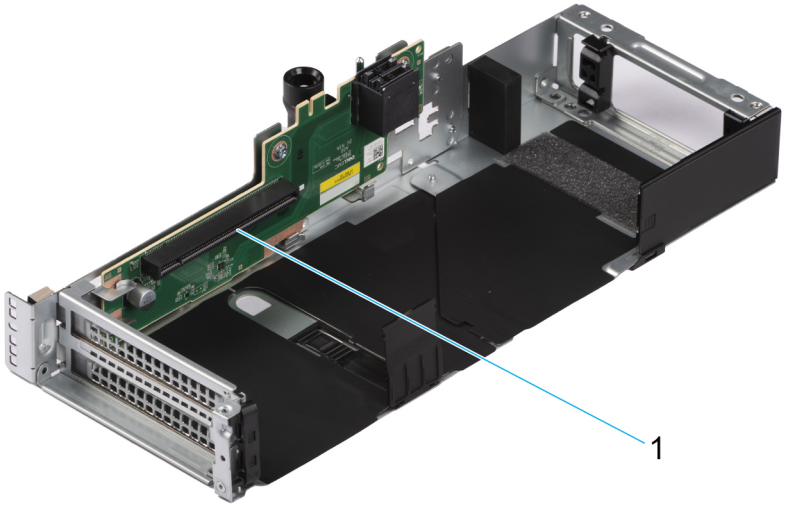

Figure 25. Riser 3A FL

1. Slot 5

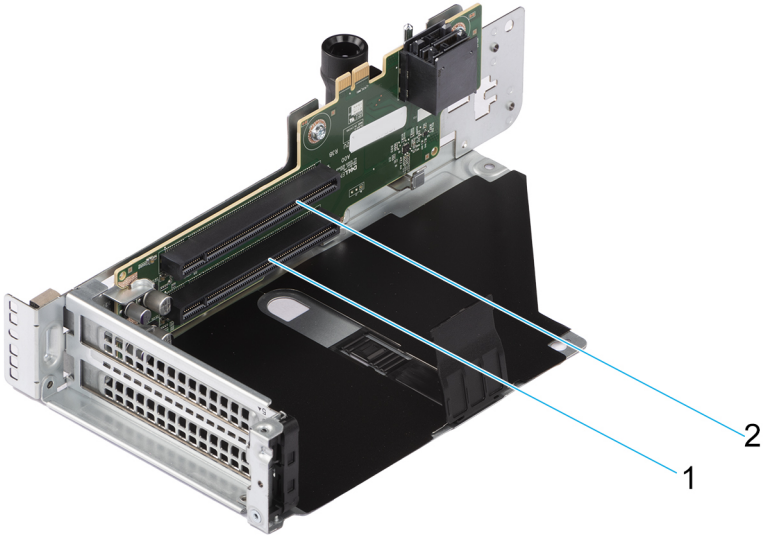

Figure 26. Riser 3B

1. Slot 4
2. Slot 5

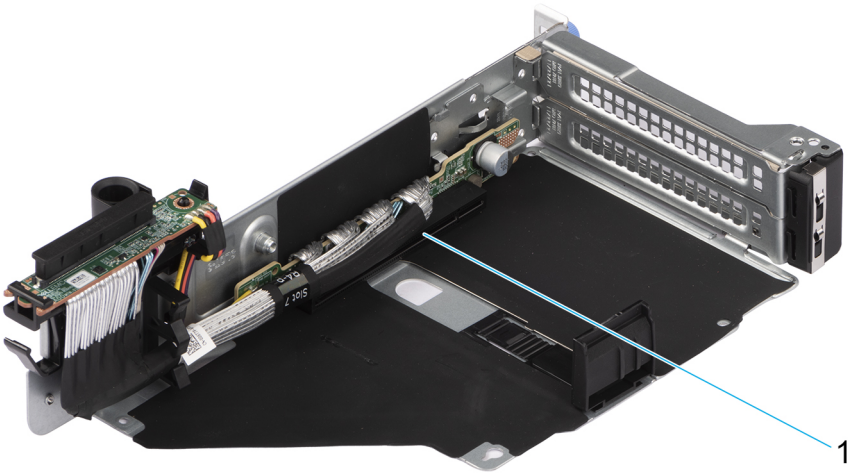

Figure 27. Riser 4P

1. Slot 7

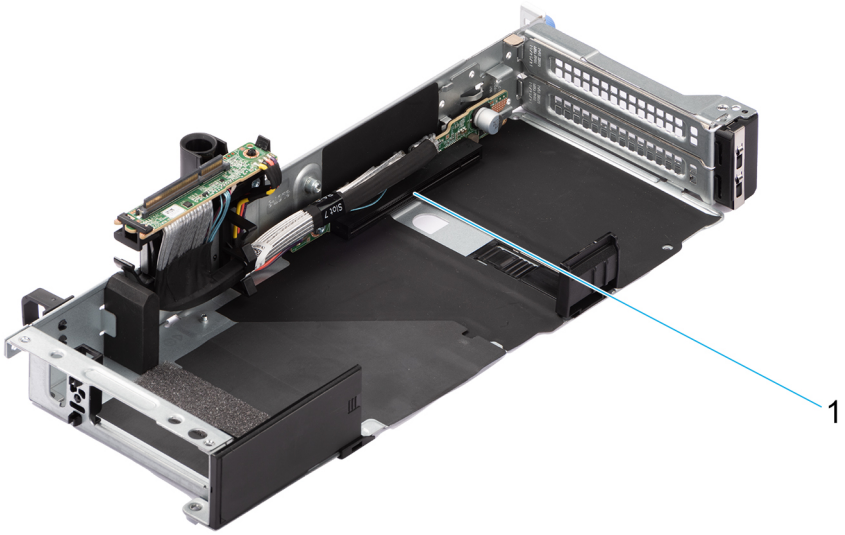

Figure 28. Riser 4P - FL

1. Slot 7

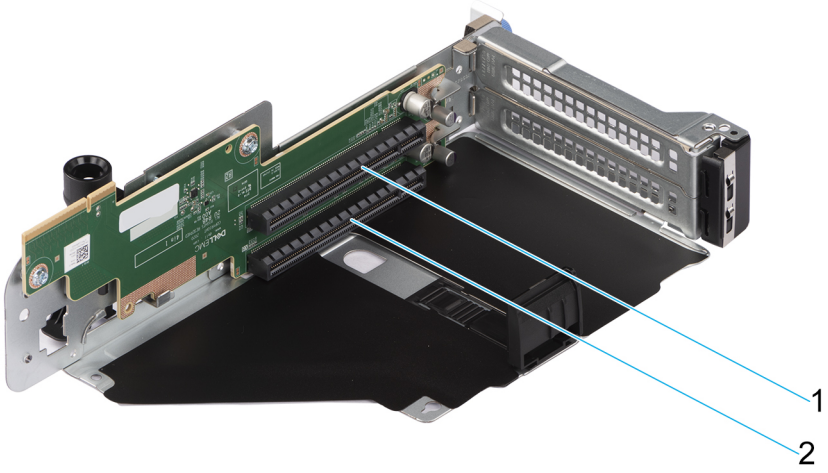

Figure 29. Riser 4B

1. Slot 8
2. Slot 7

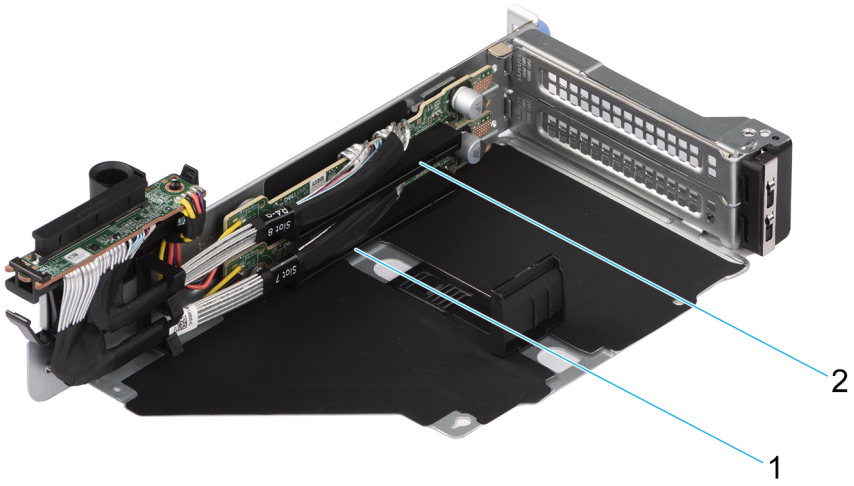

Figure 30. Riser 4Q

1. Slot 7
2. Slot 8

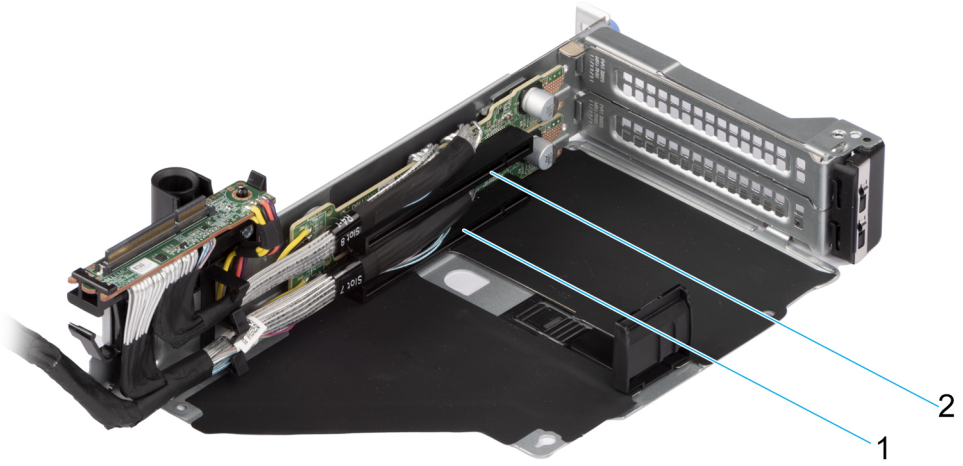

Figure 31. Riser 4R

1. Slot 7
2. Slot 8

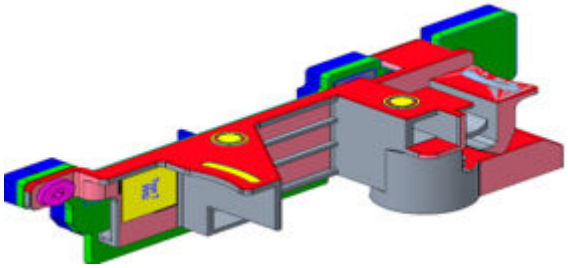

Figure 32. Riser R4 Paddle

Table 13. PCIe Riser Configurations

Config No.	Riser configuration	No. of Processors	PERC type supported	Rear storage possible
0	NO RSR	2	Front PERC	No
1	R1B+R2A+R3B+R4B	2	Front PERC/PERC Adapter	No
2	R1Q+R2A+R3B+R4Q	2	Front PERC/PERC Adapter	No
3-1	R1P+R2A+R3B+R4P (HL)	2	Front PERC/PERC Adapter	No
3-2	R1P+R2A+R3B+R4P (FL)	2	Front PERC/PERC Adapter	No
4-1	R1P+R2A+R3B+R4R (HL)	2	Front PERC/PERC Adapter	No
5-1	R1R+R2A+R3A+R4P (HL)	2	Front PERC/PERC Adapter	No
5-2	R1R+R2A+R3A+R4P (FL)	2	Front PERC/PERC Adapter	No
6	R2A+R4Q	2	Front PERC/PERC Adapter	Yes

Table 13. PCIe Riser Configurations (continued)

Config No.	Riser configuration	No. of Processors	PERC type supported	Rear storage possible
7	R1Q+R2A+R4Q	2	Front PERC/PERC Adapter	Yes
8	R1B+R2A	1	PERC Adapter	No
9	R1Q+R2A+R4R	1	Front PERC	No
10-1	R1P+R2A+R4R (HL)	1	Front PERC	No
10-2	R1P+R2A+R4R (FL)	1	Front PERC	No
11	R1 Paddle + R2A + R3B + R4 Paddle	2	N/A	No
12	R1Q+R2A+R4Q	2	Front PERC/PERC Adapter	Yes

9

Power, thermal, and acoustics

PowerEdge servers have an extensive collection of sensors that automatically track thermal activity, which helps to regulate temperature by reducing server noise and power consumption. The table below lists the tools and technologies Dell offers to lower power consumption and increase energy efficiency.

Topics:

Power

Table 14. Power tools and technologies

Feature	Description
Power Supply Units(PSU) portfolio	Dell's PSU portfolio includes intelligent features such as dynamically optimizing efficiency while maintaining availability and redundancy. Find additional information in the Power supply units section.
Tools for right sizing	Enterprise Infrastructure Planning Tool (EIPT) is a tool that can help you determine the most efficient configuration possible. With Dell's EIPT, you can calculate the power consumption of your hardware, power infrastructure, and storage at a given workload. Learn more at Dell EIPT.
Industry Compliance	Dell's servers are compliant with all relevant industry certifications and guide lines, including 80 PLUS, Climate Savers and ENERGY STAR.
Power monitoring accuracy	PSU power monitoring improvements include: ● Dell's power monitoring accuracy is currently 1%, whereas the industry standard is 5% ● More accurate reporting of power ● Better performance under a power cap
Power capping	Use Dell's systems management to set the power cap limit for your systems to limit the output of a PSU and reduce system power consumption. Dell is the first hardware vendor to leverage Intel Node Manager for circuit-breaker fast capping.
Systems Management	iDRAC Enterprise and Datacenter provides server-level management that monitors, reports and controls power consumption at the processor, memory and system level. Dell OpenManage Power Center delivers group power management at the rack, row, and data center level for servers, power distribution units, and uninterruptible power supplies.
Active power management	Intel Node Manager is an embedded technology that provides individual server-level power reporting and power limiting functionality. Dell offers a complete power management solution comprised of Intel Node Manager accessed through Dell iDRAC9 Datacenter and OpenManage Power Center that allows policy-based management of power and thermal at the individual server, rack, and data center level. Hot spare reduces power consumption of redundant power supplies. Thermal control off a speed optimizes the thermal settings for your environment to reduce fan consumption and lower system power consumption. Idle power enables Dell servers to run as efficiently when idle as when at full workload.
Rack infrastructure	Dell offers some of the industry's highest-efficiency power infrastructure solutions, including:

Table 14. Power tools and technologies (continued)

Feature	Description
	• Power distribution units (PDUs) • Uninterruptible power supplies (UPSs) • Energy Smart containment rack enclosures Find additional information at: Power and Cooling.

Power Supply Units

Energy Smart power supplies have intelligent features, such as the ability to dynamically optimize efficiency while maintaining availability and redundancy. Also featured are enhanced power-consumption reduction technologies, such as high-efficiency power conversion and advanced thermal-management techniques, and embedded power-management features, including high-accuracy power monitoring. The table below shows the power supply unit options that are available for the R760.

Table 15. PSU specifications

PSU	Class	Heat dissipation (maximum) (BTU/hr)	Frequency (Hz)	AC Voltage			DC Voltage			Current (A)
				200—240 V	100—120 V	277 V	240 V	- (48—60) V	336 V	
700 W mixed mode HLAC	Titanium	2625	50/60	700 W	N/A	N/A	N/A	N/A	N/A	4.1
	N/A	2625	N/A	N/A	N/A	N/A	700 W	N/A	N/A	3.4
800 W mixed mode	Platinum	3000	50/60	800 W	800 W	N/A	N/A	N/A	N/A	9.2—4.7
	N/A	3000	N/A	N/A	N/A	N/A	800 W	N/A	N/A	3.8
1100 W mixed mode	Titanium	4100	50/60	1100 W	1050 W	N/A	N/A	N/A	N/A	12—6.3
	N/A	4100	N/A	N/A	N/A	N/A	1100 W	N/A	N/A	5.2
1400 W mixed mode	Platinum	5250	50/60	1400 W	1050 W	N/A	N/A	N/A	N/A	12—8
	N/A	5250	N/A	N/A	N/A	N/A	1400 W	N/A	N/A	6.6
1400 W mixed mode 277 Vac and HVDC	Titanium	5250	50/60	N/A	N/A	1400 W	N/A	N/A	N/A	5.8
		5250	N/A	N/A	N/A	N/A	N/A	N/A	1400 W	5.17
1800 W mixed mode HLAC	Titanium	6750	50/60	1800	N/A	N/A	N/A	N/A	N/A	10
	N/A	6750	N/A	N/A	N/A	N/A	1800 W	N/A	N/A	8.2
2400 W mixed mode	Platinum	9000	50/60	2400 W	1400 W	N/A	N/A	N/A	N/A	16—13.5
	N/A	9000	N/A	N/A	N/A	N/A	2400 W	N/A	N/A	11.2

Table 15. PSU specifications (continued)

PSU	Class	Heat dissipation (maximum) (BTU/hr)	Frequency (Hz)	AC Voltage			DC Voltage			Current (A)
				200—240 V	100—120 V	277 V	240 V	- (48—60) V	336 V	
2800 W mixed mode HLAC	Titanium	10500	50/60	2800 W	N/A	N/A	N/A	N/A	N/A	15.6
	N/A	10500	N/A	N/A	N/A	N/A	2800 W	N/A	N/A	13.6
1100 W -48 V DC	N/A	4265	N/A	N/A	N/A	N/A	1100 W	N/A	N/A	27
3200 W mixed mode 277 Vac and HVDC	Titanium	12000	50/60	N/A	N/A	3200 W	N/A	N/A	N/A	13
		12000	N/A	N/A	N/A	N/A	N/A	N/A	3200 W	11.5

NOTE: If a system with AC 2400 W PSUs operates at low line 100-120 Vac, and then the power rating per PSU is degraded to 1400 W.

NOTE: If a system with AC 1400 W or 1100 W PSUs operates at low line 100-120 Vac, and then the power rating per PSU is degraded to 1050 W.

Figure 33. PSU power cables

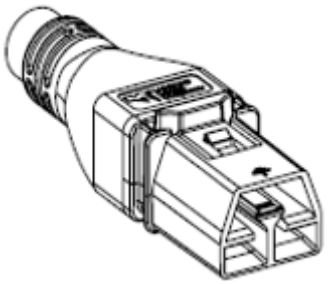

Figure 34. 277VAC/HVDC power cable

Table 16. PSU power cables

Form factor	Output	Power cable
Redundant 60 mm	700 W mixed mode HLAC	C13
	800 W mixed mode	C13
	1100 W mixed mode	C13

Table 16. PSU power cables (continued)

Form factor	Output	Power cable
	1400 W mixed mode	C13
	1400 W mixed mode 277 Vac and HVDC	277VAC/HVDC
	1800 W mixed mode HLAC	C15
Redundant 86 mm	2400 W mixed mode	C19
	2800 W mixed mode HLAC	C21
	3200 W mixed mode 277 Vac and HVDC	277VAC/HVDC

NOTE: C19 power cable combined with C20 to C21 jumper power cable can be used to adapt a 2800 W PSU.

NOTE: C13 power cable combined with C14 to C15 jumper power cable can be used to adapt a 1800 W PSU.

NOTE: The 277VAC/HVDC power cables are not available in the APJ region.

Thermal

PowerEdge servers have an extensive collection of sensors that automatically track thermal activity, which helps regulate temperature thereby reducing server noise and power consumption.

Thermal design

Thermal management of the platform helps deliver high performance with the right amount of cooling to components, while maintaining the lowest fan speeds possible. This is done across a wide range of ambient temperatures from 10°C to 35°C (50°F to 95°F) and to extended ambient temperature ranges.

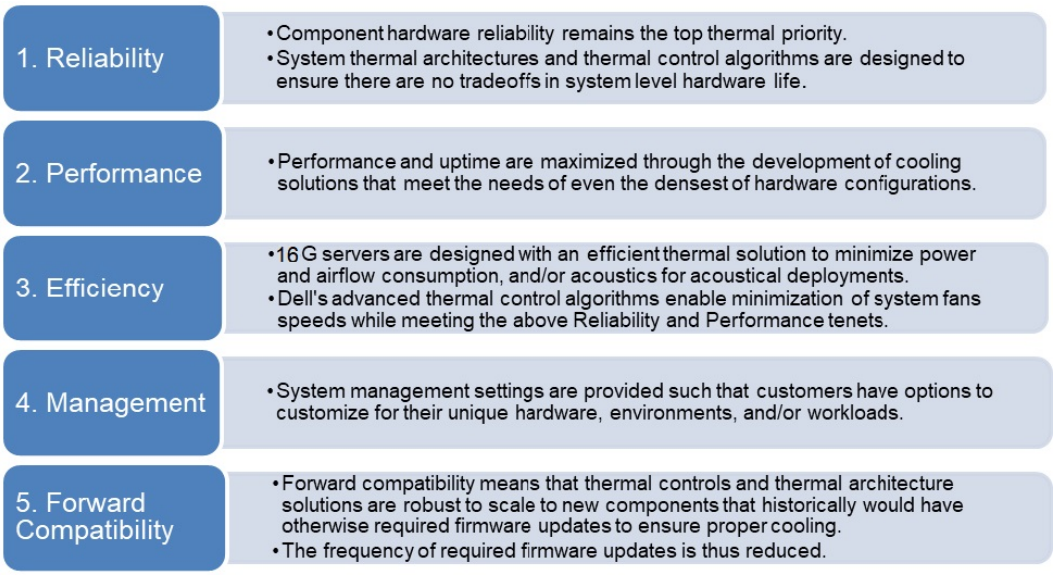

Figure 35. Thermal design characteristics

The thermal design of the PowerEdge R760 reflects the following:

- Optimized thermal design: The system layout is architected for optimum thermal design.
- System component placement and layout are designed to provide maximum airflow coverage to critical components with minimum expense of fan power.

- Comprehensive thermal management: The thermal control system regulates the fan speed based on several different responses from all system-component temperature sensors, and inventory for system configurations. Temperature monitoring includes components such as processors, DIMMs, chipset, the inlet air ambient, hard disk drives, and OCP.
- Open and closed loop thermal fan speed control: Open loop thermal control uses system configuration to determine fan speed based on inlet air ambient temperature. A closed loop thermal control method uses feedback temperatures to dynamically determine proper fan speeds.
- User-configurable settings: With the understanding and realization that every customer has a unique set of circumstances or expectations from the system, in this generation of servers, we have introduced limited user- configurable settings residing in the iDRAC BIOS setup screen. For more information, see the Dell PowerEdge R760 Installation and Service Manual at PowerEdge Manuals and "Advanced Thermal Control: Optimizing across Environments and Power Goals" on Dell.com.
- Cooling redundancy: The R760 allows N+1 fan redundancy, allowing continuous operation with one fan failure in the system.
- Environmental Specifications: The optimized thermal management makes the R760 reliable under a wide range of operating environments.

Acoustics

Acoustical configurations of R760

Dell PowerEdge R760 is a rack or tower server appropriate for attended data center environment. However, lower acoustical output is attainable with proper hardware or software configurations.

Table 17. Configurations tested for acoustical experience

Configuration	Quietest GPU configuration	Entry/ Quietest configuration	Typical-1, 2.5-inch	Typical-2, 3.5-inch	GPU configuration	NVMe Box
CPU TDP	125 W	125 W	165 W	165 W	205 W	300 W
CPU Quantity	2	2	2	2	2	2
RDIMM Memory	16 GB DDR5	16 GB DDR5	16 GB DDR5	32 GB DDR5	32 GB DDR5	16 GB DDR5
Memory Quantity	8	8	16	16	32	32
Backplane Type	8 x 2.5-inch BP	12x 3.5-inch BP	8 x 2.5-inch exp BP x2	12 x 3.5-inch BP + 2 x 2.5-inch rear BP	16 x 2.5-inch exp BP	24 x 2.5-inch exp BP (NVMe)
HDD Type	X	SATA 3.5-inch 4 TB	X	12 x 3.5-inch front 12 TB, 2 x 2.5-inch rear SSD	X	X
HDD Quantity	X	2	X	12 + 2	X	X
Flash Drives	PCIe SSD	X	PCIe SSD	X	PCIe SSD	PCIe SSD
Flash Quantity	8	X	8	X	16	24
PSU Type	1400 W	800 W	800 W	1400 W	2400 W	2400 W
PSU Quantity	2	2	2	2	2	2
OCP	2x10 G	2x10 G	10/25 2-port	10/25 2-port	10/25 2-port	2x25 G
PCI 1	X	H355	X	H755	X	X
PCI 2	X	X	X	X	GPU	X
PCI 3	X	X	X	X	X	X
PCI 4	X	X	2-port 25 Gb	2-port 10 Gb	2-port 25 Gb	X
PCI 5	X	X	2-port 25 Gb	2-port 10 Gb	2-port 25 Gb	100 Gb PCI

Table 17. Configurations tested for acoustical experience (continued)

Configuration	Quietest GPU configuration	Entry/ Quietest configuration	Typical-1, 2.5-inch	Typical-2, 3.5-inch	GPU configuration	NVMe Box
PCI 6	25/50 Gb	X	X	X	X	X
PCI 7	A30	X	X	X	GPU	100 Gb PCI
PCI 8	X	X	X	X	X	X
PERC	Front H755n	Adapt H355	Front H7455n	Adapt H755	Front H755n	Front H755n

Table 18. Acoustical experience of R760 configurations

Configuration		Quietest GPU configuration	Entry/ Quietest configuration	Typical-1, 2.5-inch	Typical-2, 3.5-inch	GPU configuration	NVMe Box
Acoustical Performance: Idle/ Operating @ 25°C Ambient							
$L_{wA,m}$ (B)	Idle[4]	6.5	5.1	5.5	6.4	6.9	6.8
	Operating/ Customer usage operating[5][6]	8.1	5.1	5.5	6.4	8.5	6.8
K_v (B)	Idle [4]	0.4	0.4	0.4	0.4	0.4	0.4
	Operating/ Customer usage operating[5][6]	0.4	0.4	0.4	0.4	0.4	0.4
$L_{pA,m}$ (dB)	Idle[4]	51	36	41	48	55	54
	Operating/ Customer usage operating[5][6]	69	36	41	48	74	54
Prominent discrete tones[3]		Prominence ratio ≤ 17 dB	No audible tones		Prominence ratio < 15 dB	Prominence ratio ≤ 17 dB	Prominence ratio < 15 dB
Acoustical Performance: Idle @ 28°C Ambient							
$L_{wA,m}$[1] (B)		7.3	5.4	5.9	6.7	7.3	7.1
K_v (B)		0.4	0.4	0.4	0.4	0.4	0.4
$L_{pA,m}$[2] (dB)		59	36	45	52	59	57
Acoustical Performance: Max. loading @ 35°C Ambient							
$L_{wA,m}$[1] (B)		9.0	6.0	7.0	7.8	9.0	7.8
K_v (B)		0.4	0.4	0.4	0.4	0.4	0.4
$L_{pA,m}$[2](dB)		79	44	58	66	79	65

[1]LwA, m: The declared mean A-weighted sound power level (LwA) is calculated per section 5.2 of ISO 9296 (2017) with data collected using the methods that are described in ISO 7779 (2010). Engineering data presented here may not be fully compliant with the ISO 7779 declaration requirement.

[2]LpA, m: The declared mean A-weighted emission sound pressure level is at the bystander position per section 5.3 of ISO 9296 (2017) and measured using methods that are described in ISO 7779 (2010). The system is placed in a 24U rack enclosure, 25 cm above a reflective floor. Engineering data presented here may not be fully compliant with the ISO 7779 declaration requirement.

[3]Prominent tones: Criteria of Annex D of ECMA-74 and the Prominence Ratio method of ECMA-418 are followed to determine if discrete tones are prominent and to report them, if so.

[4]Idle mode: The steady-state condition in which the server is energized but not operating any intended function.

[5]Operating mode: The maximum of the steady state acoustical output at 50% of CPU TDP or active storage drives for the respective sections of Annex C of ECMA-74.

[6] Customer Usage Operating mode: The operating mode is represented by the maximum of the steady state acoustical output at 25%~30% of CPU TDP, 2.5%~10% IOPs load, and >80% GPU load as the components showed in the above configurations.

10

Rack, rails, and cable management

Topics:

Rails and cable management information

The rail offerings for the PowerEdge R760 consist of two general types: sliding and static. The cable management offerings consist of an optional cable management arm (CMA) and an optional strain relief bar (SRB).

See the *Enterprise Systems Rail Sizing and Rack Compatibility Matrix* available at Dell site for information regarding:

- Specific details about rail types.
- Rail adjustability ranges for various rack mounting flange types.
- Rail depth with and without cable management accessories.
- Rack types that are supported for various rack mounting flange types.

Key factors governing proper rail selection include the following:

- Spacing between the front and rear mounting flanges of the rack.
- Type and location of any equipment that is mounted in the back of the rack such as power distribution units (PDUs).
- Overall depth of the rack.

Sliding rails features summary

The sliding rails allow the system to be fully extended out of the rack for service. There are two types of sliding rails available, ReadyRails II sliding rails and Stab-in/Drop-in sliding rails. The sliding rails are available with or without the optional cable management arm (CMA) or strain relief bar (SRB).

B21 ReadyRails sliding rails for 4-post racks

- Supports drop-in installation of the chassis to the rails.
- Support for tool-less installation in 19" EIA-310-E compliant square or unthreaded round hole 4-post racks including all generations of the Dell racks.
- Support for tooled installation in 19" EIA-310-E compliant threaded hole 4-post racks.
- Support full extension of the system out of the rack to allow serviceability of key internal components.
- Support for optional strain relief bar (SRB).
- Support for an optional cable management arm (CMA).

> **NOTE:** For situations where CMA support is not required, the outer CMA mounting brackets can be uninstalled from the sliding rails. This reduces the overall length of the rails and eliminates the potential interference with rear-mounted PDUs or the rear rack door.

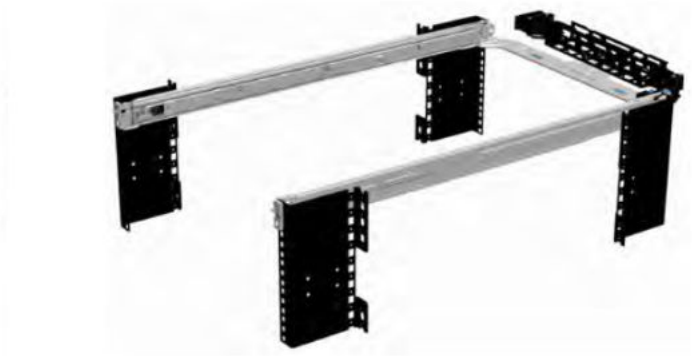

Figure 36. Sliding rails with optional CMA

Figure 37. Sliding rails with optional SRB

B22 Stab-in/Drop-in sliding rails for 4-post racks

- Supports drop-in or stab-in installation of the chassis to the rails.
- Support for tool-less installation in 19" EIA-310-E compliant square, unthreaded round hole racks including all generations of the Dell racks. Also supports tool-less installation in threaded round hole 4-post racks.
- Support for tool-less installation in Dell Titan or Titan-D racks.
- Support full extension of the system out of the rack to allow serviceability of key internal components.
- Support for an optional cable management arm (CMA).
- Support for optional strain relief bar (SRB).

NOTE: For situations where CMA support is not required, the outer CMA mounting brackets can be uninstalled from the sliding rails. This reduces the overall length of the rails and eliminates the potential interference with rear-mounted PDUs or the rear rack door.

Scan the QR code for the documentation and trouble-shooting information regarding the installation procedures for Drop-in/ Stab-in rail types.

B20 static rails summary

The static rails offer a greater adjustability range and a smaller overall mounting footprint than the sliding rails because of their reduced complexity and lack of need for CMA support. The static rails support a wider variety of racks than the sliding rails. However, they do not support serviceability in the rack and are thus not compatible with the CMA. The static rails are also not compatible with SRB.

Figure 38. Static rails

Static rails features summary

Static rails for 4-post and 2-post racks:

- Supports Stab-in installation of the chassis to the rails.
- Support tool-less installation in 19" EIA-310-E compliant square or unthreaded round hole 4-post racks including all generations of Dell racks.
- Support tooled installation in 19" EIA-310-E compliant threaded hole 4-post and 2-post racks.
- Support for tooled installation in Dell Titan or Titan-D rack.

NOTE:

- Screws are not included with the static rail kit since racks are offered with various thread types. The screws are provided for mounting static rails in racks with threaded mounting flanges.
- Screw head diameter should be 10 mm or less.

2-Post racks installation

If installing to 2-Post (Telco) racks, the ReadyRails II static rails (B20) must be used. Sliding rails support mounting in 4-post racks only.

Figure 39. Static rails in 2-post center mount configuration

Installation in the Dell Titan or Titan-D racks

For tool-less installation in Titan or Titan-D racks, the Stab-in/Drop-in sliding rails (B22) must be used. This rail collapses down sufficiently to fit in the rack with mounting flanges that are spaced about 24 inches apart from front to back. The Stab-in/Drop-in sliding rail allows bezels of the servers and storage systems to be aligned when installed in these racks. For tooled installation, Stab-in Static rails (B20) must be used for bezel alignment with storage systems.

Cable management arm (CMA)

The optional cable management arm (CMA) organizes and secures the cords and cables exiting the back of the systems. It unfolds to allow the systems to extend out of the rack without having to detach the cables. Some key features of the CMA include:

- Large U-shaped baskets to support dense cable loads.
- Open vent pattern for optimal airflow.
- Ability to mount on either side by swinging the spring-loaded brackets from one side to the other.
- Utilizes hook-and-loop straps rather than plastic tie wraps to eliminate the risk of cable damage during cycling.
- Includes a low-profile fixed tray to both support and retain the CMA in its fully closed position.
- Both the CMA and the tray mount without the use of tools by simple and intuitive snap-in designs.

NOTE: CMA is not supported in the Direct Liquid Cooling configuration.

The CMA can be mounted to either side of the sliding rails without the use of tools or the need for conversion. For systems with one power supply unit (PSU), it is recommended to mount on the side opposite to that of the power supply to allow easier access to it and the rear drives (if applicable) for service or replacement.

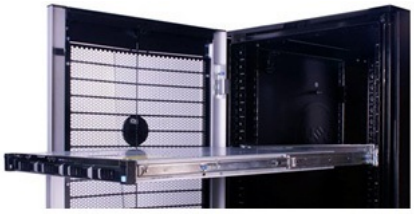

Figure 40. Sliding rails with CMA

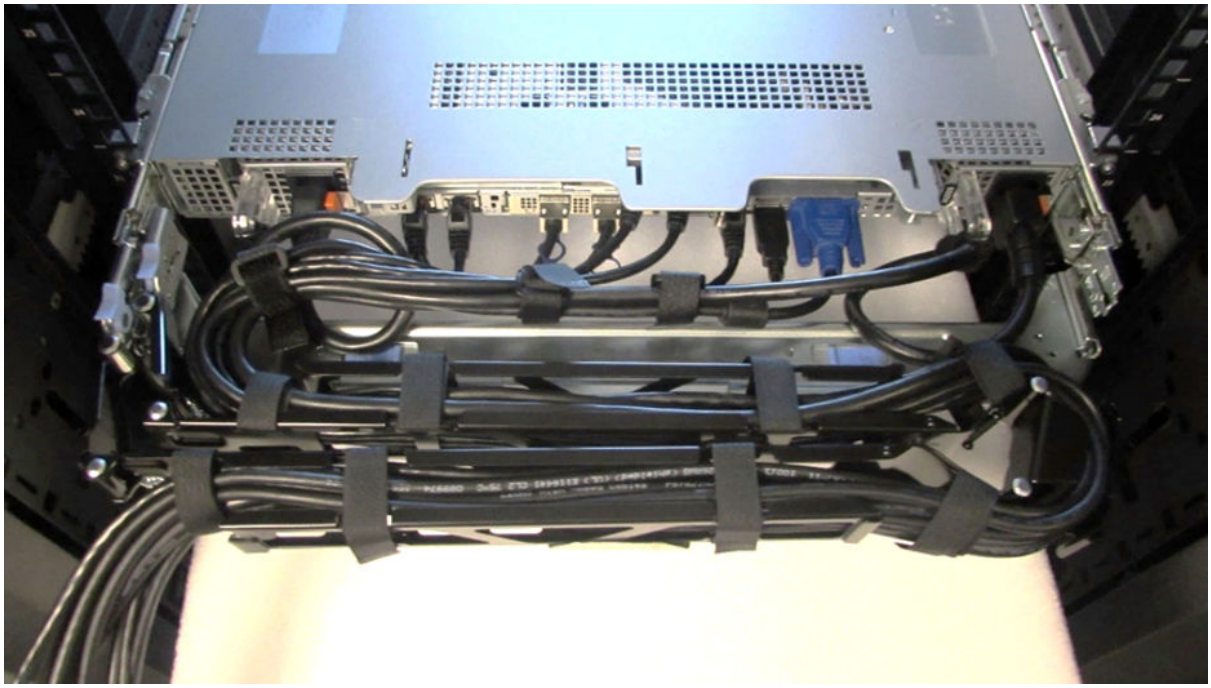

Figure 41. CMA Cabling

Strain Relief Bar (SRB)

The optional strain relief bar (SRB) for the PowerEdge R760 organizes and supports cable connections at the rear end of the server to avoid damage from bending.

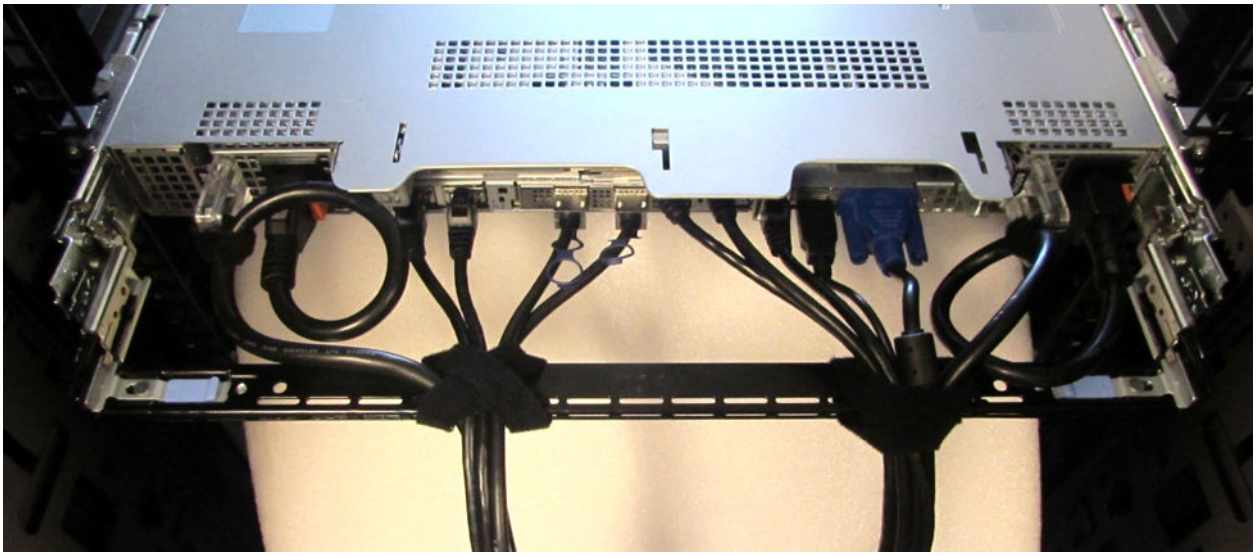

Figure 42. Cabled strain relief bar

- Tool-less attachment to the rails
- Two depth positions to accommodate various cable loads and rack depths
- Supports cable loads and controls stresses on server connectors
- Cables can be segregated into discrete purpose-specific bundles

Rack Installation

Drop-in design means that the system is installed vertically into the rails by inserting the standoffs on the sides of the system into the J-slots in the inner rail members with the rails in the fully extended position. The recommended method of installation is to first insert the rear standoffs on the system into the rear J-slots on the rails to free up a hand and then rotate the system down into the remaining J-slots while using the free hand to hold the rail against the side of the system.

Stab-in design means that the inner (chassis) rail members must first be attached to the sides of the system and then inserted into the outer (cabinet) members installed in the rack.

Installing the system into the rack (option A: Drop-In)

1. Pull the inner rails out of the rack until they lock into place.

Figure 43. Pull out inner rail

2. Locate the rear rail standoff on each side of the system and lower them into the rear J-slots on the slide assemblies.
3. Rotate the system downward until all the rail standoffs are seated in the J-slots.

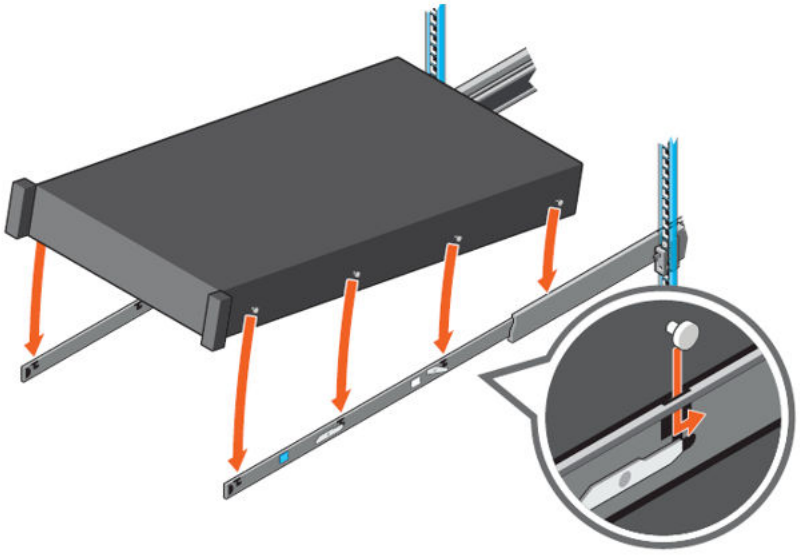

Figure 44. Rail standoffs seated in J-slots

4. Push the system inward until the lock levers click into place.
5. Pull the blue side release lock tabs forward or backward on both rails and slide the system into the rack until the system is in the rack.

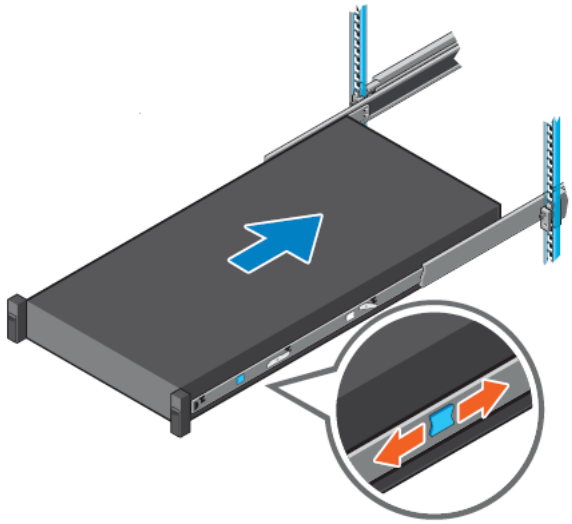

Figure 45. Slide system into the rack

Installing the system into the rack (option B: Stab-In)

1. Pull the intermediate rails out of the rack until they lock into place.
2. Release the inner rail lock by pulling forward on the white tabs and sliding the inner rail out of the intermediate rails.

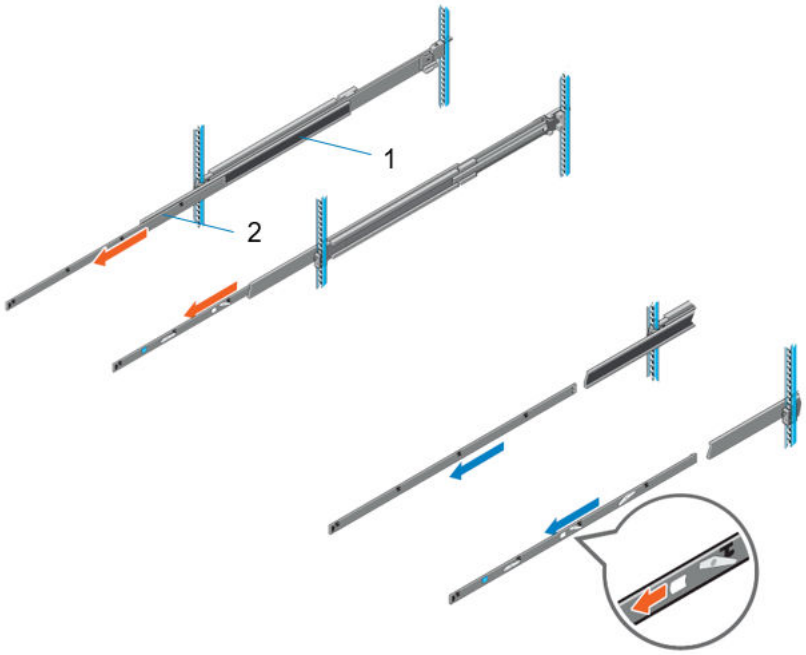

Figure 46. Pull out the intermediate rail

Table 19. Rail component label

Number	Component
1	Intermediate rail

Table 19. Rail component label (continued)

Number	Component
2	Inner rail

3. Attach the inner rails to the sides of the system by aligning the J-slots on the rail with the standoffs on the system and sliding forward on the system until they lock into place.

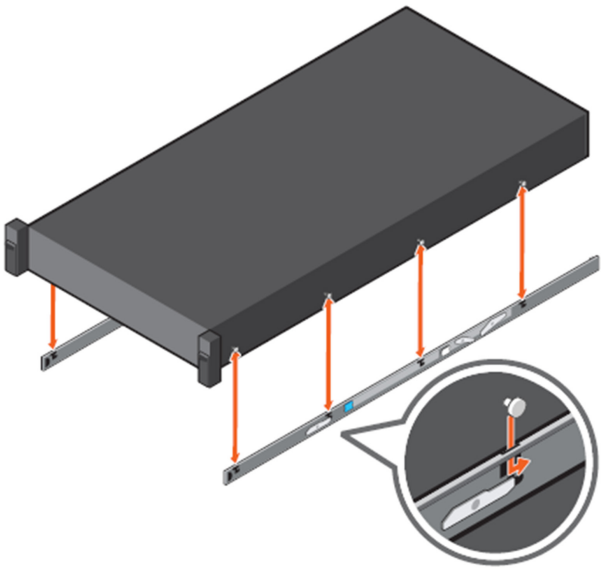

Figure 47. Attach the inner rails to the system

4. With the intermediate rails extended, install the system into the extended rails.

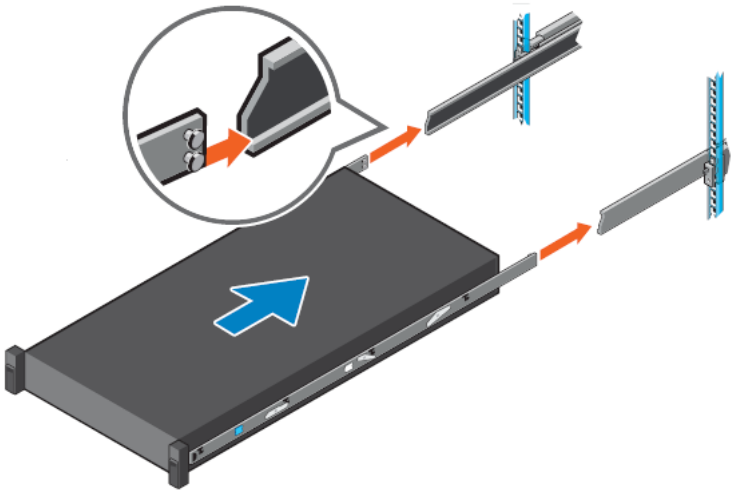

Figure 48. Install system into the extended rails

5. Pull blue slide release lock tabs forward or backward on both rails, and slide the system into the rack.

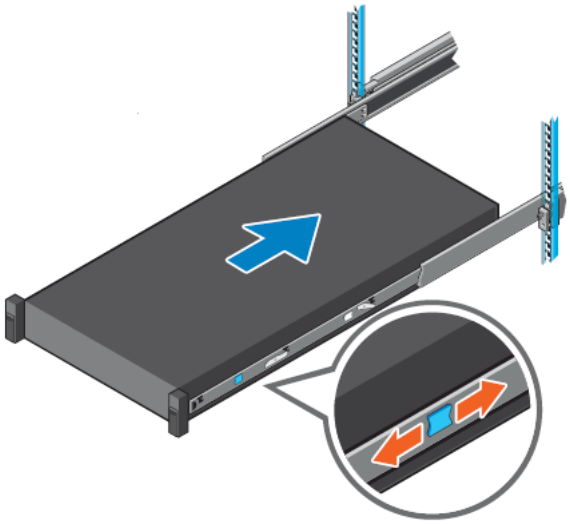

Figure 49. Slide system into the rack

11

Operating Systems and Virtualization

Topics:

- Supported Operating Systems

Supported Operating Systems

The PowerEdge system supports the following operating systems:

- Canonical® Ubuntu® Server LTS
- Microsoft® Windows Server® with Hyper-V
- Red Hat® Enterprise Linux
- SUSE® Linux Enterprise server
- VMware® ESXi®

Links to specific OS versions and editions, certification matrices, Hardware Compatibility Lists (HCL) portal, and Hypervisor support are available at Dell Enterprise Operating Systems.

12

Dell Systems Management

Dell delivers management solutions that help IT administrators effectively deploy, update, monitor, and manage IT assets. Dell solutions and tools enable you to quickly respond to problems by helping them to manage Dell servers efficiently; in physical, virtual, local, and remote environments; all without the need to install an agent in the operating system.

The OpenManage portfolio includes:

- Innovative embedded management tools - integrated Dell Remote Access Controller (iDRAC)
- Consoles - OpenManage Enterprise
- Extensible with plug-ins - OpenManage Power Manager
- Update tools - Repository Manager

Dell has developed comprehensive systems management solutions that are based on open standards and has integrated with management consoles from partners such as Microsoft and VMware, allowing advanced management of Dell servers. Dell management capabilities extend to offerings from the industry's top systems management vendors and frameworks such as Ansible, Splunk, and ServiceNow. OpenManage tools automate the full span of server life cycle management activities along with powerful RESTful APIs to script or integrate with your choice of frameworks.

For more information about the entire OpenManage portfolio, see:

- The latest Dell Systems Management Overview Guide.

Topics:

Integrated Dell Remote Access Controller (iDRAC)

iDRAC9 delivers advanced, agent-free, local and remote server administration. Embedded in every PowerEdge server, iDRAC9 provides a secure means to automate a multitude of common management tasks. Because iDRAC is embedded within every PowerEdge server, there is no additional software to install; just plug in power and network cables, and iDRAC is ready to go. Even before installing an operating system (operating system) or hypervisor, IT administrators have a complete set of server management features at their fingertips.

With iDRAC9 in-place across the Dell PowerEdge portfolio, the same IT administration techniques and tools can be applied throughout. This consistent management platform allows easy scaling of PowerEdge servers as an organization's infrastructure grows. Customers can use the iDRAC RESTful API for the latest in scalable administration methods of PowerEdge servers. With this API, iDRAC enables support for the Redfish standard and enhances it with Dell extensions to optimize at-scale management of PowerEdge servers. By having iDRAC at the core, the entire OpenManage portfolio of Systems Management tools allows every customer to tailor an effective, affordable solution for any size environment.

Zero Touch Provisioning (ZTP) is embedded in iDRAC. ZTP - Zero Touch Provisioning is Intelligent Automation Dell's agent-free management puts IT administrators in control. Once a PowerEdge server is connected to power and networking, that system can be monitored and fully managed, whether you're standing in front of the server or remotely over a network. In fact, with no need for software agents, an IT administrator can: · Monitor · Manage · Update · Troubleshoot and remediate Dell servers. With features like zero-touch deployment and provisioning, iDRAC Group Manager, and System Lockdown, iDRAC9 is purpose-built to make server administration quick and easy. For those customers whose existing management platform utilizes in-band management, Dell does provide iDRAC Service Module, a lightweight service that can interact with both iDRAC9 and the host operating system to support legacy management platforms.

When ordered with DHCP enabled from the factory, PowerEdge servers can be automatically configured when they are initially powered up and connected to your network. This process uses profile-based configurations that ensure each server is configured per your specifications. This feature requires an iDRAC Enterprise license.

iDRAC9 offers following license tiers:

Table 20. iDRAC9 license tiers

License	Description
iDRAC9 Basic	• Available only on 100-500 series rack/tower • Basic instrumentation with iDRAC web UI • For cost conscious customers that see limited value in management
iDRAC9 Express	• Default on 600+ series rack/tower, modular, and XR series • Includes all features of Basic • Expanded remote management and server life-cycle features
iDRAC9 Enterprise	• Available as an upsell on all servers • Includes all features of Basic and Express. Includes key features such as virtual console, AD/LDAP support, and more • Remote presence features with advanced, Enterprise-class, management capabilities
iDRAC9 Datacenter	• Available as an upsell on all servers • Includes all features of Basic, Express, and Enterprise. Includes key features such as telemetry streaming, Thermal Manage, automated certificate management, and more • Extended remote insight into server details, focused on high end server options, granular power, and thermal management

For a full list of iDRAC features by license tier, see Integrated Dell Remote Access Controller 9 User's Guide at Dell.com.

For more details on iDRAC9 including white papers and videos, see:

- Support for Integrated Dell Remote Access Controller 9 (iDRAC9) on the Knowledge Base page at Dell.com

Systems Management software support matrix

Table 21. Systems Management software support matrix

Categories	Features	PE mainstream
Embedded Management and In-band Services	iDRAC9 (Express, Enterprise, and Datacenter licenses)	Supported
	OpenManage Mobile	Supported
	OM Server Administrator (OMSA)	Supported
	iDRAC Service Module (iSM)	Supported
	Driver Pack	Supported
Change Management	Update Tools (Repository Manager, DSU, Catalogs)	Supported
	Server Update Utility	Supported
	Lifecycle Controller Driver Pack	Supported
	Bootable ISO	Supported
Console and Plug-ins	OpenManage Enterprise	Supported
	Power Manager Plug-in	Supported
	Update Manager Plug-in	Supported
	SupportAssist Plug-in	Supported
	CloudIQ	Supported
Integrations and connections	OM Integration with VMware Vcenter/vROps	Supported
	OM Integration with Microsoft System Center (OMIMSC)	Supported
	Integrations with Microsoft System Center and Windows Admin Center (WAC)	Supported

Table 21. Systems Management software support matrix (continued)

Categories	Features	PE mainstream
	ServiceNow	Supported
	Ansible	Supported
	Third-party Connectors (Nagios, Tivoli, Microfocus)	Supported
Security	Secure Enterprise Key Management	Supported
	Secure Component Verification	Supported
Standard operating system	Red Hat Enterprise Linux, SUSE, Windows Server 2019 or 2022, Ubuntu, CentOS	Supported (Tier-1)

13

Appendix D: Service and support

Topics:

Why attach service contracts

Dell PowerEdge servers include a standard hardware warranty that highlights our commitment to product quality by guaranteeing repair or replacement of defective components. While industry-leading, our warranties are limited to 1 or 3 years, depending on model, and do not cover software assistance. Call records show that customers are most often seeking Dell technical support for software related issues like configuration guidance, troubleshooting, upgrade assistance or performance tuning. Encourage customers to purchase ProSupport service contracts to supplement warranty coverage and ensure optimal support for both hardware and software. ProSupport provides a complete hardware guarantee beyond the original warranty period.

ProSupport Infrastructure Suite

ProSupport Infrastructure Suite is a set of support services that enable customers to build the solution that is right for their organization. It is an industry-leading, enterprise-class support that aligns with the criticality of your systems, the complexity of your environment, and the allocation of your IT resources.

Figure 50. ProSupport Enterprise Suite

	Basic Hardware Support	ProSupport	BEST ProSupport Plus
Customer Advocacy *via assigned Services Account Manager* ⓘ			
Benefit from personalized services assistance that aligns with your business goals.			✓
Stay ahead of challenges with actionable insights gained through comprehensive service intelligence.			✓
Experience fast critical issue resolution through coordinated team response and executive escalation paths.			✓
Ensure **coverage continuity** by planning effectively for technology lifecycle transitions.			✓
Proactive Monitoring & Actionable Insights *via Dell's connectivity solutions and tools*			
Quickly visualize performance through a current system health score		✓	✓
Cybersecurity monitoring and mitigation recommendations provide another layer of protection		✓	✓
Predictive performance and capacity analysis address bottlenecks		✓	✓
Prevent or plan for downtime with predictive hardware anomaly detection		✓	✓
Energy consumption and carbon footprint forecasting support sustainability and stewardship initiatives		✓	✓
Get ahead of problems with proactive issue detection with automated case creation	✓	✓	✓
Streamline internal IT efforts with efficient service request and escalation management tools	✓	✓	✓
Minimize disruptions by self-dispatching eligible parts	✓	✓	✓
Support Essentials			
Keep systems code current and performing at peak through Proactive System Maintenance			✓
Count on Mission Critical Support during Sev 1 incidents and natural disasters ⓘ			✓
Enjoy priority access to senior technical support engineers			✓
Bringing your own software? We provide limited 3rd party software support ⓘ			✓
Choose onsite parts delivery and labor response that meets your needs	Next Business Day	NBD or 4-hour	4-hour
Select product coverage that best augments your internal resources	Hardware	Hardware & Software	Hardware & Software
Have an issue? We are here for you by phone, chat and online	Local business hours	24/7/365	24/7/365

ProSupport Plus for Infrastructure

ProSupport Plus for Infrastructure is the ultimate solution for customers seeking preventative maintenance and optimal performance on their business-critical assets. The service caters to customers who require proactive, predictive, and personalized support for systems that manage critical business applications and workloads. When customers purchase PowerEdge server, we recommend ProSupport Plus, our proactive and preventative support service for business-critical systems. ProSupport Plus provides all the benefits of ProSupport, including the following "Top five reasons to buy ProSupport Plus (PSP)"

1. **Priority access to specialized support experts:** Immediate advanced troubleshooting from an engineer that understands Dell infrastructure solutions.
2. **Mission Critical Support:** When critical (Severity 1) support issues happen, the customer is assured that we do all that we can to get them back up and running as quickly as possible.
3. **Service Account Manager:** A customer's #1 support advocate, ensuring they get the best possible proactive and predictive support experience.
4. **Systems maintenance:** On a semiannual basis, we will keep a customer's ProSupport Plus system(s) up to date by installing the latest firmware, BIOS, and driver updates to improve performance and availability.
5. **Third-party software support:** Dell is a customer's single point of accountability for any eligible third-party software that is installed on their ProSupport Plus system, whether they purchased the software from us or not.

ProSupport for Infrastructure

Comprehensive 24x7 support for hardware and software – best for production, but not critical, workloads and applications. The ProSupport service offers highly trained experts around the clock and around the globe to address IT needs. We help minimize disruptions and maximize availability of PowerEdge server workloads with:

- 24x7 support through phone, chat and online
- A central point of accountability for all hardware and software issues
- Hypervisor, operating system, and application support
- Dell security advisories
- Onsite response service levels 4 hour or Next Business Day options

- Proactive issue detection with automated case creation
- Predictive hardware anomaly detection
- Incident Manager assigned for Severity 1 cases
- Collaborative third-party support
- Access to AIOps Platforms - (MyService360, TechDirect, and CloudIQ)
- Consistent experience regardless of where customers are located or what language that they speak.

Basic Hardware Support

Provides reactive hardware support during normal business hours, excluding local national holidays. No software support or software-related guidance. For improved levels of support, choose ProSupport or ProSupport Plus.

Specialty Support Services

Optional specialty support services complement the ProSupport Infrastructure Suite to provide additional proficiencies that are critical for modern data center operations.

Hardware coverage add-ons to ProSupport

- **Keep Your Hard Drive (KYHD), Keep Your Component (KYC), or Keep Your GPU (KYGPU):**

  Normally if a device fails under warranty, Dell replaces it using a one-for-one exchange process.KYHD/KYCC/KYGPU gives you the option to retain your device. It provides full control of sensitive data and minimizes security risk by letting you retain possession of failed drives, components, or GPU when receiving replacement parts without incurring additional cost.
- **Onsite Diagnosis Service:**

  Ideal for sites with non-technical staff. Dell field technician performs initial troubleshooting diagnosis onsite and transfers to Dell remote engineers to resolve the issue.
- **ProSupport Add-on for HPC:**

  Sold as an add-on to a ProSupport service contract, the ProSupport Add-on for HPC provides solution-aware support to cover the additional requirements that are required to maintain an HPC environment such as:

  - Access to senior HPC experts
  - Advanced HPC cluster assistance: Performance, interoperability, and configuration
  - Enhanced HPC solution level end-to-end support
  - Remote pre-support engagement with HPC Specialists during ProDeploy implementation
- **ProSupport Add-on for Telco (Respond & Restore):**

  An add-on service designed for the top 31 TELCO customers globally, Respond & Restore provides direct access to Dell solution experts who specialize in TELCO carrier-grade support. This add-on also provides a hardware uptime guarantee, meaning if a system fails, Dell has it installed and operational within 4 hours for Severity 1 issues. Dell incurs penalties and fees if SLAs are not met.

Personalized Support and Supplemental Site-wide Expertise

- **Technical Account Manager:**

  Designated technology lead who monitors and manages the performance and configuration of specific technology sets.
- **Designated Remote Support:**

  Personalized support expert who manages all troubleshooting and resolution of IT assets.
- **Multivendor Support Service:**

  Support your third-party devices as one service plan for servers, storage, and networking (includes coverage for: Broadcom, Cisco, Fujitsu, HPE, Hitachi, Huawei, IBM, Lenovo, NetApp, Oracle, Quanta, SuperMicro and others).

Services for large enterprises

- **ProSupport One for Data Center:**

  ProSupport One for Data Center offers flexible site-wide support for large and distributed data centers with more than 1,000 assets (combined total of server, storage, networking, so forth). This offering is built on standard ProSupport features that leverage our global scale and are tailored to specific customer needs. While not for everyone, this service option offers a truly unique solution for our largest customers with the most complex environments.

  - Team of assigned Services Account Managers with remote or onsite options
  - Assigned technical and field engineers who are trained on the customer's environment and configurations.
  - On-demand reporting and recommendations that are enabled by ProSupport AIOps tools (MyService360, TechDirect, and CloudIQ)
  - Flexible onsite support and parts options that fit their operational model
  - A tailored support plan and training for their operations staff
- **ProSupport One for CSPs (Cloud Serviced Providers)**

  ProSupport One for CSPs is a unique offer that is designed for a limited set of Dell accounts purchasing Gen AI computing solutions greater than 1,000 servers and $250M in sales. PS1 for CSPs improves the entire services experience combining support, deployment (rack integration), residency services, a designated support engineer and the LOIS parts locker as one holistic bundle. Special pricing has been determined to compete effectively against competitors and provide the best customer experience. PS1 for CSPs can only be sold with XE Servers and all networking platforms (Dell and NVIDIA). All other products would be eligible for the standard PS1DC not this special bundle offer. More details on PS1 for CSPs here.
- **Logistics Online Inventory Solution (LOIS)**

  Ideal for large organizations that have their own staff to support their data center. Dell offers a service that is called Logistics Online Inventory Solution which is an onsite parts locker that provides self-maintainers with a local inventory of common replacement components. Having access to these parts lockers allows the self-maintainer to replace a failed component immediately without delay. Each replacement part would automatically initiate a replenishment of the parts inventory that is shipped the next day or delivered onsite by Dell during a regular scheduled visit (called Scheduled Onsite Service). As part of the LOIS system, customers can integrate their systems directly to Dell TechDirect using APIs to help streamline the support management process.

End-of-Life Services

- **Post Standard Support (PSS)**

  Extend service life beyond the initial seven years of ProSupport, adding up to five more additional years of hardware coverage.
- **Data Sanitization & Data Destruction**

  Renders data unrecoverable on repurposed or retired products, ensuring security of sensitive data and enabling compliance and provides NIST-compliant certification.
- **Asset Recovery Services**

  Recycle, resale, and disposal of hardware. Helps you securely and responsibly retire IT assets that are no longer needed while protecting both your business and the planet.

ProDeploy Infrastructure Suite

ProDeploy Infrastructure Suite provides various deployment offerings that satisfy a customer's unique needs. It is made up of various sub-offers: Factory Configuration Services, Rack Integration, Basic Deployment, ProDeploy, ProDeploy Plus, and optionally ProDeploy FLEX which allows for some customization of the features listed.

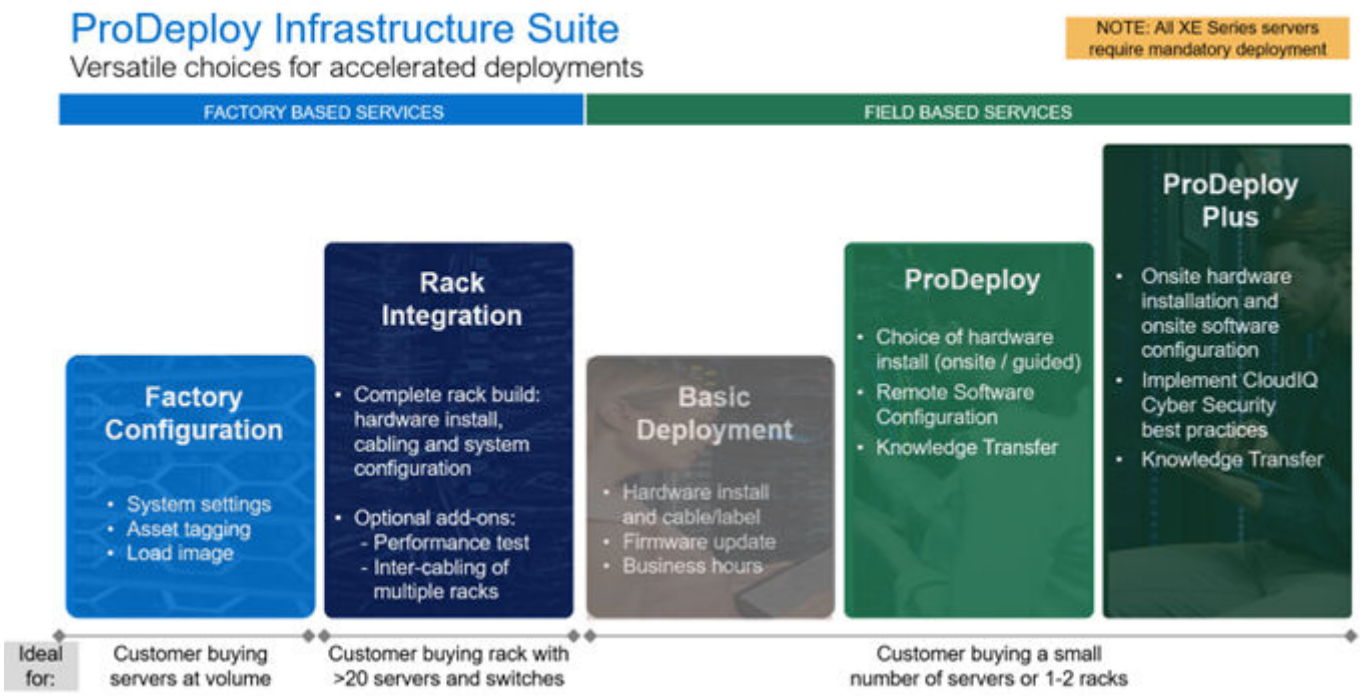

Figure 51. ProDeploy Infrastructure Suite

Factory-based Services

Pre-configured systems or complete racks, customized prior to shipping to the customer's site.

Rack Integration or ProDeploy FLEX Rack Integration

Ideal for customers buying servers in volume and seeking pre-configuration prior to shipping such as: custom image, system settings, and asset tagging so it arrives ready to use out of the box. Furthermore, servers are packaged and bundled to meet specific shipping and distribution requirements for each customer location to facilitate the rollout process. Once the server is onsite, Dell can install and configure the server to the environment using any of the field-based deployment services outlined in the next section.

- STANDARD SKUs for Rack Integration is available in then USA only and requires:
  - 20 or more devices (XE, R and C series servers, VxRail and all Dell or non-Dell switches).
  - Shipping to contiguous USA.
- USE CUSTOM QUOTE for Rack Integration scenarios that require:
  - Any Direct Liquid Cooling (DLC) implementation
  - Shipping to multiple locations or shipment to any country outside USA or shipping outside contiguous USA
  - Air-cooled racks containing less than 20 servers
  - Any rack that includes Storage

Factory Configuration

Ideal for customers buying servers in volume and seeking pre-configuration prior to shipping such as: custom image, system settings, and asset tagging so it arrives ready to use out of the box. Furthermore, servers are packaged and bundled to meet specific shipping and distribution requirements for each customer location to facilitate the rollout process. Once the server is onsite, Dell can install and configure the server to the environment using any of the field-based deployment services outlined in the next section.

ProDeploy Flex | Modular deployment (built in factory, onsite or remote)

Pre -deployment	Single point of contact for project management	●
	Expanded end-to-end project management	Selectable
	Site readiness review and implementation planning	●
Deployment	Deployment service hours	24/7
	Hardware installation options [1]	Onsite, factory[2,5] or remote[3]
	System software installation and configuration options [1]	Onsite, factory[2,5] or remote[3]
	Multivendor networking deployment [4]	Onsite, factory[2,5] or remote[3]
	Onsite Deployment in remote locations	Selectable
	Onsite Deployment in challenging environments	Selectable
	Onsite Deployment with special site-based protocols or requirements	Selectable
	Install connectivity software based on Secure Connect Gateway technology	●
	Dell NativeEdge Orchestrator deployment	Selectable
	Configure 3rd party software applications and workloads [4]	Selectable
Post -deployment	Deployment verification, documentation, and knowledge transfer	●
	Configuration data transfer to Dell support	●
Online collaboration	Online collaborative environment - Planning, managing and tracking delivery process	●

[1] Hardware and Software delivery methods can be independently chosen; selecting Rack integration for software requires hardware Rack integration to also be selected.
[2] Factory Rack Integration for server and VxRail; includes associated Dell network switches; final onsite rack installation available.
[3] Remote hardware option includes project specific instructions, documentation and live expert guidance for hardware installation.
[4] Select 3rd party multivendor networking and software applications.
[5] Pair with Field Onsite Hardware service for final installation.

Figure 52. ProDeploy Flex modular services

Field-based services

Put PowerEdge servers to work faster with Dell field-based deployment services. Whether we are deploying one server to one thousand – we have you covered. Dell provides versatile delivery options to fit every budget and operating model.

- **ProDeploy Plus:** Elevate Infrastructure deployments with our most complete service from planning through onsite hardware installation and software configuration including the implementation of cybersecurity best practices. ProDeploy Plus provides the skill and scale that is needed to successfully execute demanding deployments in today's complex IT environments. The deployment starts with a site readiness review and implementation plan. Certified deployment experts perform the software configuration to include setup of leading operating systems and hypervisors. Dell will also configure PowerEdge software tools to include iDRAC and OpenManage system utilities as well as support AIOps platforms: MyService360, TechDirect, and CloudIQ. Unique to ProDeploy Plus, the cybersecurity implementation helps customers understand potential security risks and make recommendations for reducing product attack surfaces. The system is tested, validated prior to completion. The customer will also receive full project documentation and knowledge transfer to complete the process.
- **ProDeploy:** ProDeploy provides remote software configuration and choice of hardware installation (onsite or guided). ProDeploy is great for customers who are price sensitive or willing to participate in some portion of the deployment to include providing remote access to their network. The ProDeploy remote software includes everything mentioned in ProDeploy Plus except it does not include the added value, cybersecurity implementation, and implementatiod best practices.
- **Basic Deployment:** Basic Deployment delivers worry-free professional installation by experienced technicians. This service is often sold to Competency Enabled Partners who will have Dell do the hardware installation while they complete the software configuration. Furthermore, Basic Deployment tends to be purchased by large enterprises who have smart technical staff. These companies just need Dell to install the hardware, and they will perform the software configuration. The last use case for Basic Deployment is when paired with Factory Configuration services. The servers are preconfigured in the factory, and the basic deployment service will install the system into the rack to finalize the deployment.

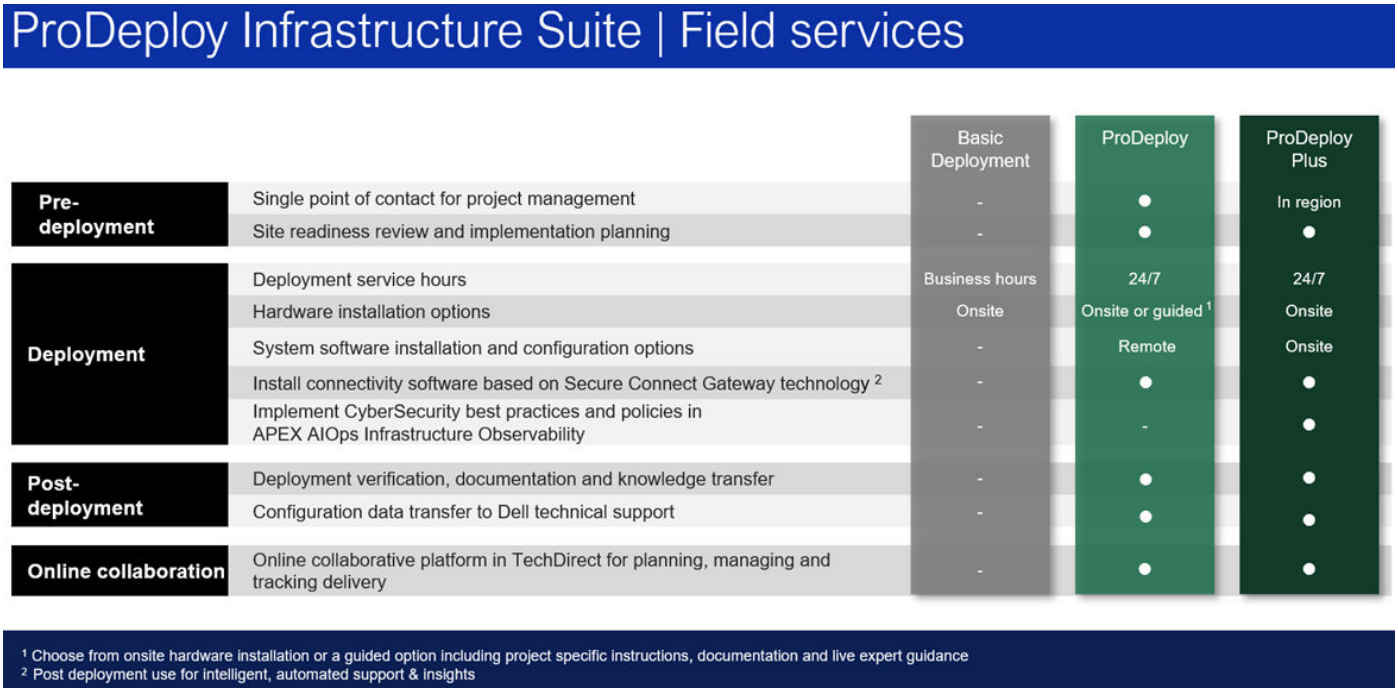

Figure 53. ProDeploy Infrastructure Suite - Field services

Supplemental Deployment Services

Additional ways to expand scope or deploy for unique scenarios.

Two Host Adder (requires PD/PDP)

Deploying new storage, compute, or networking devices may require interconnection to other servers (also called hosts). The Dell delivery team will set up four hosts per device as part of every ProDeploy service. For example, if the customer is buying two storage arrays the ProDeploy service will automatically include connectivity of four hosts each (4x2=8 total hosts per project since there are two devices). This supplemental "Two Host Adder" service provides for the configuration of additional hosts above what is already provided as part of the ProDeploy service. In many cases, customers can work with us while we set up the included hosts, so they may understand how to do the rest themselves. Always ask the customer how many hosts are being connected and sell the host adder depending on the customer's technology skillset. Note that this service applies to the connectivity of Dell devices not 3rd party devices.

Additional Deployment Services (ADT) – sold with or without PD/PDP

You can expand the scope of a ProDeploy engagement leveraging Additional Deployment Time (ADT). ADT covers additional tasks above the normal deliverables of the ProDeploy offers. ADT can also be used as a standalone service without ProDeploy. SKUs are available for both Project Management and Technical Resource Expertise. SKUs are sold as blocks of four hours remote or eight hours onsite. The delivery team can help in scoping the number of hours required for additional tasks.

Data Migration Services

Migrating data sets is no easy task. Our experts use proven tools and process to streamline data migrations and avoid compromising data. A customer project manager works with our experienced team of experts to create a migration plan. Data migration is part of every technology upgrade, platform change, and shift to the cloud. You can rely on Dell data migration services to perform a seamless transition.

Residency Services

Certified technical professionals act like an extension of your IT staff to enhance internal capabilities and resources and help you realize faster adoption and maximized ROI of new technology. Residency Services help customers transition to new capabilities quickly by leveraging specific technology skill sets. Residency experts can provide post implementation management and knowledge transfer that is related to a new technology acquisition or day-to-day operational management of the IT infrastructure.

- Global experts available to serve in-person (onsite) or virtual (remote)
- Engagements starting at 2 weeks with flexibility to adjust
- Residency is available for project management needs, and many different technology skills sets such as: Server, storage, Gen AI, networking, security, multi-cloud, data mgmt., and modern workforce application residents

Unique Deployment Scenarios

Custom Deployment Services

When a deployment is beyond the scope of the ProDeploy Infrastructure Suite, you can turn to the custom deployment services team to address complex implementation scenarios and customer unique requirements. The Dell custom deployment team is staffed with solution architects who will assist with customer scoping calls to define the project and develop the statement of work. Custom services can handle a wide range of deployments that can be performed in the factory or onsite. All custom engagement services are requested through SFDC.

Deployment of AI or HPC

Dell provides a number of deploy options for Artificial Intelligence (AI) or High-Performance Computing (HPC) implementations. These complex environments require specialists that understand advanced feature sets. Dell deploys and understands the complexities to optimize the environment. AI and HPC deployments are always scoped as custom service engagements.

Deployment choices for cluster implementation

Approaches, Best Practices, and Key Considerations

Custom deploy	IRSS 7000 Solution (Product Design) + Choose one	GOOD	BETTER	BEST
Scope	**Rack Integration Services**	**Baseline Cluster Configuration**	**Custom Deploy of Fabric and Cluster**	**Design AI Strategy & Deploy Cluster**
Factory rack build, cabling & cooling	●	Rack arrives from factory	Rack arrives from factory	Rack arrives from factory
Configure devices per requirement	●			
Rack ship & select testing onsite	●			
80 hours consulting to define workload strategy & design network				●
Onsite Infrastructure Assessment			●	●
Review system design and plan		●	●	●
Configure servers and switches		●	●	●
Inter-rack cabling and labeling			●	●
Liquid connectivity and leak test[1]			●	●
Cluster Configuration		●	●	●
Cluster acceptance testing		●	●	●
Ideal for	Customers seeking fully integrated racks and will configure the cluster themselves	Customers who will do inter-rack cabling and need assistance with configuration and testing of cluster	Customers who have a solid AI strategy and will outsource the entire implementation to Dell	Customers seeking design strategy for GPU optimization, scaling, and connectivity with full deployment

Figure 54. Deployment choices for cluster implementation

DAY 2 – Automation Services with Ansible

Dell solutions are built as “automation ready” with integrated APIs (Application Programming Interfaces) to allow customers to programmatically call actions on the product through code. Although Dell has published Anisble automation use cases,

some customers need additional assistance with GitOps. By the end of the service, the customer will have the foundational components required to accelerate automation and understand how the programming works together: Day 1 and Day 2 use case automation scripts (ansible modules), CI/CD tool (Jenkins), and Version control (Git).

Dell Technologies Consulting Services

Our expert consultants help customers transform faster, and quickly achieve business outcomes for the high-value workloads Dell PowerEdge systems can handle. From strategy to full-scale implementation, Dell Technologies Consulting can help determine how to perform IT, workforce, or application transformation. We use prescriptive approaches and proven methodologies that are combined with the portfolio and partner ecosystem of Dell Technologies to help achieve real business outcomes. From multicloud, applications, DevOps, and infrastructure transformations, to business resiliency, data center modernization, analytics, workforce collaboration, and user experiences-we are here to help.

Dell Managed Services

Some customers prefer Dell to manage the complexity and risk of daily IT operations, Dell Managed Services utilizes proactive, AI enabled delivery operations and modern automation to help customers realize desired business outcomes from their infrastructure investments. With these technologies, our experts run, update, and fine-tune customer environments that are aligned with service levels, while providing environment-wide and down-to-the-device visibility. There are two types of managed service offers. First the outsourcing model or CAPEX model where Dell manages the customer owned assets using our people and tools. The second is the as-a-Service model or OPEX model called APEX. In this service, Dell owns all technology and all the management of it. Many customers will have a blend of the two management types depending on the goals of the organization.

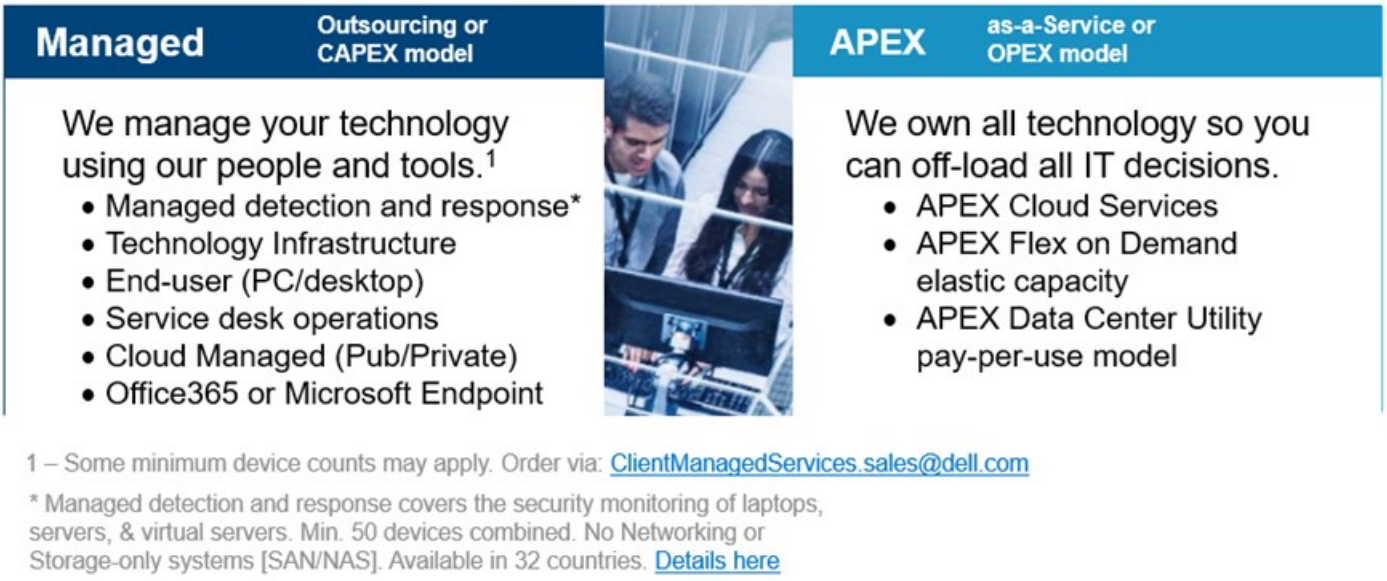

Figure 55. Dell Managed Services

Managed Detection and Response (MDR)

Dell Technologies Managed Detection and Response (MDR) is powered by Secureworks Taegis XDR software platform. MDR is a managed service that secures the customer's IT environment against malicious actors and provides remediation if and when a threat is identified. When a customer purchases MDR, they will receive the following features from our team:

- Dell badge resources
- Agent rollout assistance to help deploy the Secureworks Endpoint Agent
- 24x7 threat detection and investigation
- Up to 40 hrs per quarter of response and active remediation activities
- If the customer experiences a breach, we will provide up to 40 hrs per year of Cyber incident response initiation
- Quarterly reviews with the customer to review the data

Dell Technologies Education Services

Build the IT skills required to influence the transformational outcomes of the business. Enable talent and empower teams with the right skills to lead and perform transformational strategy that drives competitive advantage. Leverage the training and certification that is required for real transformation.

Dell Technologies Education Services offers PowerEdge server training and certifications that are designed to help customers achieve more from their hardware investment. The curriculum delivers the information and the practical, firsthand skills that their team must confidently install, configure, manage, and troubleshoot Dell servers.

To learn more or register for a class today, see Education.Dell.com.

Resources

Service for powerEdge

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Appendix A: Additional specifications

Topics:

Chassis dimension

The R760 has the following dimensions:

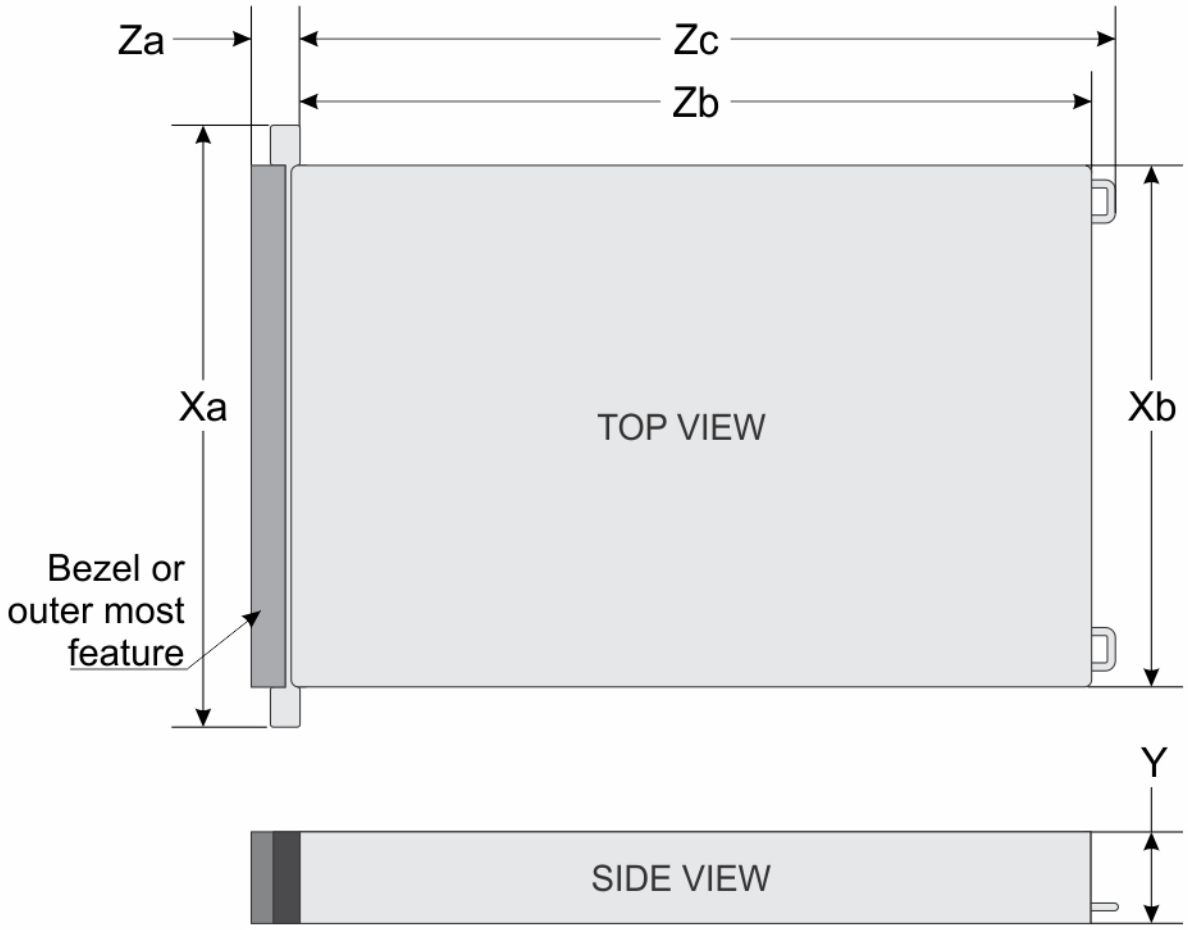

Figure 56. Chassis dimensions

Table 22. Chassis dimensions

Model number	Xa	Xb	Y	Za with bezel	Za without bezel	Zb	Zc	Max Sys Wgt	Chassis
R760	482 mm	434 mm	86.8 mm	35.84 mm	22 mm	700.7 mm	736.29 mm	36.1 kg	2U

Chassis weight

Table 23. Chassis weight

System Configuration	Maximum Weight
A server with fully populated drives	36.1 kg (79.58 lbs)
A server without drives and PSU installed	25.1 kg (55.33 lbs)

NIC port specifications

The PowerEdge R760 system supports up to two Network Interface Controller (NIC) ports embedded on the LAN on Motherboard (LOM) card and up to four ports integrated on the Open Compute Project (OCP) NIC card.

Table 24. NIC port specification for the system

Feature	Specifications
LOM card (optional)	1 GbE x 2
OCP NIC card (OCP NIC 3.0) (optional)	1GbE x 4, 10 GbE x 2, 10 GbE x 4, 25 GbE x 2, 25 GbE x 4, 100GbE x 2
Management Interface Card (MIC) to support Dell Data Processing Unit (DPU) card (optional)	25 GbE x 2, 100 GbE x 2 or 200 GbE x 2

NOTE: The system allows either LOM card or an OCP NIC card or both to be installed in the system.

NOTE: On the MS system board, the supported OCP NIC PCIe width is x8; when x16 PCIe width is installed, it is downgraded to x8.

NOTE: A 100 GbE OCP NIC card of PCIe width x16 can be used by connecting the OCP NIC cable from SL11_CPU1_PB7 to SL13_CPU1_PB7 on the MAX system board.

NOTE: For storage configurations that already use the SL11_CPU1_PB7 or SL13_CPU1_PB7 connector on the Max system board, there is a restriction on supporting OCP NIC cable.

NOTE: The system allows either LOM card or MIC card to be installed in the system.

Video specifications

The PowerEdge R760 system supports integrated Matrox G200 graphics controller with 16 MB of video frame buffer.

Table 25. Video specifications for R760

Resolution	Refresh rate (Hz)	Color depth (bits)
1024 x 768	60	8, 16, 32
1280 x 800	60	8, 16, 32
1280 x 1024	60	8, 16, 32

Table 25. Video specifications for R760 (continued)

Resolution	Refresh rate (Hz)	Color depth (bits)
1360 x 768	60	8, 16, 32
1440 x 900	60	8, 16, 32
1600 x 900	60	8, 16, 32
1600 x 1200	60	8, 16, 32
1680 x 1050	60	8, 16, 32
1920 x 1080	60	8, 16, 32
1920 x 1200	60	8, 16, 32

USB Ports

Figure 57. Front USB Port

Figure 58. Rear USB Port

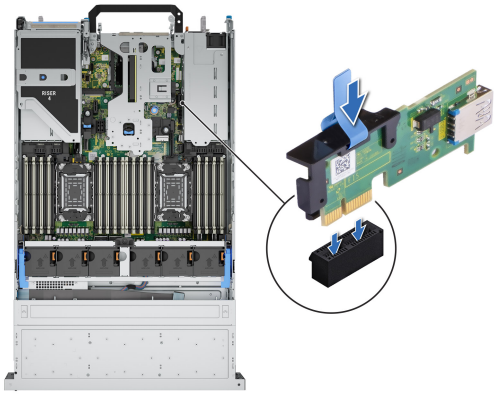

Figure 59. Internal USB Port

Table 26. Systems USB Specifications

Front		Rear		Internal	
USB port type	No. of ports	USB port type	No. of ports	USB port type	No. of ports
USB x.2.0 – compliant port	1	USB x.2.0 – compliant port	1	USB x.3.0 – compliant port	1
		USB x.3.0 – compliant port	1		

PSU rating

Below table lists the power capacity of the PSUs in high/low line operation mode.

Table 27. PSUs highline and lowline ratings

PSU	700 W Titanium	800 W Platinum	1100 W Titanium	1100 W -48 VDC	1400 W Platinum	1400 W Titanium	1800 W Titanium	2400 W Platinum	2800 W Titanium	3200 W Titanium
Peak Power (Highline /-72 VDC)	1190 W	1360 W	1870 W	1360 W	2380 W	2380 W	3060 W	4080 W	4760 W	5440 W
Highline /-72 VDC	700 W	800 W	1100 W	1100 W	1400 W	1400 W	1800 W	2400 W	2800 W	3200 W
Peak Power (Lowline /-40 VDC)	N/A	1360 W	1785 W	1785 W	1785 W	1785 W	N/A	2380 W	N/A	N/A
Lowline/ -40 VDC	N/A	800 W	1050 W	1100 W	1050 W	1050 W	N/A	1400 W	N/A	N/A
Highline 240 VDC	700 W	800 W	1100 W	N/A	1400 W	1400 W	1800 W	2400 W	2800 W	3200 W
DC-(48—60) V	N/A	N/A	N/A	1100 W	N/A	N/A	N/A	N/A	N/A	N/A

The PowerEdge R760 supports up to two AC power supplies with 1+1 redundancy, autosensing, and auto switching capability.

If two PSUs are present during POST, a comparison is made between the wattage capacities of the PSUs. In case the PSU wattages do not match, the larger of the two PSUs is enabled. Also, there is a PSU mismatch warning that is displayed in the BIOS, iDRAC, or on the system LCD.

If a second PSU is added at run-time, in order for that particular PSU to be enabled, the wattage capacity of the first PSU must equal the second PSU. Otherwise, the PSU is flagged as unmatched in iDRAC and the second PSU is not enabled.

Dell PSUs have achieved Platinum efficiency levels as shown in the table below.

Table 28. PSU efficiency level

Efficiency Targets by Load						
Form factor	**Output**	**Class**	**10%**	**20%**	**50%**	**100%**
Redundant 60 mm	700 W AC	Titanium	90.00%	94.00%	96.00%	91.50%
	800 W AC	Platinum	89.00%	93.00%	94.00%	91.50%

Table 28. PSU efficiency level (continued)

Efficiency Targets by Load						
Form factor	**Output**	**Class**	**10%**	**20%**	**50%**	**100%**
	1100 W AC	Titanium	90.00%	94.00%	96.00%	91.50%
	1100 W -48 V DC	N/A	85.00%	90.00%	92.00%	90.00%
	1400 W AC	Platinum	89.00%	93.00%	94.00%	91.50%
	1400 W AC	Titanium	90.00%	94.00%	96.00%	91.50%
	1800 W AC	Titanium	90.00%	94.00%	96.00%	94.00%
Redundant 86 mm	2400 W AC	Platinum	89.00%	93.00%	94.00%	91.50%
	2800 W AC	Titanium	90.00%	94.00%	96.00%	94%
	3200 W AC	Titanium	90.00%	94.00%	96.00%	91%

Environmental specifications

NOTE: For additional information about environmental certifications, refer to the *Product Environmental Datasheet* located with the *Documentation* on Dell Support.

Table 29. Continuous Operation Specifications for ASHRAE A2

Temperature	Specifications
Allowable continuous operations	
Temperature range for altitudes <= 900 m (<= 2953 ft)	10–35°C (50–95°F) with no direct sunlight on the equipment
Humidity percent range (non-condensing at all times)	8% RH with -12°C (10.4°F) minimum dew point to 80% RH with 21°C (69.8°F) maximum dew point
Operational altitude de-rating	Maximum temperature is reduced by 1°C/300 m (1.8°F/984 Ft) above 900 m (2953 Ft)

Table 30. Continuous Operation Specifications for ASHRAE A3

Temperature	Specifications	
Allowable continuous operations		
Temperature range for altitudes <= 900 m (<= 2953 ft)	5–40°C (41–104°F) with no direct sunlight on the equipment	
	Excursion Limited Operation	5-35°C (41-95°F) Continuous Operation
		35-40°C (95-104°F) 10% Annual Runtime
Humidity percent range (non-condensing at all times)	8% RH with -12°C (10.4°F) minimum dew point to 85% RH with 24°C (75.2°F) maximum dew point	
Operational altitude de-rating	Maximum temperature is reduced by 1°C/175 m (1.8°F/574 Ft) above 900 m (2953 Ft)	

Table 31. Continuous Operation Specifications for ASHRAE A4

Temperature	Specifications
Allowable continuous operations	

Table 31. Continuous Operation Specifications for ASHRAE A4 (continued)

Temperature	Specifications	
Temperature range for altitudes <= 900 m (<= 2953 ft)	5–45°C (41–113°F) with no direct sunlight on the equipment	
	Excursion Limited Operation	5-35°C (41-95°F) Continuous Operation
		35-40°C (95-104°F) 10% Annual Runtime
		40-45°C (104-113°F) 1% Annual Runtime
Humidity percent range (non-condensing at all times)	8% RH with -12°C (10.4°F) minimum dew point to 90% RH with 24°C (75.2°F) maximum dew point	
Operational altitude de-rating	Maximum temperature is reduced by 1°C/125 m (1.8°F/410 Ft) above 900 m (2953 Ft)	

Table 32. Common Environmental Specifications for ASHRAE A2, A3 and A4

Temperature	Specifications
Allowable continuous operations	
Maximum temperature gradient (applies to both operation and non-operation)	20°C in an hour* (36°F in an hour) and 5°C in 15 minutes (9°F in 15 minutes), 5°C in an hour* (9°F in an hour) for tape hardware **NOTE:** * - Per ASHRAE thermal guidelines for tape hardware, these are not instantaneous rates of temperature change.
Non-operational temperature limits	-40 to 65°C (-40 to 149°F)
Non-operational humidity limits	5% to 95% RH with 27°C (80.6°F) maximum dew point
Maximum non-operational altitude	12,000 meters (39,370 feet)
Maximum operational altitude	3,050 meters (10,006 feet)

Table 33. Maximum vibration specifications

Maximum vibration	Specifications
Operating	0.21 G_{rms} at 5 Hz to 500 Hz for 10 minutes (all operation orientations)
Storage	1.88 G_{rms} at 10 Hz to 500 Hz for 15 minutes (all six sides tested)

Table 34. Maximum shock pulse specifications

Maximum shock pulse	Specifications
Operating	Six consecutively executed shock pulses in the positive and negative x, y, and z axis of 6 G for up to 11 ms
Storage	Six consecutively executed shock pulses in the positive and negative x, y, and z axis (one pulse on each side of the system) of 71 G for up to 2 ms

Particulate and gaseous contamination specifications

The following table defines the limitations that help avoid any equipment damage or failure from particulates and gaseous contamination. If the levels of particulates or gaseous pollution exceed the specified limitations and result in equipment damage or failure, you may need to rectify the environmental conditions. Remediation of environmental conditions is the responsibility of the customer.

Table 35. Particulate contamination specifications

Particulate contamination	Specifications
Air filtration	Data center air filtration as defined by ISO Class 8 per ISO 14644-1 with a 95% upper confidence limit

Table 35. Particulate contamination specifications (continued)

Particulate contamination	Specifications
	NOTE: This condition applies to data center environments only. Air filtration requirements do not apply to IT equipment designed to be used outside a data center, in environments such as an office or factory floor. **NOTE:** Air entering the data center must have MERV11 or MERV13 filtration.
Conductive dust	Air must be free of conductive dust, zinc whiskers, or other conductive particles **NOTE:** This condition applies to data center and non-data center environments.
Corrosive dust	• Air must be free of corrosive dust • Residual dust present in the air must have a deliquescent point less than 60% relative humidity **NOTE:** This condition applies to data center and non-data center environments.
Walk-Up Edge Data Center or Cabinet (sealed, closed loop environment)	Filtration is not required for cabinets that are anticipated to be opened 6 times or less per year. Class 8 per ISO 1466-1 filtration as defined above is required otherwise **NOTE:** In environments commonly above ISA-71 Class G1 or that may have known challenges, special filters may be required.

Table 36. Gaseous contamination specifications

Gaseous contamination	Specifications
Copper coupon corrosion rate	<300 Å/month per Class G1 as defined by ANSI/ISA71.04-2013
Silver coupon corrosion rate	<200 Å/month as defined by ANSI/ISA71.04-2013

Thermal restriction matrix

Table 37. Processor and heat sink matrix

Heat sink	Processor TDP
STD HSK	≤ 165 W (supports only 2.5-inch drives and non-GPU configuration)
2U HPR HSK	125 W–250 W (supports 3.5-inch drives and non-GPU configuration)
	165 W–350 W (supports 2.5-inch drives and non-GPU configuration)
L-type HSK	Supports all GPU/FPGA configurations

NOTE: All GPU/FGPA cards require 1U L-type HSK and GPU shroud.

Table 38. Label reference

Label	Description
STD	Standard
HPR (Silver)	High performance Silver (HPR Silver) fan
HPR (Gold)	High performance Gold (HPR Gold) fan

Table 38. Label reference (continued)

Label	Description
HSK	Heat sink
LP	Low profile
FH	Full height
DLC	Direct Liquid Cooling

NOTE: The ambient temperature of the configuration is determined by the critical component in that configuration. For example, if the processor's supported ambient temperature is 35°C (95°F), the DIMM is 35°C (95°F), and the GPU is 30°C (86°F), the combined configuration can only support 30°C (86°F).

Thermal restriction matrix for 4th Gen Intel® Xeon® Scalable or Intel® Xeon® Max Processors

Table 39. Thermal restriction matrix for air cooled configuration

Configuration				No backplane	8 x 2.5-inch NVMe	16 x 2.5-inch SAS and Split NVMe-SAS	16 x 2.5-inch or 16 x EDSFF E3.S NVMe	24 x 2.5-inch SAS		16 x 2.5-inch SAS + 8 x 2.5-inch NVMe	24 x 2.5-inch NVMe	12 x 3.5-inch		Ambient temperature
Rear storage				No rear drives	No rear drives	No rear drives	No rear drives	No rear drives	2.5-inch or EDSFF E3.S rear drives with rear fan	No rear drives	No rear drives	No rear drives	2.5-inch or EDSFF E3.S rear drives with rear fan	
CPU TDP/cTDP		Cores	T-Case max center (°C)	Fan								HPR GOLD fan 70%^		
3408U	125 W[1]	8	79	STD	STD	STD	STD	STD	HPR SLVR	STD	HPR GOLD	HPR SLVR	HPR GOLD	35°C (95°F)
5415+	150 W[1]	8	78	STD	STD	STD	STD	STD	HPR SLVR	STD	HPR GOLD	HPR SLVR	HPR GOLD	35°C (95°F)
4410Y		12	78											
5416S		16	78											
5418N	165 W[1]	24	84	STD	STD	STD	STD	STD	HPR SLVR	STD	HPR GOLD	HPR SLVR	HPR GOLD	35°C (95°F)
5411N		24	84											
4416+		20	82											
6426Y	185 W[1]	16	72	STD	STD	STD	STD	STD	HPR SLVR	HPR SLVR	HPR GOLD	HPR GOLD	HPR GOLD	35°C (95°F)
5418Y		24	80											
5412U		24	80											
6428N		32	85											
6421N		32	85											

Table 39. Thermal restriction matrix for air cooled configuration (continued)

Configuration				No backplane	8 x 2.5-inch NVMe	16 x 2.5-inch SAS and Split NVMe-SAS	16 x 2.5-inch or 16 x EDSFF E3.S NVMe	24 x 2.5-inch SAS		16 x 2.5-inch SAS + 8 x 2.5-inch NVMe	24 x 2.5-inch NVMe	12 x 3.5-inch		Ambient temperature
Rear storage				No rear drives	No rear drives	No rear drives	No rear drives	No rear drives	2.5-inch or EDSFF E3.S rear drives with rear fan	No rear drives	No rear drives	No rear drives	2.5-inch or EDSFF E3.S rear drives with rear fan	
CPU TDP/cTDP		Cores	T-Case max center (°C)	Fan								HPR GOLD fan 70%^		
6434	205 W[1]	8	96	STD	STD	STD	STD	STD	HPR SLVR	HPR SLVR	HPR GOLD	HPR GOLD	HPR GOLD	35°C (95°F)
5420+		28	84											
6438Y+		32	76											
6438M		32	84											
6438N		32	84											
6442Y	225 W[1]	24	79	STD	STD	STD	STD	STD	HPR SLVR	HPR SLVR	HPR GOLD	HPR GOLD*	HPR GOLD*	35°C (95°F)
6448Y		32	79											
6444Y	270 W[2]	32	75	HPR SLVR	HPR SLVR	HPR SLVR	HPR SLVR	HPR SLVR	HPR SLVR	HPR SLVR	HPR GOLD	Required DLC	Required DLC	35°C (95°F)
8462Y+	300 W[2]	32	81	HPR SLVR	HPR SLVR	HPR SLVR	HPR SLVR	HPR SLVR	HPR SLVR fan	HPR SLVR	HPR GOLD	Required DLC	Required DLC	35°C (95°F)
6458Q	350 W[2]	32	64	Required DLC	Required DLC	Required DLC	Required DLC	Required DLC	Required DLC	Required DLC	Required DLC	Required DLC	Required DLC	35°C (95°F)
6414U	250 W[2]	32	76	STD fan	STD fan	STD fan	STD fan	STD fan	HPR SLVR fan	HPR SLVR	HPR GOLD	HPR GOLD*	HPR GOLD*	35°C (95°F)
6454S	270 W[2]	32	71	HPR SLVR	HPR SLVR	HPR SLVR	HPR SLVR	HPR SLVR	HPR SLVR fan	HPR SLVR	HPR GOLD	Required DLC	Required DLC	35°C (95°F)
6430		32	71											
8471N	300 W[2]	52	76	HPR SLVR	HPR SLVR	HPR SLVR	HPR SLVR	HPR SLVR	HPR SLVR	HPR SLVR	HPR GOLD	Required DLC	Required DLC	35°C (95°F)
8470N		52	76											
8460Y+		40	75											
8452Y		36	75											

Table 39. Thermal restriction matrix for air cooled configuration (continued)

Configuration				No backplane	8 x 2.5-inch NVMe	16 x 2.5-inch SAS and Split NVMe-SAS	16 x 2.5-inch or 16 x EDSFF E3.S NVMe	24 x 2.5-inch SAS		16 x 2.5-inch SAS + 8 x 2.5-inch NVMe	24 x 2.5-inch NVMe	12 x 3.5-inch		Ambient temperature
Rear storage				No rear drives	No rear drives	No rear drives	No rear drives	No rear drives	2.5-inch or EDSFF E3.S rear drives with rear fan	No rear drives	No rear drives	No rear drives	2.5-inch or EDSFF E3.S rear drives with rear fan	
CPU TDP/cTDP		Cores	T-Case max center (°C)	Fan								HPR GOLD fan 70%^		
8480+	350 W[2]	56	79	HPR SLVR	HPR SLVR	HPR SLVR	HPR SLVR	HPR SLVR	HPR SLVR	HPR SLVR	HPR GOLD*	Required DLC	Required DLC	35°C (95°F)
8470		52	79											
8468		48	79											
8470Q	350 W[2]	52	57	Required DLC	Required DLC	Required DLC	Required DLC	Required DLC	Required DLC	Required DLC	Required DLC	Required DLC	Required DLC	35°C (95°F)
9480	350 W[2]	56	64	Required DLC	Required DLC	Required DLC	Required DLC	Required DLC	Required DLC	Required DLC	Required DLC	Required DLC	Required DLC	35°C (95°F)
9470		52	64											
9460	350 W[2]	40	77	HPR SLVR	HPR SLVR	HPR SLVR	HPR SLVR	HPR SLVR	HPR SLVR	HPR SLVR	HPR GOLD*	Required DLC	Required DLC	35°C (95°F)
9462		32	77											

NOTE: The platform supports Maximum (MAX) and Mainstream (MS) system boards.

- [1] supports MS system board (CPU TDP < 250 W)
- [2] supports MAX system board (CPU TDP => 250 W)

NOTE: ^The fan speed in the 3.5-inch chassis is limited to 70% due to the drive dynamic profile.

NOTE: *Supported ambient temperature is 30°C (86°F).

Table 40. Thermal restriction matrix for memory with air cooled configuration (non-GPU)

Configuration		No backplane	8 x 2.5-inch NVMe	16 x 2.5-inch SAS and Split NVMe-SAS	16 x 2.5-inch or 16 x EDSFF E3.S NVMe	24 x 2.5-inch SAS		16 x 2.5-inch SAS + 8 x 2.5-inch NVMe	24 x 2.5-inch NVMe	12 x 3.5-inch	
Rear storage		No rear drives	No rear drives	No rear drives	No rear drives	No rear drives	2.5-inch or EDSFF E3.S rear drives with rear fan	No rear drives	No rear drives	No rear drives	2.5-inch or EDSFF E3.S rear drives with rear fan
DIMM Configuration	2DPC/ Power	STD fan (CPU TDP <= 250 W)					HPR SLVR fan (CPU TDP up to 350 W)	STD fan (CPU TDP <= 165 W)	HPR GOLD fan (CPU TDP up to 350 W)	HPR SLVR fan 70% (CPU TDP up to 165 W)^	
256 GB RDIMM	12.7 W	30°C (86°F)	30°C (86°F)	30°C (86°F)	30°C (86°F)	30°C (86°F)	35°C (95°F)	Required DLC	35°C (95°F)	Required DLC	Required DLC
128 GB RDIMM	8.9 W	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	30°C (86°F)	35°C (95°F)	30°C (86°F)	35°C (95°F)	30°C (86°F)	30°C (86°F)
64 GB RDIMM	6.9 W	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	30°C (86°F)	30°C (86°F)
32 GB RDIMM	4.1 W	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)
16 GB RDIMM	3 W	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)
DIMM Configuration	2DPC/ Power	HPR SLVR fan (CPU TDP up to 350 W)							HPR GOLD fan (CPU TDP up to 350 W)	HPR GOLD fan 70% (CPU TDP up to 250 W)	
256 GB RDIMM	12.7 W	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	Required DLC	Required DLC
128 GB RDIMM	8.9 W	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	30°C (86°F)	30°C (86°F)
64 GB RDIMM	6.9 W	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	30°C (86°F)	30°C (86°F)
32 GB RDIMM	4.1 W	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)

Table 40. Thermal restriction matrix for memory with air cooled configuration (non-GPU) (continued)

Configuration		No backplane	8 x 2.5-inch NVMe	16 x 2.5-inch SAS and Split NVMe-SAS	16 x 2.5-inch or 16 x EDSFF E3.S NVMe	24 x 2.5-inch SAS		16 x 2.5-inch SAS + 8 x 2.5-inch NVMe	24 x 2.5-inch NVMe	12 x 3.5-inch	
Rear storage		No rear drives	No rear drives	No rear drives	No rear drives	No rear drives	2.5-inch or EDSFF E3.S rear drives with rear fan	No rear drives	No rear drives	No rear drives	2.5-inch or EDSFF E3.S rear drives with rear fan
DIMM Configuration	2DPC/ Power	STD fan (CPU TDP <= 250 W)					HPR SLVR fan (CPU TDP up to 350 W)	STD fan (CPU TDP <= 165 W)	HPR GOLD fan (CPU TDP up to 350 W)	HPR SLVR fan 70% (CPU TDP up to 165 W)^	
16 GB RDIMM	3 W	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)

NOTE: In 12 x 3.5-inch with rear module configuration, for CPU TDP greater than 270 W and specific Low Temperature-case CPUs are not supported.

NOTE: ^The fan speed in the 3.5-inch chassis is limited to 70% due to the drive dynamic profile.

Table 41. Thermal restriction matrix for rear NVMe drives with air cooled configuration (non-GPU)

Configuration			24 x 2.5-inch SAS		12 x 3.5-inch	
Rear storage			2 x 2.5-inch with rear fan	4 x 2.5-inch with rear fan	2 x 2.5-inch with rear fan	4 x 2.5-inch with rear fan
Drive type	Drives capacity	Power	HPR SLVR fan		HPR GOLD fan 70%	
Kioxia CD7	15.36 TB	19 W	35°C (95°F)	35°C (95°F)	30°C (86°F)	30°C (86°F)
Samsung PM9A3	7.68 TB	14 W	35°C (95°F)	35°C (95°F)	30°C (86°F)	30°C (86°F)
Samsung PM1733	15.36 TB	22 W	30°C (86°F)	30°C (86°F)	N/A	N/A
Samsung PM1733a	15.36 TB	19.7 W	35°C (95°F)	30°C (86°F)	30°C (86°F)	N/A
Samsung PM1735a	12.8 TB	19.8 W	35°C (95°F)	30°C (86°F)	30°C (86°F)	N/A
Redtail	7.68 TB	24.5 W	30°C (86°F)	30°C (86°F)	N/A	N/A
Hynix PE8010	7.68/3.84/1.92 TB	17 W	35°C (95°F)	30°C (86°F)	30°C (86°F)	N/A
Intel P5520	15.36 TB	20 W	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)
Kioxia CM7	30.72 TB	25 W	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)
Kioxia CD8	15.36 TB	19 W	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)
PE8110	7.68 TB	20 W	30°C (86°F)	N/A	N/A	N/A
PE8110	3.84/1.92 TB	20 W	35°C (95°F)	30°C (86°F)	30°C (86°F)	N/A
PS1010	15.36 TB	20 W	35°C (95°F)	35°C (95°F)	30°C (86°F)	30°C (86°F)

Table 41. Thermal restriction matrix for rear NVMe drives with air cooled configuration (non-GPU) (continued)

Configuration			24 x 2.5-inch SAS		12 x 3.5-inch	
Rear storage			2 x 2.5-inch with rear fan	4 x 2.5-inch with rear fan	2 x 2.5-inch with rear fan	4 x 2.5-inch with rear fan
Drive type	Drives capacity	Power	HPR SLVR fan		HPR GOLD fan 70%	
PS1030	12.8 TB	20 W	35°C (95°F)	35°C (95°F)	30°C (86°F)	30°C (86°F)

Table 42. Thermal restriction matrix for GPU configurations

Configuration				No back plane	8 x 2.5-inch NVMe	8 x 2.5-inch NVMe + 8 x 2.5-inch SAS	16 x 2.5-inch SAS	16 x 2.5-inch or 16 x EDSFF E3.S NVMe	24 x 2.5-inch SAS	16 x 2.5-inch SAS + 8 x 2.5-inch NVMe	24 x 2.5-inch NVMe
Rear storage				No rear drives	No rear drives	No rear drives	No rear drives	No rear drives	No rear drives	No rear drives	No rear drives
CPU TDP/cTDP		Cores	T-Case max center (°C)	HPR GOLD fan with 1U HPR L-Type HSK							
3408U	125 W [1]	8	79	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)
5415+	150 W [1]	8	78	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)
4410Y		12	78								
5416S		16	78								
5418N	165 W [1]	24	84	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)
5411N		24	84								
4416+		20	82								
6426Y	185 W [1]	16	72	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)
5418Y		24	80								
5412U		24	80								
6428N		32	85								
6421N		32	85								
6434	205 W [1]	8	96	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (86°F)	30°C (86°F)
5420+		28	84								
6438Y+		32	76								
6438M		32	84								
6438N		32	84								
6442Y	225 W [1]	24	79	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)
6448Y		32	79								
6444Y	270 W [2]	32	75	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)

Table 42. Thermal restriction matrix for GPU configurations (continued)

Configuration				No back plane	8 x 2.5-inch NVMe	8 x 2.5-inch NVMe + 8 x 2.5-inch SAS	16 x 2.5-inch SAS	16 x 2.5-inch or 16 x EDSFF E3.S NVMe	24 x 2.5-inch SAS	16 x 2.5-inch SAS + 8 x 2.5-inch NVMe	24 x 2.5-inch NVMe
Rear storage				No rear drives	No rear drives	No rear drives	No rear drives	No rear drives	No rear drives	No rear drives	No rear drives
CPU TDP/cTDP		Cores	T-Case max center (°C)	HPR GOLD fan with 1U HPR L-Type HSK							
8462Y+	300 W [2]	32	81	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	30°C (86°F)	30°C (86°F)	30°C (86°F)
6458Q	350 W [2]	32	64	Required DLC	Required DLC	Required DLC	Required DLC	Required DLC	Required DLC	Required DLC	Required DLC
6414U	250 W [2]	32	76	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)
6454S	270 W [2]	32	71	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	30°C (86°F)	30°C (86°F)	30°C (86°F)
6430		32	71								
8471N	300 W [2]	52	76	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	30°C (86°F)	30°C (86°F)	30°C (86°F)
8470N		52	76								
8460Y+		40	75								
8452Y		36	75								
8480+	350 W [2]	56	79	30°C (86°F)	30°C (86°F)	30°C (86°F)	30°C (86°F)	30°C (86°F)	Required DLC	Required DLC	Required DLC
8470		52	79								
8468		48	79								
8470Q	350 W [2]	52	57	Required DLC	Required DLC	Required DLC	Required DLC	Required DLC	Required DLC	Required DLC	Required DLC
9480	350 W [2]	56	64	Required DLC	Required DLC	Required DLC	Required DLC	Required DLC	Required DLC	Required DLC	Required DLC
9470		52	64								
9460	350 W [2]	40	77	30°C (86°F)	30°C (86°F)	30°C (86°F)	30°C (86°F)	30°C (86°F)	Required DLC	Required DLC	Required DLC
9462		32	77								

NOTE: The platform supports Maximum (MAX) and Mainstream (MS) system boards.

- [1] supports MS system board (CPU TDP < 250 W)
- [2] supports MAX system board (CPU TDP => 250 W)

NOTE: ^The fan speed in the 3.5-inch chassis is limited to 70% due to the drive dynamic profile.

NOTE: *Supported ambient temperature is 30°C (86°F).

NOTE: GPU configuration supports only High performance Gold (HPR Gold) fan.

Table 43. Thermal restriction matrix for memory with air cooled configuration (GPU)

Configuration		No backplane	8 x 2.5-inch NVMe	16 x 2.5-inch SAS and Split NVMe-SAS *	16 x 2.5-inch or 16 x EDSFF E3.S NVMe **	24 x 2.5-inch SAS*	16 x 2.5-inch SAS + 8 x 2.5-inch NVMe***	24 x 2.5-inch NVMe***
DIMM Configuration	2DPC/ Power	HPR GOLD fan with 1U HPR L-Type HSK						
256 GB RDIMM	12.7 W	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	Required DLC	Required DLC	Required DLC
128 GB RDIMM	8.9 W	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)
64 GB RDIMM	6.9 W	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)
32 GB RDIMM	4.1 W	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)
16 GB RDIMM	3 W	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)

NOTE: *In 16 x 2.5-inch SAS and 8 x 2.5-inch NVMe configurations, for CPU TDP 350 W supported ambient temperature is 30°C (86°F).

NOTE: **In 16 x 2.5-inch NVMe configuration, for CPU TDP greater than 300 W supported ambient temperature is 30°C (86°F).

NOTE: ***In 24 x 2.5-inch SAS/NVMe configuration and 16 x 2.5-inch SAS + 8 x 2.5-inch NVMe, for CPU TDP 270 W - 300 W and specific Low Temperature-case CPUs supported ambient temperature is 30°C (86°F).

Table 44. Optimized Ecological upgrade thermal restriction matrix for air cooled configuration

Configuration			No backplane	8 x 2.5-inch NVMe	16 x 2.5-inch SAS and split NVMe-SAS	16 x 2.5-inch or 16 x EDSFF E3.S NVMe	24 x 2.5-inch SAS		16 x 2.5-inch SAS + 8 x 2.5-inch NVMe	24 x 2.5-inch NVMe	12 x 3.5-inch			Ambient temperature
Rear storage			No rear drives	No rear drives	No rear drives	No rear drives	No rear drives	2.5-inch or EDSFF E3.S rear drives with rear fan	No rear drives	No rear drives	No rear drives	2.5-inch rear drives with rear fan	EDSFF E3.S rear drives with rear fan	
CPU TDP/cTDP		Cores	T-Case max center (°C)	Fan/HSK							HPR GOLD fan 70%^			
5415+	150 W	8	78	STD /2U HPR	STD /2U HPR	STD /2U HPR	STD / 2U HPR	STD /2U HPR	HPR SLVR / 2U HPR	STD / 2U HPR	HPR GOL	HPR SLVR	HPR GOLD /	HPR SLVR / 2U HPR	35° C
4410Y		12	78											

Table 44. Optimized Ecological upgrade thermal restriction matrix for air cooled configuration (continued)

Configuration				No backplane	8 x 2.5-inch NVMe	16 x 2.5-inch SAS and split NVMe-SAS	16 x 2.5-inch or 16 x EDSFF E3.S NVMe	24 x 2.5-inch SAS		16 x 2.5-inch SAS + 8 x 2.5-inch NVMe	24 x 2.5-inch NVMe	12 x 3.5-inch			Ambient temperature
Rear storage				No rear drives	No rear drives	No rear drives	No rear drives	No rear drives	2.5-inch or EDSFF E3.S rear drives with rear fan	No rear drives	No rear drives	No rear drives	2.5-inch rear drives with rear fan	EDSFF E3.S rear drives with rear fan	
CPU TDP/cTDP		Cores	T-Case max center (°C)	Fan/HSK								HPR GOLD fan 70%^			
5416S		16	78								D / STD	/2U HPR	2U HPR		(95° F)
5418N/ 5411N	165 W	24	84	STD /2U HPR	STD /2U HPR	STD /2U HPR	STD / 2U HPR	STD /2U HPR	HPR SLVR / 2U HPR	STD / 2U HPR	HPR GOLD / STD	HPR SLVR /2U HPR	HPR GOLD / 2U HPR	HPR SLVR / 2U HPR	35° C (95° F)
4416+		20	82												

NOTE: ^The fan speed in the 3.5-inch chassis is limited to 70% due to the drive dynamic profile.

Thermal restriction matrix for 5th Gen Intel® Xeon® Scalable Processors

Table 45. Thermal restriction matrix for air cooled configuration

Configuration				No back plane	8 x 2.5-inch NVMe	16 x 2.5-inch SAS and Split NVMe-SAS	16 x 2.5-inch or 16 x EDSFF E3.S NVMe	24 x 2.5-inch SAS		16 x 2.5-inch SAS + 8 x 2.5-inch NVMe	24 x 2.5-inch NVMe	12 x 3.5-inch^		Ambient temperature
Rear storage				No rear drives	No rear drives	No rear drives	No rear drives	No rear drives	2.5-inch or EDSFF E3.S rear drives with rear fan	No rear drives	No rear drives	No rear drives	2.5-inch or EDSFF E3.S rear drives with rear fan	
CPU TDP/cTDP		Cores	T-Case max center (°C)	Fan										
4509Y	125 W[1]	8	84	STD	STD	STD	STD	STD	HPR SLVR	STD	HPR GOLD	HPR SLVR	HPR GOLD	35°C (95°F)
4510	150 W[1]	12	84	STD	STD	STD	STD	STD	HPR SLVR	STD	HPR GOLD	HPR SLVR	HPR GOLD	35°C (95°F)
4514Y		16	79											
5512U	185 W[1]	28	89	STD	STD	STD	STD	STD	HPR SLVR	HPR SLVR	HPR GOLD	HPR GOLD	HPR GOLD	35°C (95°F)
6534	195 W[1]	8	64	STD	STD	STD	STD	STD	HPR SLVR	HPR SLVR	HPR GOLD	HPR GOLD	HPR GOLD	35°C (95°F)
6526Y		16	82											
6542Y	250 W[1]	24	83	STD	STD	STD	STD	STD	HPR SLVR	HPR SLVR	HPR GOLD	HPR GOLD*	HPR GOLD*	35°C (95°F)
6548Y+		32	83											
6548N		32	83											
8562Y+	300 W [2]	32	81	HPR SLVR	HPR SLVR	HPR SLVR	HPR SLVR	HPR SLVR	HPR SLVR	HPR SLVR	HPR GOLD	Required DLC	Required DLC	35°C (95°F)
8558U	300 W [2]	48	78	HPR SLVR	HPR SLVR	HPR SLVR	HPR SLVR	HPR SLVR	HPR SLVR	HPR SLVR	HPR GOLD	Required DLC	Required DLC	35°C (95°F)
8568Y+	350 W [2]	48	81	HPR SLVR	HPR SLVR	HPR SLVR	HPR SLVR	HPR SLVR	HPR SLVR fan	HPR SLVR fan	HPR GOLD*	Required DLC	Required DLC	35°C (95°F)
8580		60	81											
8592+		64	81											

NOTE: The platform supports Maximum (MAX) and Mainstream (MS) system boards.

- [1] supports MS system board (CPU TDP < 250 W)
- [2] supports MAX system board (CPU TDP ≥ 250 W)

NOTE: *Supported ambient temperature is 30°C (86°F).

NOTE: ^The fan speed in the 3.5-inch chassis is limited to 70% due to the drive dynamic profile.

Table 46. Thermal restriction matrix for memory with air cooled configuration (non-GPU)

Configuration		No backplane	8 x 2.5-inch NVMe	16 x 2.5-inch SAS and Split NVMe-SAS	16 x 2.5-inch or 16 x EDSFF E3.S NVMe	24 x 2.5-inch SAS		16 x 2.5-inch SAS + 8 x 2.5-inch NVMe	24 x 2.5-inch NVMe	12 x 3.5-inch	
Rear storage		No rear drives	No rear drives	No rear drives	No rear drives	No rear drives	2.5-inch or EDSFF E3.S rear drives with rear fan	No rear drives	No rear drives	No rear drives	2.5-inch or EDSFF E3.S rear drives with rear fan
DIMM Configuration	2DPC/ Power	STD fan (CPU TDP <= 250 W)					HPR SLVR fan (CPU TDP up to 350 W)	STD fan (CPU TDP <= 165 W)	HPR GOLD fan (CPU TDP up to 350 W)	HPR SLVR fan 70% (CPU TDP up to 165 W)^	
256 GB RDIMM	12.7 W	30°C (86°F)	30°C (86°F)	30°C (86°F)	30°C (86°F)	30°C (86°F)	35°C (95°F)	Required DLC	35°C (95°F)	Required DLC	Required DLC
128 GB RDIMM	8.9 W	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	30°C (86°F)	35°C (95°F)	30°C (86°F)	35°C (95°F)	30°C (86°F)	30°C (86°F)
96 GB RDIMM	8.3 W	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	30°C (86°F)	35°C (95°F)	30°C (86°F)	35°C (95°F)	30°C (86°F)	30°C (86°F)
64 GB RDIMM	6.9 W	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	30°C (86°F)	30°C (86°F)
32 GB RDIMM	4.1 W	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)
16 GB RDIMM	3 W	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)
DIMM Configuration	2DPC/ Power	HPR SLVR fan (CPU TDP up to 350 W)							HPR GOLD fan (CPU TDP up to 350 W)	HPR GOLD fan 70% (CPU TDP up to 250 W)^	
256 GB RDIMM	12.7 W	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	Required DLC	Required DLC
128 GB RDIMM	8.9 W	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	30°C (86°F)	30°C (86°F)

Table 46. Thermal restriction matrix for memory with air cooled configuration (non-GPU) (continued)

Configuration		No backplane	8 x 2.5-inch NVMe	16 x 2.5-inch SAS and Split NVMe-SAS	16 x 2.5-inch or 16 x EDSFF E3.S NVMe	24 x 2.5-inch SAS		16 x 2.5-inch SAS + 8 x 2.5-inch NVMe	24 x 2.5-inch NVMe	12 x 3.5-inch	
Rear storage		No rear drives	No rear drives	No rear drives	No rear drives	No rear drives	2.5-inch or EDSFF E3.S rear drives with rear fan	No rear drives	No rear drives	No rear drives	2.5-inch or EDSFF E3.S rear drives with rear fan
DIMM Configuration	2DPC/ Power	STD fan (CPU TDP <= 250 W)					HPR SLVR fan (CPU TDP up to 350 W)	STD fan (CPU TDP <= 165 W)	HPR GOLD fan (CPU TDP up to 350 W)	HPR SLVR fan 70% (CPU TDP up to 165 W)^	
96 GB RDIMM	8.3 W	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	30°C (86°F)	30°C (86°F)
64 GB RDIMM	6.9 W	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	30°C (86°F)	30°C (86°F)
32 GB RDIMM	4.1 W	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)
16 GB RDIMM	3 W	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)

NOTE: ^The fan speed in the 3.5-inch chassis is limited to 70% due to the drive dynamic profile.

Table 47. Supported ambient temperature for processors with GPU

Configuration				No backplane	8 x 2.5-inch NVMe	16 x 2.5-inch SAS and Split NVMe-SAS	16 x 2.5-inch or 16 x EDSFF E3.S NVMe	24 x 2.5-inch SAS	16 x 2.5-inch SAS + 8 x 2.5-inch NVMe	24 x 2.5-inch NVMe
Rear storage				No rear drives	No rear drives	No rear drives	No rear drives	No rear drives	No rear drives	No rear drives
CPU TDP/cTDP		Cores	T-Case max center (°C)	Support HPR GOLD fan with 1U HPR L-Type HSK						
4509Y	125 W[1]	8	84	35°C	35°C	35°C	35°C	35°C	35°C	35°C
4510	150 W[1]	12	84	35°C	35°C	35°C	35°C	35°C	35°C	35°C
4514Y		16	79							
5512U	185 W[1]	28	89	35°C	35°C	35°C	35°C	35°C	35°C	35°C
6534	195 W[1]	8	64	35°C	35°C	35°C	35°C	35°C	35°C	35°C

Table 47. Supported ambient temperature for processors with GPU (continued)

Configuration				No backplane	8 x 2.5-inch NVMe	16 x 2.5-inch SAS and Split NVMe-SAS	16 x 2.5-inch or 16 x EDSFF E3.S NVMe	24 x 2.5-inch SAS	16 x 2.5-inch SAS + 8 x 2.5-inch NVMe	24 x 2.5-inch NVMe
Rear storage				No rear drives	No rear drives	No rear drives	No rear drives	No rear drives	No rear drives	No rear drives
CPU TDP/cTDP		Cores	T-Case max center (°C)	Support HPR GOLD fan with 1U HPR L-Type HSK						
6526Y		16	82							
6542Y	250 W[1]	24	83	35°C	35°C	35°C	35°C	35°C	35°C	35°C
6548Y+		32	83							
6548N		32	83							
8562Y+	300 W [2]	32	81	35°C	35°C	35°C	35°C	30°C	30°C	30°C
8558U	300 W [2]	48	78	35°C	35°C	35°C	35°C	30°C	30°C	30°C
8568Y+	350 W [2]	48	81	30°C	30°C	30°C	30°C	Required DLC	Required DLC	Required DLC
8580		60	81							
8592+		64	81							

NOTE: The platform supports Maximum (MAX) and Mainstream (MS) system boards.

- [1] supports MS system board (CPU TDP < 250 W)
- [2] supports MAX system board (CPU TDP ≥ 250 W)

NOTE: *Supported ambient temperature is 30°C (86°F).

Table 48. Thermal restriction matrix for memory with air cooled configuration (GPU)

Configuration		No backplane	8 x 2.5-inch NVMe	16 x 2.5-inch SAS and Split NVMe-SAS	16 x 2.5-inch NVMe	24 x 2.5-inch SAS	16 x 2.5-inch SAS + 8 x 2.5-inch NVMe	24 x 2.5-inch NVMe
DIMM Configuration	2DPC/ Power	HPR GOLD fan with 1U HPR L-Type HSK						
256 GB RDIMM	12.7 W	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	Required DLC	Required DLC	Required DLC
128 GB RDIMM	8.9 W	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)
96 GB RDIMM	8.3 W	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)
64 GB RDIMM	6.9 W	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)
32 GB RDIMM	4.1 W	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)
16 GB RDIMM	3 W	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)

NOTE: *256 GB RDIMM with 5th Gen Intel® Xeon® Scalable Processors will be supported in the future release.

Common thermal restrictions for both 4th and 5th Gen Intel processors

Table 49. GPU types support thermal restriction for both air cooling and liquid cooling configuration

Configuration	No backplane	8 x 2.5-inch NVMe	16 x 2.5-inch SAS and split NVMe-SAS	16 x 2.5-inch NVMe or 16 x EDSFF E3.S NVMe	24 x 2.5-inch SAS	16 x 2.5-inch SAS + 8 x 2.5-inch NVMe	24 x 2.5-inch NVMe
Rear storage	**No rear drives**	**No rear drives**	**No rear drives**	**No rear drives**	**No rear drives**	**No rear drives**	**No rear drives**
GPU	**HPR GOLD fan with 1U HPR L-Type HSK**						
A40 (Max 2)	35°C (95°F)	35°C (95°F)	35°C (95°F)	30°C (86°F)	30°C (86°F)	30°C (86°F)	30°C (86°F)
Intel PVC (Max 2)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	30°C (86°F)	30°C (86°F)	30°C (86°F)
A100 80 GB (Max 2)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)
A16 (Max 2)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)
A30 (Max 2)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)
A2 (Max 6)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)
H100 (Max 2)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)
A800 (Max 2)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)
L4 (Max 6)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)
L40 (Max 2)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)
Intel ASM (Max 6)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)
L40S (Max 2)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)	35°C (95°F)

Table 50. Thermal restriction for memory with liquid cooled configuration(non-GPU)

Configuration		No backplane	8 x 2.5-inch NVMe	16 x 2.5-inch SAS and Split NVMe-SAS	16 x 2.5-inch or 16 x EDSFF E3.S NVMe	24 x 2.5-inch SAS		16 x 2.5-inch SAS + 8 x 2.5-inch NVMe	24 x 2.5-inch NVMe	12 x 3.5-inch^		Ambient temperature
Rear storage		No rear drives	No rear drives	No rear drives	No rear drives	No rear drives	2.5-inch or EDSFF E3.S rear drives with rear fan	No rear drives	No rear drives	No rear drives	2.5-inch or EDSFF E3.S rear drives with rear fan	
DIMM Configuration	Power	Fan										
256 GB RDIMM	12.7 W	HPR SLVR	HPR SLVR	HPR SLVR	HPR SLVR	HPR SLVR	HPR SLVR	HPR SLVR	HPR SLVR	HPR GOLD	HPR GOLD fan	35°C (95°F)
128 GB RDIMM	8.9 W	STD	STD	STD	STD	STD	STD	STD	STD	HPR GOLD	HPR GOLD	35°C (95°F)
96 GB RDIMM	8.3 W	STD	STD	STD	STD	STD	STD	STD	STD	HPR GOLD	HPR GOLD	35°C (95°F)
64 GB RDIMM	6.9 W	STD	STD	STD	STD	STD	STD	STD	STD	HPR GOLD	HPR GOLD	35°C (95°F)
32 GB RDIMM	4.1 W	STD	STD	STD	STD	STD	STD	STD	STD	HPR GOLD	HPR GOLD	35°C (95°F)
16 GB RDIMM	3 W	STD	STD	STD	STD	STD	STD	STD	STD	HPR GOLD	HPR GOLD	35°C (95°F)

NOTE: ^The fan speed in the 3.5-inch chassis is limited to 70% due to the drive dynamic profile.

Table 51. Thermal restriction for memory with liquid cooled configuration(GPU)

Configuration		No backplane	8 x 2.5-inch NVMe	16 x 2.5-inch SAS and Split NVMe-SAS	16 x 2.5-inch or 16 x EDSFF E3.S NVMe	24 x 2.5-inch SAS	16 x 2.5-inch SAS + 8 x 2.5-inch NVMe	24 x 2.5-inch NVMe	Ambient temperature
Rear storage		No rear drives	No rear drives	No rear drives	No rear drives	No rear drives	No rear drives	No rear drives	
DIMM Configuration	Power	Fan							
256 GB RDIMM	12.7 W	HPR GOLD fan							35°C (95°F)
128 GB RDIMM	8.9 W								
96 GB RDIMM	8.3 W								
64 GB RDIMM	6.9 W								

Table 51. Thermal restriction for memory with liquid cooled configuration(GPU) (continued)

Configuration		No backplane	8 x 2.5-inch NVMe	16 x 2.5-inch SAS and Split NVMe-SAS	16 x 2.5-inch or 16 x EDSFF E3.S NVMe	24 x 2.5-inch SAS	16 x 2.5-inch SAS + 8 x 2.5-inch NVMe	24 x 2.5-inch NVMe	Ambient temperature
Rear storage		No rear drives	No rear drives	No rear drives	No rear drives	No rear drives	No rear drives	No rear drives	
DIMM Configuration	Power	Fan							
32 GB RDIMM	4.1 W								
16 GB RDIMM	3 W								

NOTE: *256 GB RDIMM with 5th Gen Intel® Xeon® Scalable Processors will be supported in the future release.

Thermal air restrictions

Table 52. Air cooling configurations thermal restriction for AHSRAE A3 and A4

ASHRAE	A3/40°C (104°F)	A4/45°C (113°F)
PSU	Two PSUs are required in redundant mode. If there is PSU failure, system performance may be reduced.	
PCIe card	Non-Dell qualified peripheral cards and peripheral cards greater than 25 W are not supported.	
GPU/FPGA	Not supported	
DIMM	128 GB, or greater capacity DIMMs are not supported.	
PCIe SSD	Not supported	
Front storage	Not supported in 12 x 3.5-inch SAS configuration.	
Rear storage	Not supported	
Fan	HPR SLVR fans are required.	
Processor	≤ 165 W	≤ 125 W
OCP	Supported with 85°C (185°F) active optic cable.	Supported with 85°C (185°F) active optic cable and cards tier ≤4.
BOSS	BOSS-N1 is supported.	BOS-N1 is not supported.

Table 53. Liquid cooling configurations thermal restriction for AHSRAE A3 and A4

ASHRAE	A3/40°C (104°F)	A4/45°C (113°F)
PSU	Two PSUs are required in redundant mode. If there is PSU failure, system performance may be reduced.	
PCIe card	Non-Dell qualified peripheral cards and peripheral cards greater than 25 W are not supported.	
GPU/FPGA	Not supported	
DIMM	128 GB, or greater capacity DIMMs are not supported.	
PCIe SSD	Not supported	
Front storage	Not supported in 12 x 3.5-inch SAS configuration.	
Rear storage	Not supported	
Fan	HPR SLVR fans are required in 2.5-inch configurations systems.	

Table 53. Liquid cooling configurations thermal restriction for AHSRAE A3 and A4 (continued)

ASHRAE	A3/40°C (104°F)	A4/45°C (113°F)
OCP	Supported with 85°C (185°F) active optic cable.	Supported with 85°C (185°F) active optic cable and cards tier ≤4.
BOSS	BOSS-N1 is supported.	BOSS-N1 is not supported.

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Appendix B. Standards compliance

The system conforms to the following industry standards.

Table 54. Industry standard documents

Standard	URL for information and specifications
ACPIAdvance Configuration and Power Interface Specification, v6.4	Uefi specifications and tools
Ethernet IEEE Std 802.3-2022	ieee standards
MSFT WHQL Microsoft Windows Hardware Quality Labs	microsoft.com/whdc/system/platform/pcdesign/desguide/serverdg.mspx
IPMI Intelligent Platform Management Interface, v2.0	intel.com/design/servers/ipmi
DDR5 Memory DDR5 SDRAM Specification	jedec.org/standards-documents/docs/jesd79-4.pdf
PCI Express PCI Express Base Specification, v5.0	pcisig.com/specifications/pciexpress
PMBus Power System Management Protocol Specification, v1.2	pmbus specification and revisions
SAS Serial Attached SCSI, 3 (SAS-3) (T10/INCITS 519)	SCSI storage interfaces information
SATA Serial ATA Rev. 3.3	sata-io.org page
SMBIOS System Management BIOS Reference Specification, v3.3.0	BIOS reference specification page
TPM Trusted Platform Module Specification, v1.2 and v2.0	trustedcomputinggroup org page
UEFI Unified Extensible Firmware Interface Specification, v2.7	UEFIF specifications
PI Platform Initialization Specification, v1.7	
USB Universal Serial Bus v2.0 and SuperSpeed v3.0 (USB 3.1 Gen1)	USB Implementers Forum, Inc. USB document library
NVMe Express Base Specification. Revision 2.0c	NVME specifications
NVMe Command Set Specifications 1. NVM Express NVM Command Set Specification. Revision 1.1c 2. NVM Express Zoned Namespaces Command Set. Revision 1.0c 3. NVM Express® Key Value Command Set. Revision 1.0c	
NVMe Transport Specifications 1. NVM Express over PCIe Transport. Revision 1.0c 2. NVM Express RDMA Transport Revision. 1.0b 3. NVM Express TCP Transport. Revision 1.0c	
NVMe NVM Express Management Interface. Revision 1.2c	
NVMe NVMe Boot Specification. Revision 1.0	

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Appendix C Additional resources

Table 55. Additional resources

Resource	Description of contents	Location
Installation and Service Manual	This manual, available in PDF format, provides the following information: • Chassis features • System Setup program • System indicator codes • System BIOS • Remove and replace procedures • Diagnostics • Jumpers and connectors	Dell.com/Support/Manuals
Getting Started Guide	This guide ships with the system, and is also available in PDF format. This guide provides the following information: • Initial setup steps	Dell.com/Support/Manuals
Rack Installation Guide	This document ships with the rack kits, and provides instructions for installing a server in a rack.	Dell.com/Support/Manuals
System Information Label	The system information label documents the system board layout and system jumper settings. Text is minimized due to space limitations and translation considerations. The label size is standardized across platforms.	Inside the system chassis cover
QR code for system resources	This code on the chassis can be scanned by a phone application to access additional information and resources for the server, including videos, reference materials, service tag information, and Dell contact information.	Inside the system chassis cover
Enterprise Infrastructure Planning Tool (EIPT)	The Dell online EIPT enables easier and more meaningful estimates to help you determine the most efficient configuration possible. Use EIPT to calculate the power consumption of your hardware, power infrastructure, and storage.	Dell.com/calc

A

Dell PowerEdge R760 NEBS level 3

As IT and Operational Technologies converge, communications service providers are evaluating their infrastructures to meet the demands of digital transformation. Dell is uniquely positioned to assist both service providers and network equipment providers (NEPs) in succeeding. By working closely with customers to fully understand their needs, Dell offers global partnership and collaboration.

- Network Equipment-Building System (NEBS) Level 3 and ETSI validated
- Commercial off the shelf hardware
- Comprehensive, global availability, service, and support

Telecom server solution

NEBS compliance is an important requirement in your environment. Dell Solutions, a global leader in enterprise platforms, provides NEBS Level-3 (GR-63 and GR-1089) and ETSI compliant PowerEdge Servers with Intel® Xeon® Processors, ensuring top stability and global availability. Rack-mount systems are designed to deliver high performance, maximum scalability, and safe and reliable service.

Dell PowerEdge Servers offer:

1. Open standard systems:
   - Improved compatibility based on industry-leading Dell products
   - Rapidly scalable and expandable
2. Industry standards Solutions
   - Validated to NEBS Level 3 standards, VZ.TPR.9205, and various ETSI standards
   - Enabled for operation in warmer environments than traditional data centers – Designed for extreme conditions such as high humidity, earthquakes, and dust
3. Global regulatory support and availability

Following are the additional NEBS validated technology devices available:

- Intel i350 Quad Port 1 GbE BASE-T
- OCP NIC 3.0 [540-BCOE]
- Intel Ethernet i350 Quad Port 1 GbE BASE-T Adapter, PCIe Full Height, V2, FIRMWARE RESTRICTIONS APPLY [540-BDIW]
- Intel E810-XXVDA4 Quad Port 10/25GbE SFP28 Adapter, PCIe Full Height [540-BDDR]

NOTE: We cannot include the Serial Com card as it has not undergone testing on any platforms. Therefore, we cannot confirm it as an additional card.

Service and support

Bring game-changing innovations to market quickly with services including design, manufacturing, fulfillment, and global support. Refine products or design new ones with the right services, allowing focus on IP. Choose from services that can help:

- Conduct applications testing on the hardware
- Integrate hardware, images, applications, peripheral, and documents as your systems are built
- Consolidate, stage, deliver, and support your orders globally
- Deliver Customer Support anywhere with over 30,000 Dell employees in tech support, parts, and field services across 100+ countries

More Features

- Combine density, performance, and scalability to optimize application performance
- Manage your clients more efficiently with industry-leading support

- Ensure server security from the factory to you
  - Rely on a secure component supply chain to ensure protection from the factory to the data center
  - Maintain data safety with cryptographically signed firmware packages and Secure Boot
  - Prevent unauthorized or malicious changes with Server Lockdown
  - Wipe all data from nonvolatile media including hard drives, SSDs, and system memory quickly and securely with SystemErase

Table 56. Specifications

Feature	Technical Specification	
Processor: Available for the entire life cycle. Up to 2x 185W Intel Xeon SP	• Intel Xeon 6428N • Intel Xeon 5412U • Intel Xeon 5418N • Intel Xeon 5411N • Intel Xeon 4514Y • Intel Xeon 4410Y • Intel Xeon 6421N • Intel Xeon 4509Y • Intel Xeon 5415+ • Intel Xeon 5512U • Intel Xeon 3408U • Intel Xeon 6426Y • Intel Xeon 5416S • Intel Xeon 4416+ • Intel Xeon 5418Y • Intel Xeon 4510	
Memory	32 DDR4 DIMM slots supporting RDIMM, speeds up to 4800 8GB, 16GB, 32GB, 64GB capacities supported	
Storage controllers	Front Controllers: PERC H965i, PERC H755	
Drive bays	R760 Front Drive Bays: Up to 24 x 2.5 inch SAS or SATA SSD including 8 Universal Slots (NVMe direct)	
Power supplies	Titanium redundant hot swap 1100 W DC, 1400 W AC, and 1800 W AC power supply supported.	
Sizing	Form factor: 1. R760: Rack (2U)	Chassis depth: 1. R760: 772.13 mm with Bezel
Embedded management	iDRAC9 with Lifecycle Controller (Express, Enterprise)	
Bezel	NEBS Filtered, Dell branded	
OpenManage Software	• OpenManage Enterprise • OpenManage Power Manager plugin • OpenManage Service plugin • OpenManage Update Manager plugin • CloudIQ for PowerEdge plug in • OpenManage Enterprise Integration for VMware vCenter • OpenManage Integration for Microsoft System Center • OpenManage Integration with Windows Admin Center	
Integrations and connections	• BMC Truesight • Microsoft System Center • OpenManage Integration with ServiceNow	• IBM Tivoli Netcool/OMNIbus • IBM Tivoli Network Manager IP Edition • Micro Focus Operations Manager

Table 56. Specifications (continued)

Feature	Technical Specification
	• Red Hat Ansible Modules • Terraform Providers • VMware vCenter and vRealize Operations Manager • Nagios Core • Nagios XI
Security	• Cryptographically signed firmware • Data at Rest Encryption (SEDs with local or external key mgmt) • Secure Boot • Secured Component Verification (Hardware integrity check) • Secure Erase • Silicon Root of Trust • System Lockdown (requires iDRAC9 Enterprise or Datacenter) • TPM 2.0 FIPS, CC-TCG certified, TPM 2.0 China NationZ
Embedded NIC	Broadcom 5720 Dual Port 1 GbE LOM
I/O Adapter Options	Additional card options: • Intel Ethernet 100G 2P E810-C Adapter (FH and LP) • Broadcom NetXtreme-E P2100D BCM57508 2x100G QSFP PCIE Ethernet (LP) • Mellanox ConnectX-6 Dx Dual Port 100 GbE QSFP56 PCIe Adapter (FH and LP) • Mellanox Bluefield 2 DP 25 GbE SFP Crypto DPU (FH) • Broadcom NetXtreme-E P425D BCM57504 4x25G SFP28 PCIE Ethernet (FH) • Intel(R) Ethernet 25G 2P E810-XXV Adapter (LP) • NVIDIA ConnectX-6LX Dual Port 25G GbE SFP28 Network Adapter (LP) • Broadcom BCM57414 25G SFP Dual Port PCIE adapter (LP) • Intel(R) Ethernet 25G 4P E810-XXV OCP • Broadcom BCM57414 25G SFP Dual Port OCP3 Mezz • Intel(R) Ethernet 25G 4P E810-XXV OCP
Ports	R760: • Front ports: 1x VGA, 1x USB 2.0, 1x dedicated iDRAC Direct Micro-USB. • Rear ports: 1x VGA, 1 x USB 2.0, 1x USB 3.0, 1x Dedicated iDRAC Ethernet.
Fans	HPR Gold Fan
Rack rail support	Combo Rails
Environmental specs (NEBS Level-3 and ETSI)	• Temperature: Continuous operating temperature of -5C to 40C; 96 hour operating excursions from -5C to 55C • Humidity water/kg of dry air: Operating Humidity of 5% to 85% with excursions of 5% to 90%, but not to exceed 0.24 kg : • Altitude: Up to 4000m; -60m to 1800 m; -61m to 1829m at 40C; 1829m–3960m at 30C • Dust: Dust filter rated 80% per ASHRAE Std 52.1 • Seismic: Operational resiliency up to Richter 7.5 seismic event (Zone 4 seismic event) • EMI: Immunity up to 8kV contact or 15kV air discharge • Fire resistance: Constructed from fire-retardant materials designed to contain and extinguish any fires that may occur inside the box.