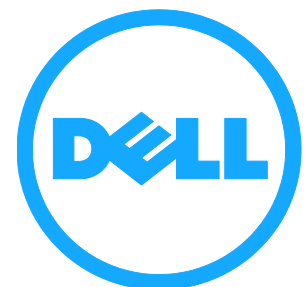


PRECISION™ 7920 TOWER



Technical
Guidebook



Dell Precision 7920 Tower

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7920 TOWER EXTERNAL CHASSIS VIEWS

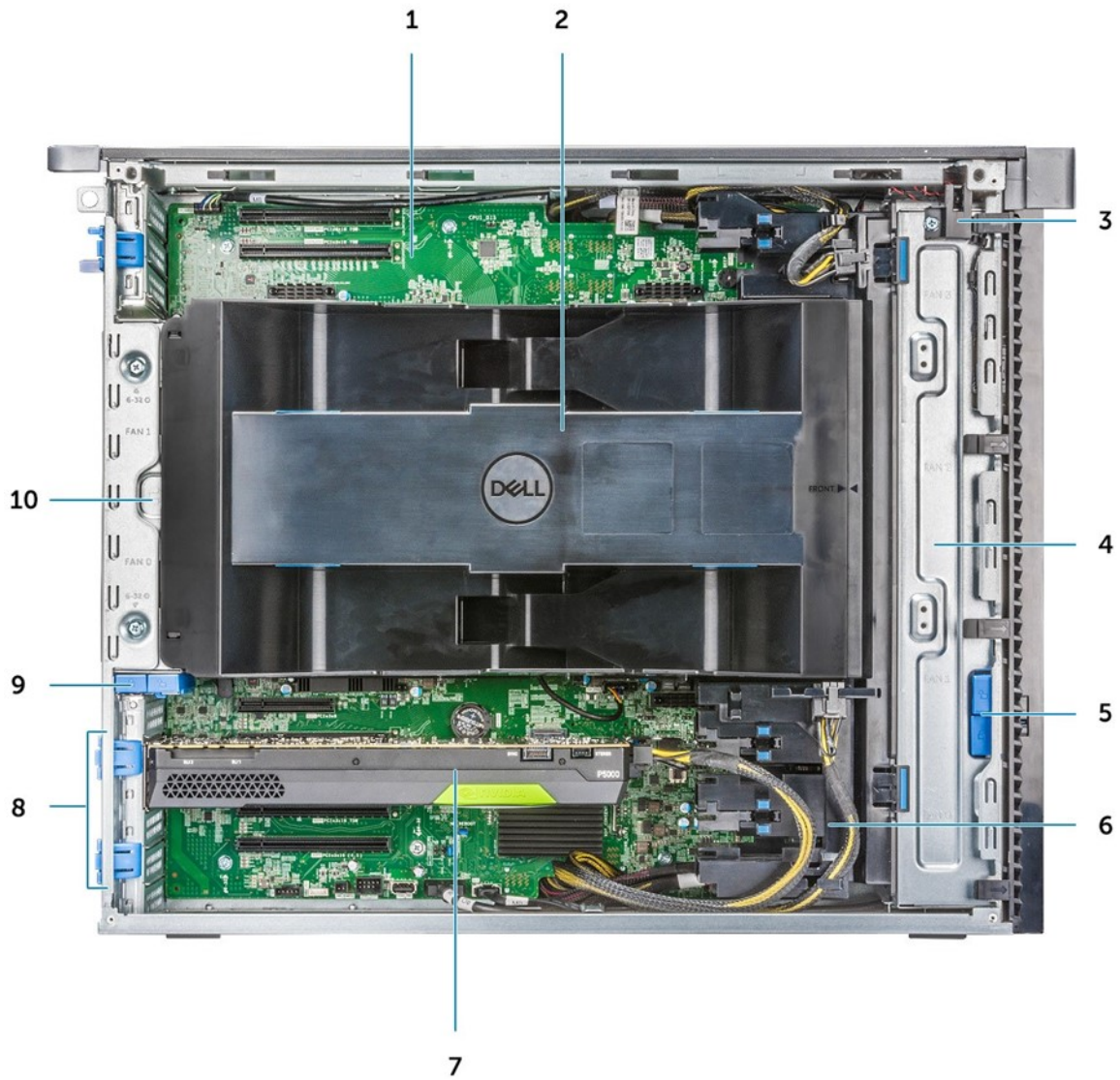


FRONT VIEW			
1	Power button, power light	6	USB 3.1 Gen 1 Type C port
2	Drive Activity Light	7	Universal Audio Jack
3	SD Card Slot	8	Front Bezel Release Latch
4	USB 3.1 Gen 1 Type A ports	9	5.25" ODD Bay (optional)
5	USB 3.1 Gen 1 Type C port (with PowerShare)	10	Slimline Optical Bay



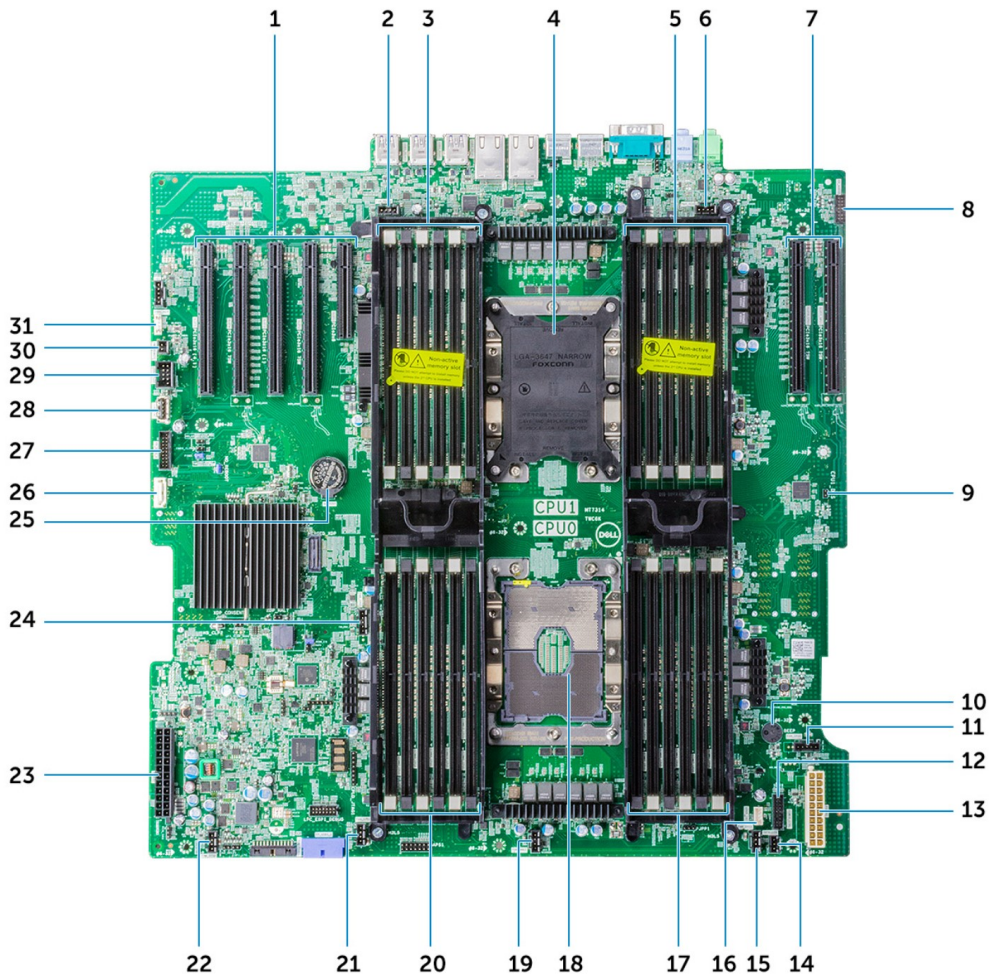
BACK VIEW			
1	Power Supply	9	Network Port
2	Line-Out Port	10	USB 3.1 Gen 1 Type A Ports
3	Microphone/Line-in Port	11	USB 3.1 Gen 1 Type A port (with PowerShare)
4	Serial Port	12	Mechanical Expansion Slot
5	PS/2 Mouse Port	13	PCIe Expansion Slots
6	PSU BIST	14	Side Cover Release Latch
7	PS/2 Keyboard Port	15	PCIe expansion slots (CPU1 required)
8	Network Port (AMT Enabled—Optional)		

7920 TOWER INTERNAL VIEW



Number	Name	Number	Name
1	System board	6	Auxiliary PCIe power cables
2	CPU and Memory Air shroud	7	Graphics card (GPU) with aux power connector
3	Intrusion switch	8	PCIe card release latches
4	Front system fan assembly	9	Rear HDD Bezel lock/unlock button
5	Front Bezel lock/unlock button	10	Rear Fans

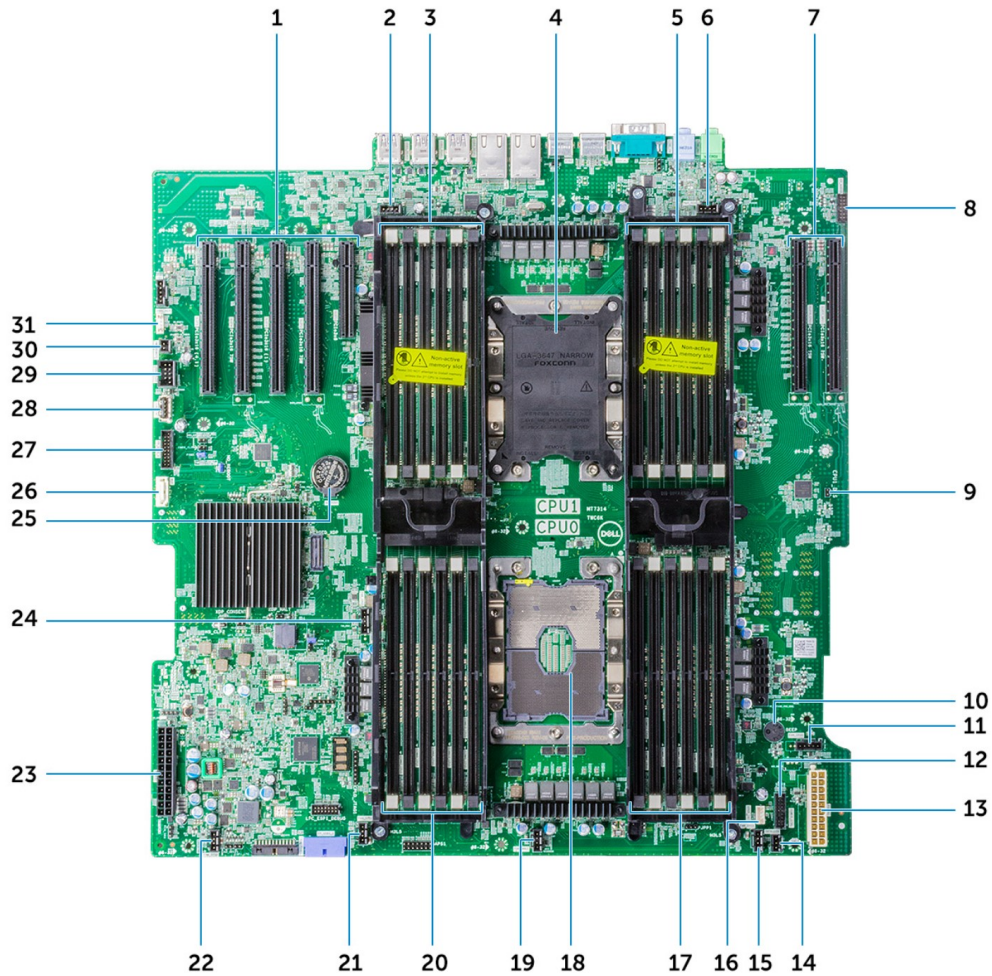
7920 TOWER MOTHERBOARD LAYOUT



System Board

Number	Name	Number	Name
1	PCIe Gen3 Slots (right to left below)	8	Front Panel Audio connector
	Slot 1—PCIe x8 Gen 3 (Open Ended)	9	N/A
	Slot 2—PCIe x16 Gen 3	10	Piezo Speaker
	Slot 3—PCIe x16 Gen 3 (wired as x1)	11	CPU 0 Fan Connector
	Slot 4—PCIe x16 Gen 3	12	Power Control Connector
	Slot 5—PCIe x16 Gen 3 (wired as x4)	13	Power 2 Fan Connector
2	Rear Fan 0 Connector	14	Intrusion Switch Connector
3	DIMM Slots (available only when optional CPU1 is installed)	15	System Fan 3
4	CPU1 Socket	16	Internal Speaker Connector
5	DIMM Slots (available only when optional CPU1 is installed)	17	DIMM Slots (CPU0)
6	Rear Fan 1 Connector	18	CPU0 Socket
7	PCIe x16 Gen 3 Slots (Slot 6 and 7)	19	System Fan 2

7920 TOWER MOTHERBOARD LAYOUT (CONT.)



Number	Name	Number	Name
20	DIMM Slots (CPU0)	26	ODD Connector
21	System Fan 1	27	Front Panel USB Connector
22	N/A	28	Internal USB Port (Type A)
23	Power 1 Connector	29	2x5 USB 2.0 header for flex bay. (Requires optional splitter cable to support 2 x USB 2.0 Type A ports)
24	CPU Fan 1 (Mid CPU Fan)	30	Power Remote (Teradici) header
25	Coin Cell Battery	31	Intel vROC® Key (optionally enables PCIe NVMe RAID)

SYSTEM CONFIGURATION OPTIONS

NOTE: Offerings may vary by country. .

Operating Systems

Microsoft® Windows 7® operating system	Factory Installed Microsoft® Windows 7® Professional (64 bit), This is a Windows 10 Pro for Workstations license downgrade option to Windows 7 Pro - while offered by Microsoft
Microsoft® Windows 10® operating system	Factory Installed Microsoft® Windows® 10 Pro for Workstations (64 bit) WHQL Logo achieved with RS2
Red Hat® Enterprise Linux®	Factory installed RHEL workstation 7.3
Ubuntu 16.04 SP1	Factory Installed—limited options supported Ubuntu 16.04 compatible—limited options supported
NeoKylin	Factory Installed in China —limited options supported
Microsoft® Windows XP Professional	Not qualified, no Dell Technical support, no drivers provided

CHIPSET

Chipset	Intel C621 Chipset (C620 Series)
Non-volatile memory on chipset	
BIOS Configuration SPI (Serial Peripheral Interface)	256Mbit (32MB)
TPM 1.2 Security Device (Trusted Platform Module) ¹ TPM 2.0 ships and is supported with Windows 10 only Note: All systems are field upgradable to TPM 2.0 (with firmware & BIOS updates plus Windows 10 Installation http://www.dell.com/support/article/us/en/04/SLN300914	18KB
Non-TPM	Available in select countries
NIC EEPROM	LOM configuration contained within SPI_FLASH – no dedicated LOM EEPROM

7920 Tower Processors— Intel Xeon Scalable Processor family- SP
 Transitioning from T7910 E5-2600 v3/v4 Series

Note: Global Standard Products (GSP) are a subset of Dell’s relationship products that are managed for availability and synchronized transitions on a worldwide basis. They ensure the same platform is available for purchase globally. This allows customers to reduce the number of configurations managed on a worldwide basis, thereby reducing their costs. They also enable companies to implement global IT standards by locking in specific product configurations worldwide. The following GSP processors identified below will be made available to Dell customers.

Note: Processor numbers are not a measure of performance. Processor availability subject to change and may vary by region/ country.

- 2666MHz DDR4 ECC RDIMM/LRDIMM memory will scale down to 2400MHz with Xeon Gold 51XX Series (excluding 5122) and Xeon Silver 41XX Series and down to 2133MHz with Xeon Bronze 31XX Series Processors.

Precision 7820 Tower, 7920 Tower, 7920 Rack

Intel Xeon® E5-2600 v4 Broadwell Intel Xeon® Processor Scalable Family - SP

Advanced	LLC Cache 22C-55M, 20C-50M 18C-45M, 16C-40M 14C-35M, 12C-30M 10C-25M, 8C-20M 6C-15M 4C-10M	•9.6 GT/s QPI •DDR4-2400 •Hyper-Threading •Turbo Boost Base GHz- Max Turbo 100MHz Turbo steps	E5-2699* v4 22C 145W 2.2-3.6GHz 9.6GT/s E5-2698 v4 20C 135W 2.2-3.6GHz 9.6GT/s E5-2697* v4 18C 145W 2.3-3.6GHz 9.6GT/s E5-2695 v4 18C 120W 2.1-3.3GHz 9.6GT/s E5-2687W* v4 12C 160W 3.0-3.5GHz 9.6GT/s E5-2667 v4 8C 135W 3.2-3.6GHz 8.0GT/s E5-2680* v4 14C 120W 2.4-3.3GHz 9.6GT/s E5-2660 v4 14C 105W 2.0-3.2GHz 9.6GT/s E5-2643* v4 6C 135W 3.4-3.7GHz 9.6GT/s E5-2650* v4 12C 105W 2.2-2.9GHz 9.6GT/s E5-2637* v4 4C 135W 3.5-3.7GHz 9.6 GT/s	Xeon 81XX Platinum •3 UPI links @10.4 GT/s •DDR4-2666 •Hyper-Threading/Turbo Boost •M SKUs support up to 1.5TB memory per CPU*	8180 (M) 28C 2.5-3.8GHz 205W 8168* 24C 2.7-3.7GHz 205W 8160* (M)* 24C 2.1-3.7GHz 150W						
	Gold	•8.0 GT/s QPI •DDR4-2133 •Hyper-Threading •Turbo Boost	E5-2630* v4 10C 85W 2.2-3.1GHz 8.0GT/s E5-2623* v4 4C 85W 2.6G-3.2Hz 8.0GT/s E5-2620* v4 8C 85W 2.1G-3.0Hz 8.0GT/s	Xeon Gold 61XX •3 UPI links @10.4 GT/s UPI •DDR4-2666 •Hyper-Threading/Turbo Boost •M SKUs support up to 1.5TB memory per CPU	6152 22C 2.1-3.7GHz 140W 6148* 20C 2.4-3.7GHz 150W 6138 20C 2.0-3.7GHz 125W 6136* 12C 3.0-3.7GHz 150W 6140*(M) 18C 2.3-3.7GHz 125W 6134* (M) 8C 3.2-3.7GHz 130W 6130* 16C 2.1-3.7GHz 125W 6128* 6C 3.4-3.7GHz 115W						
						Gold	Xeon Gold 51XX •2 UPI links @ 10.4GT/s •DDR4-2400 •Hyper-Threading/ Turbo Boost	5120* 14C 2.2-3.7GHz 105W 5118*12C 2.3-3.2GHz 105W 5122* 4C 3.6-3.7GHz 105W			
									Silver	Xeon Silver •2 UPI links @ 9.6 GT/s •DDR4-2400 •Hyper-Threading/ Turbo Boost	4116* 12C 2.1-3.0GHz 85W 4114* 10C 2.2-3.0GHz 85W 4112* 4C 2.6-3.0GHz 85W 4110* 8C 2.1-3.0GHz 85W
						Bronze	•Xeon Bronze •2 UPI Links @ 9.6 GT/s •DDR4-2133 •No Turbo/No HT	3106* 8C 1.7GHz 85W 3104* 6C 1.7GHz 85W			

- Notes:
1. "M" SKUs enable 1.5TB and 3.0TB memory configs
 2. "M"SKUs are available on 7920 Tower at launch (on 7920 Rack in Dec. 2017)
 3. "M" SKUs are **also** available as standard SKUs with max memory of 1.5TB (w 2 CPUs)
 4. 8160M is also a GSP on 7920 tower and 7920 Rack
 5. 5122 SKU supports memory at 2666MHz

*= GSP SKUs

MEMORY

Note: The Precision 7920 Tower workstation has a six channel memory bus architecture and two memory controllers per CPU. Dell recommends that all six memory channels be populated with DIMMS for maximum memory performance. The 7920 supports Dell Reliable Memory Technology Pro which virtually eliminates memory errors.

Note: With certain processors, 2666MHz DDR4 ECC RDIMM/LRDIMM memory will scale down to 2400MHz or 2133MHz. See processor page for details.

Type:	DDR4 SDRAM RDIMM/LRDIMM ECC
Max Frequency	2666/2400/2133MHz
DIMM Slots	24 (12 per CPU)
DIMM Capacities	8GB, 16GB,32GB RDIMM, 64GB, 128GB LRDIMM
Minimum Memory Offered	16GB (2x 8GB) per CPU (1 DIMM per CPU validated)
Maximum System Memory	3TB - Requires Xeon "M" CPU SKUs and 2nd "M" CPU to be installed)

FACTORY INSTALLED MEMORY CONFIGURATIONS:

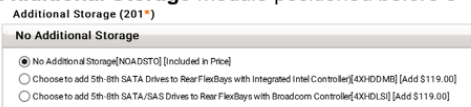
Note: Other configurations are possible via CFI or memory customer kits, but are not available as standard factory installed options.

7920 Tower Memory				CPU0												CPU1											
				iMC1						iMC0						iMC0						iMC1					
				Ch5		Ch4		Ch3		Ch0		Ch1		Ch2		Ch2		Ch1		Ch0		Ch3		Ch4		Ch5	
Config	Total (GB)	DPC	Frequency	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0			
				DIMM2	DIMM8	DIMM4	DIMM10	DIMM6	DIMM12	DIMM11	DIMM5	DIMM9	DIMM3	DIMM7	DIMM1	DIMM1	DIMM7	DIMM3	DIMM9	DIMM5	DIMM11	DIMM12	DIMM6	DIMM10	DIMM4	DIMM8	DIMM2
S16R	16	1DPC	2666	8											8												
S32R	32	1DPC	2666	8									8		8												
S48R	48	1DPC	2666	8	8			8			8		8		8												
S64R	64	2DPC	2666	8	8	8		8			8		8	8	8												
S96R	96	2DPC	2666	8	8	8	8	8	8	8	8	8	8	8	8												
S32Rb	32	1DPC	2666	16																							
S64R	64	1DPC	2666	16		16							16		16												
S96R	96	1DPC	2666	16	16			16			16		16		16												
S128R	128	2DPC	2666	16	16	16		16			16		16	16	16												
S192R	192	2DPC	2666	16	16	16	16	16	16	16	16	16	16	16	16												
S192R	192	1DPC	2666	32	32	32		32			32		32		32												
S256R	256	2DPC	2666	32	32	32		32			32		32	32	32												
S384R	384	2DPC	2666	32	32	32	32	32	32	32	32	32	32	32	32												
S384LR	384	1DPC	2666	64	64	64		64			64		64		64												
S512LR	512	2DPC	2666	64	64	64		64			64		64	64	64												
S768LR	768	2DPC	2666	64	64	64	64	64	64	64	64	64	64	64	64												
S512LR	512	1DPC	2666	128		128							128		128												
S768LR	768	1DPC	2666	128		128							128		128												
S1024LR	1024	2DPC	2666	128	128	128		128			128		128	128	128												
S1536LR	1536	2DPC	2666	128	128	128	##	128	128	128	128	128	128	128	128												
D32R	32	1DPC	2666	8											8	8											8
D64R	64	1DPC	2666	8		8							8	8	8	8											8
D96R	96	1DPC	2666	8	8			8			8		8	8	8	8	8			8							8
D64R	64	1DPC	2666	16											16	16											16
D128R	128	1DPC	2666	16		16							16	16	16	16											16
D192R	192	1DPC	2666	16	16			16			16		16	16	16	16	16			16							16
D256R	256	2DPC	2666	16	16	16		16			16		16	16	16	16	16	16	16	16							16
D384R	384	2DPC	2666	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
D384R	384	1DPC	2666	32	32	32		32			32		32		32	32	32	32	32	32	32	32	32	32	32	32	32
D512R	512	2DPC	2666	32	32	32		32			32		32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
D768R	768	2DPC	2666	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
D512LR	512	1DPC	2666	64		64							64		64	64			64								64
D768LR	768	1DPC	2666	64		64					64		64		64	64			64								64
D1024LR	1024	2DPC	2666	64	64	64		64			64		64	64	64	64	64	64	64	64							64
D1536LR	1536	2DPC	2666	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64
D1024LR	1024	1DPC	2666	128		128							128		128	128			128								128
D1536LR	1536	1DPC	2666	128		128					128		128		128	128			128								128
D2048LR	2048	2DPC	2666	128	128	128		128			128		128	128	128	128	128	128	128	128	128	128	128	128	128	128	128
D3072LR	3072	2DPC	2666	128	128	128	##	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128

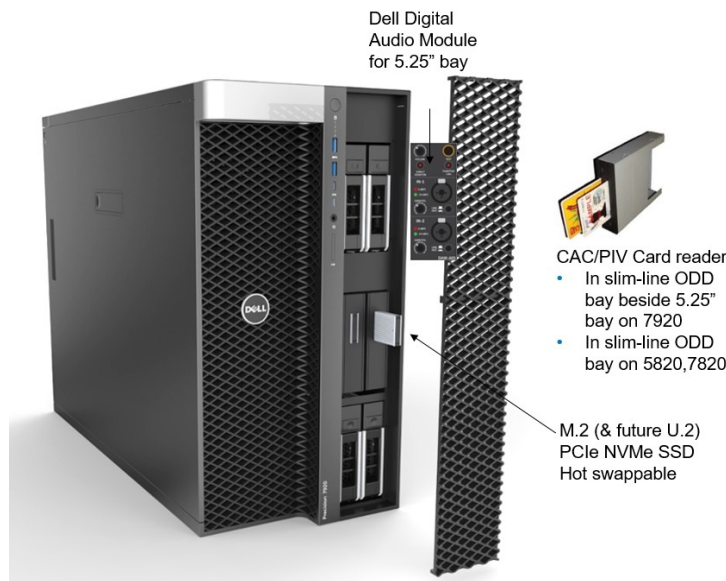
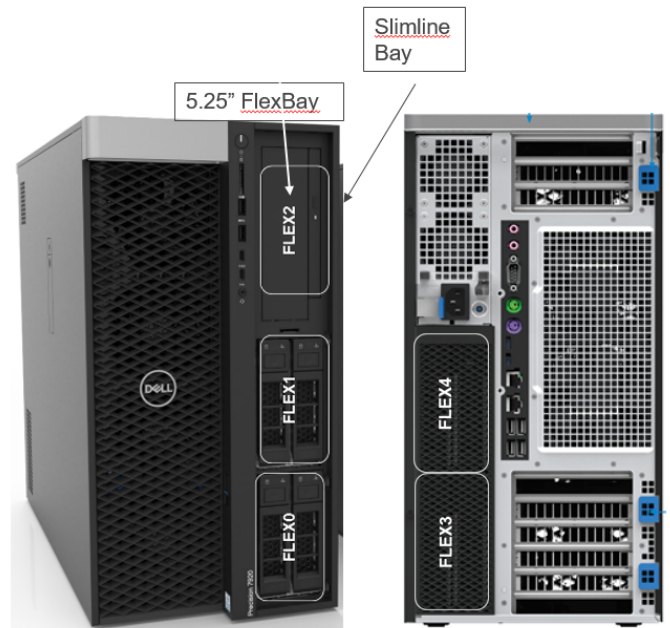
7920 Tower FlexBay Storage

7920 Tower – FlexBay Options

- **FlexBay 0 and 1**
 - Default SATA/SAS FlexBays each support 2x 2.5" or 3.5" SATA/SAS HDDs with appropriate controllers up to 4 drives (1-4)
 - Optional PCIe FlexBays can support M.2 PCIe NVMe SSDs via M.2 carrier with hot swap up to 4 drives with dual CPUs
 - FlexBay 1 is default for 1st and 2nd M.2 PCIe NVMe SSDs
- **FlexBay 3 and 4** (rear storage) are optional and can only contain SATA/SAS) HDDs/SSDs
 - They are populated with drives 5-8 **when** that option is chosen in the **Additional Storage** module positioned before 5th HDD module



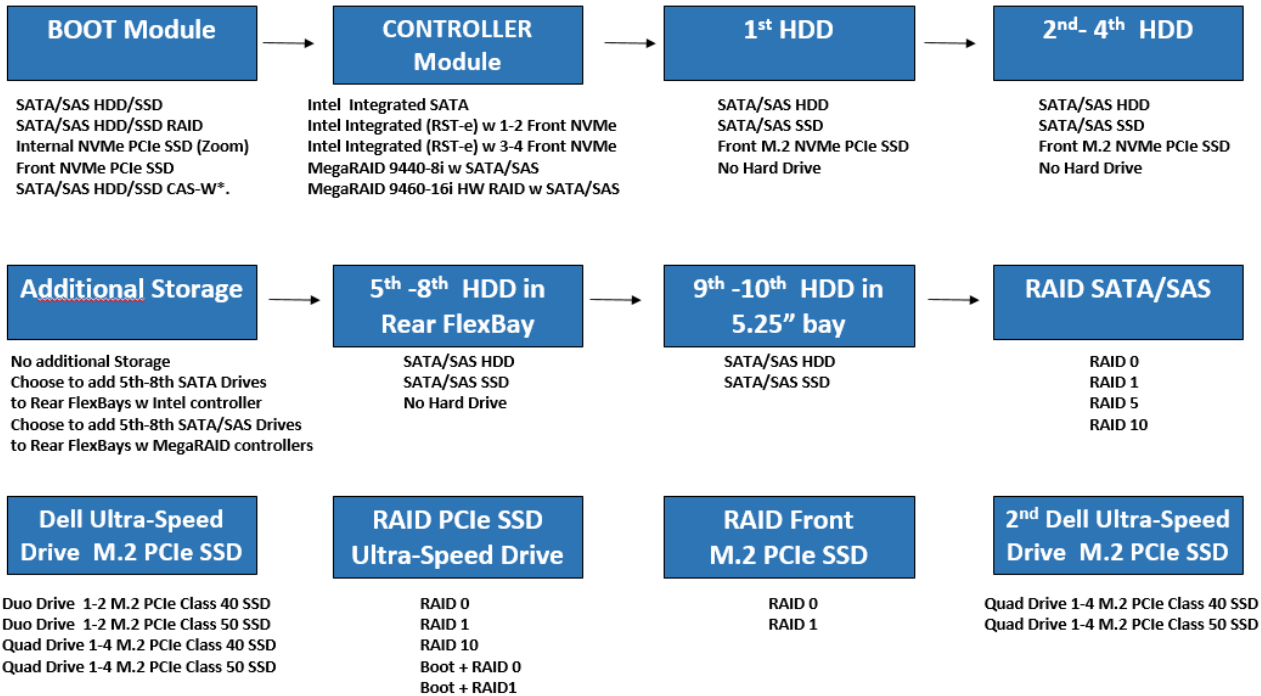
- **FlexBay 2** is a 5.25" bay for HH Optical Drives, Dell Digital Audio I/F and converts to support 9th and 10th SATA/SAS drives with Broadcom 9460-16i
 - In that config the slimline bay goes away
- Slimline bay supports:
 - Slimline Opticals
 - CAC/PIV Smart Card Reader



¹The total amount of available memory will be less than 4GB on systems running 32-bit operating systems. The amount less depends on the actual system configuration. To fully utilize 4GB or more of memory requires a 64-bit operating system.

7920 TOWER - CONFIGURING STORAGE

7920 Tower Storage Configuration Path & NVMe options



GRAPHICS

NOTE: The systems support full height (FH) cards. Up to 4 single wide or 3 double wide graphics cards can be supported with the 2nd CPU installed (adds two additional PCIe Gen 3.0 x16 slots)

NOTE: Dual Graphics with NVIDIA SLI (Scalable Link Interface) options available with select cards.

Graphics Options	
High End 3D Cards	
Options	Aux power dongle required
Radeon Pro WX 9100	1x8 pin
Radeon Pro SSG (future)	1x6 pin; 1x8 pin
NVIDIA Quadro GP100	1x8 pin
NVIDIA Quadro P6000	1x8 pin
NVIDIA Quadro P5000	1x8 pin
Mid-range 3D Cards	
Options	Aux power dongle required
Radeon Pro WX 7100	1x6 pin
Radeon Pro WX 5100	
Radeon Pro WX 4100	
NVIDIA Quadro P4000	1x6 pin
NVIDIA Quadro P2000	
Entry 3D Cards	
Options	Aux power dongle required
Radeon Pro WX 3100	
Radeon Pro WX 2100	
NVIDIA Quadro P1000	
NVIDIA Quadro P600	
NVIDIA Quadro P400	
Professional 2D Cards	
Options	Aux power dongle required
NVIDIA NVS 310	
NVIDIA NVS 315	

Bays, Drives and Optical Storage Options

Bays:	
4x FlexBays and 1x 5.25" FlexBay supporting up to 10x 3.5" or 2.5" drives	5
Hard Drives Supported - 3.5" or 2.5"	10x 3.5" or 2.5" with Broadcom 9460-16i controller
Front FlexBay Access M.2 PCIe NVMe SSDs supported	4 with dual CPUs installed
Internal M.2 PCIe NVMe SSDs supported on Dell Ultra-Speed Drive PCIe cards	8 on two cards
Slimline Optical Bay	1
Optical Drives Supported	1x slimline, 1x HH
Interface:	
Integrated: Intel® chipset SATA controller (6Gb/s) Optional: Broadcom MegaRAID® SAS/SATA PCIe Controllers	8 SATA HDD ports + 1 SATA port for optical
3.5" Hard Drives:	
4TB ¹ SAS 7200 RPM nearline HDD	X
4TB ¹ SATA 5400 RPM HDD	X
2TB ¹ SATA 7200 RPM HDD	X
1TB ¹ SATA 7200 RPM HDD	X
500GB ¹ SATA 7200 RPM HDD	X Post RTS
2.5" Hard Drives:	
2.5" 1TB SATA 7200 RPM HDD	X
2.5" 500GB SATA 7200 RPM HDD	X
2.5" 500GB SATA 7200 RPM Opal SED HDD	X Post RTS
2.5" 1.8GB SAS 12Gb/s 10K RPM HDD	X Post RTS
2.5" 900GB SAS 12Gb/s 15K RPM HDD	X Post RTS
2.5" 600GB SAS 12Gb/s 15K RPM HDD	X
2.5" 300GB SAS 12Gb/s 15K RPM HDD	X

¹ For hard drives, GB means 1 billion bytes; actual capacity varies with preloaded material and operating environment and

Optical Drives:	
Slimline DVD+/-RW ¹ SATA 1.5Gbit/s	X
Slimline DVD-ROM ¹ SATA 1.5Gbit/s	X
Half height BD-RE SATA	X
5.25" DVD+/-RW ¹ SATA 1.5Gbit/s	X
Media Card Reader:	
Front panel—integrated	X

¹ Discs burned with this drive may not be compatible with some existing drives and players; using DVD+R media provides maximum compatibility.

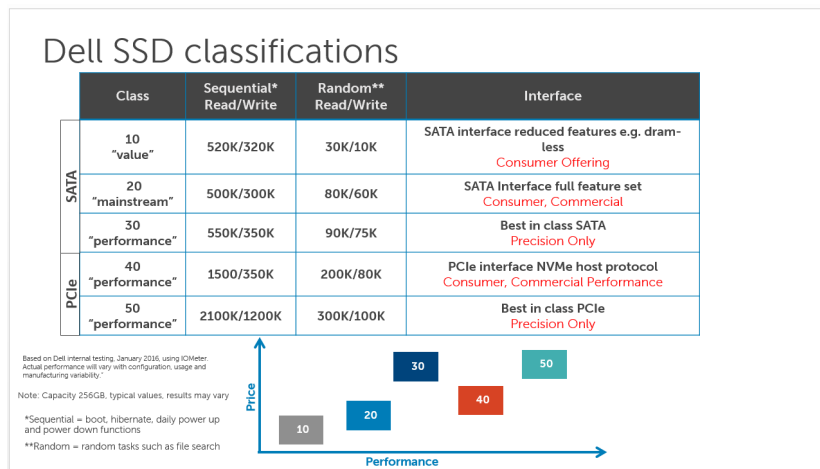
² DVD-ROM drives may have write-capable hardware that has been disabled via firmware modifications.

DELL™ PRECISION™ 7920 TOWER TECHNICAL GUIDEBOOK

Solid State Drives

2.5" SAS SSDs2	
2.5" 800GB ¹ SAS 12Gbps Enterprise Solid State Drive	X
2.5" 400GB ¹ SAS 12Gbps Enterprise Solid State Drive	X
2.5" SATA SSDs:	
2.5" 1TB SATA Class 20 Solid State Drive	X Post RTS
2.5" 500GB SATA Class 20 Solid State Drive	X
2.5" 256GB SATA Class 20 Solid State Drive	X
M.2 PCIe NVMe PCIe SSDs	
M.2 1TB PCIe NVMe Class 50 Solid State Drive	X
M.2 512GB PCIe NVMe Class 50 Solid State Drive	X
M.2 1TB PCIe NVMe Class 40 Solid State Drive	X
M.2 512GB PCIe NVMe Class 40 Solid State Drive	X
M.2 256G PCIe NVMe Class 40 Solid State Drive	X
M.2 1TB PCIe NVMe Class 40 SED Solid State Drive	X Post RTS
M.2 512GB PCIe NVMe Class 40 SED Solid State Drive	X Post RTS

¹ For hard drives, GB means 1 billion bytes; actual capacity varies with preloaded material and operating environment and will be less.



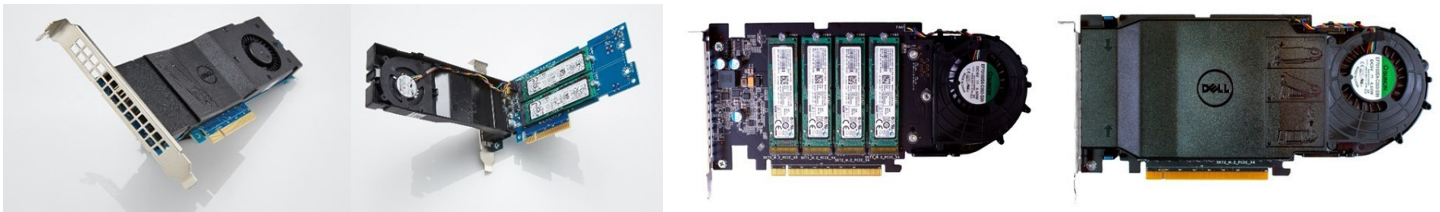
Storage Reliability & Endurance Summary

Category	Capacity	SATA HDD	SATA Value, Mainstream Class 10, Class 20	SATA Performance Class 30	PCIe NVMe Mainstream Class 40	PCIe NVMe Performance Class 50
SSD Endurance (TBW)	128GB		72			
	256GB		72	150	72	150
	360GB		72			
	512GB		72	292	72	292
	1TB		72		72	
Reliability (MTBF hours)	All SSD		800,000	1,200,000	800,000	1,200,000
	ALL HDD	550,000				

Endurance is a measure of SSD life, how much data can be written for how long – measured in Terabytes Written. TBW, our SSD's are specified for TBW over a 5 year lifecycle
Reliability is measured in Mean Time Between Failures, MTBF units = hours

Values shown are minimum required – Dell Internal Engineering Specification.

DELL PRECISION ULTRA -SPEED DUO AND QUAD DRIVES



Dell Precision Ultra-Speed Drive Specifications

	Duo	Quad
Configuration:		
On-board M.2 Slots	2	4
NAND Type	Class 40 Minimum	
M.2 Capacity Options	256GB, 512GB, 1TB	
Maximum Capacity	2x 1TB	4x 1TB
System Requirements:		
System Board Connection	PCIe Gen3 X8	PCIe Gen3 X16
Form Factor	HHHL	FHFL
OS	Win 7, 8.1, 10; RHEL, Ubuntu 14.04	
Supported Platforms	5820, 7820, 7920 Towers 7920 Rack	
Performance*		
Sequential Reads	At least 1500	
Sequential Writes	At least 350K	
SPECwpc Storage General Ops.	Up to 123	
Endurance		
Terabytes Written (TBW)	Up to 72	
MTBF	800,000 Hours	
Physical		
Weight (Single M.2 Populated)	.242 lbs. (110g)	.484 lbs. (220g)
Dimensions (HWD)	167.65mm x 69.56mm x 17.77mm	240mm x 111.15mm x 19.23mm
Operating Temperature Range	50-95F (10-35C)	
Airflow	3.5 CFM	12 CFM
Certifications	UL, CE, RoHS	

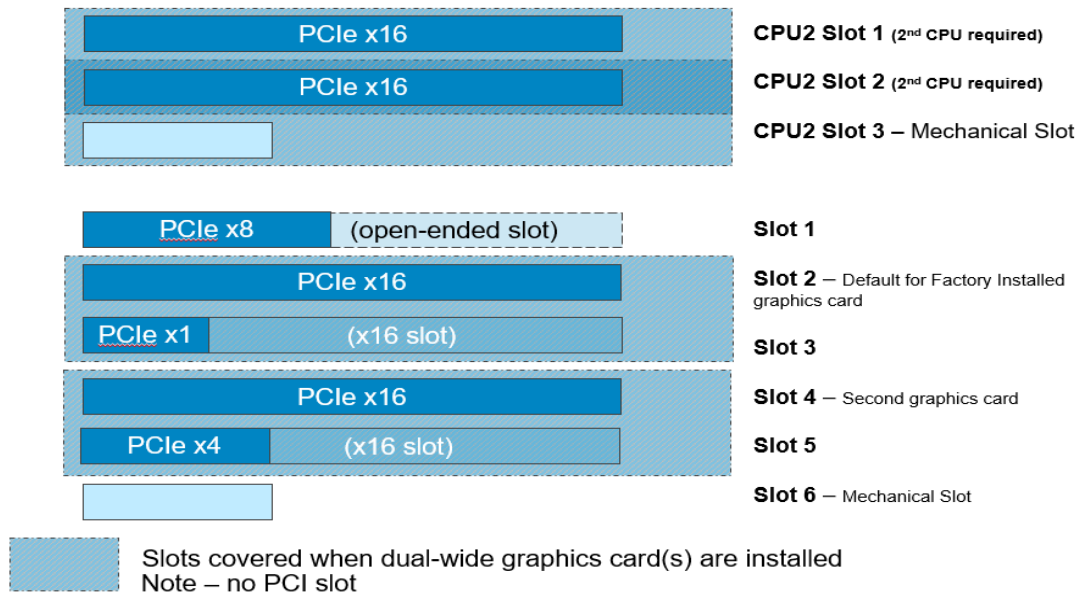
SYSTEM EXPANSION SLOTS

NOTE: See Detailed Engineering Specifications for supported voltage, maximum wattage and card dimensions.

All slots are PCIe Gen 3 and Full height/Full length

PCIe x16 Slot Gen 3	2 Slots - (slots 1-2, 1-4), 2 slots (slots 2-1, 2-2 with 2nd CPU) 4 slots total with 2nd CPU installed
PCIe x16 (wired x8—open ended)	1 (Slot 1)
PCIe x16 Slot (wired x4)	1 (Slot 5)
PCIe x16 Slot (wired x1)	1 Slot 3)
SATA connectors for hard drives and optical drives	8 SATA @6Gb/s plus 1 for optical

7920 Tower Slot Layout



EXTERNAL PORTS/CONNECTORS

NOTE: See chassis diagrams section for port/connector locations

USB 3.1	Front: 2x USB 3.1 Gen 1 Type A, 2x USB 3.1 Gen 1 Type C Rear: 6x USB 3.1 Gen1 Type A Optional: 2 x USB 3.1 Gen 2 Type C on PCIe card
USB 2.0	Internal: 1x USB 2.0 plus 1x 2x5 USB 2.0 header for flex bay. (Requires 3rd party splitter cable to support 2x USB 2.0 Type A ports)
Serial	1 Rear
Network Connector (RJ-45)	2 Rear
PS/2	2 Rear
Audio:	
Universal Audio Jack	1 Front
Audio Line out	1 Rear
Audio Line in/Microphone	1 Rear

HARD DRIVE CONTROLLERS

Integrated Intel® Chipset SATA controller (6Gb/s) controller supports SATA software RAID 0, 1, 5, 10. Intel® vROC software RAID option (motherboard activation key) supports software RAID 0, 1, 10 with PCIe NVMe SSDs	Base Option at point of sale or customer kit
Broadcom MegaRAID® 9440-8i SAS 12Gb/s (SATA 6Gb/s) controller with 8 ports, supports software RAID 0, 1, 5, 10.	Optional PCIe x8 card
Broadcom MegaRAID® 9460-16i SAS 12Gb/s (SATA 6Gb/s) controller with 16 ports and 4GB cache memory with Flash module/Super Cap backup. Hardware based RAID 0, 1, 5, 10.	Optional PCIe x8 card

COMMUNICATIONS - NETWORK

Intel® i219 Gigabit Ethernet LAN 10/100/1000 ¹	Integrated on system board
Intel® I210 Gigabit Ethernet LAN Adapter 10/100/1000 ¹	Integrated on system board
Intel® I210-T1 Gigabit Ethernet LAN Adapter 10/100/1000 ¹	Optional PCIe x1 card
Intel® X550-T2 10GbE Ethernet Server Adapter ¹	Optional PCIe x4 card
Aquantia AQN-108 2.5Gbit/5Gbit single port Ethernet Adapter	Optional PCIe x4 card

¹ This term does not connote an actual operating speed of 1 or 10Gb/sec. For high speed transmission, connection to a Gigabit Ethernet server and network infrastructure is required.

AUDIO AND SPEAKERS

Realtek ALC3234 High Definition Audio Codec (2 channel)	Integrated on system board
Dell Digital Audio Interface	Optional module (USB) installed in 5.25" FlexBay Post RTS
Internal Chassis Speaker	Standard
Dell AC511 USB SoundBar	Optional
Dell AE515 Pro USB SoundBar	Optional
Dell AX210 USB Stereo Speakers	Optional

KEYBOARD AND MOUSE

Dell Multimedia Keyboard - KB216	Optional
Dell Optical Mouse - MS116	Optional
Dell KB813 Smartcard Keyboard	Optional
Dell Wireless Keyboard and Mouse - KM636	Optional
Dell Laser Scroll USB 6-Buttons Silver and Black Mouse	Optional

SECURITY

Trusted Platform Module (TPM) TPM 2.0	Integrated on system board TPM 2.0 is 100% on Windows 10 systems We enable TPM 1.2 with Windows 7, RHEL, Ubuntu and Neo-Kylin
Chassis Intrusion Switch with AC power interlock Note: System powers down when right side cover is opened	Standard
Dell Smartcard Keyboard	Optional
Chassis Kensington® lock slot, Padlock loop	Standard
Externally removable Power Supply—lockable with interior screw	Standard
Front and rear FlexBay bezels are lockable	Standard
Hard drive/SSD FlexBay sleds with key lock - set of 4 with 2 keys	Optional—Factory installed or Customer kit
CAC/PIV Smart Card Reader—fits into slim-line bay	Optional

¹TPM is not available in all countries. Depending on your country regulations, no-TPM system boards may be available.

SECURITY SOFTWARE

Dell Data Protection Security Tools (DDP ST)	Standard
Dell Data Protection Encryption (DDPE)	Optional

MISC. SOFTWARE

Dell Precision Optimizer V4.0	Included at no charge
Intel CAS W (Cache Acceleration Software - requires 256GB SSD Caching Drive (non-boot))	Optional

SERVICE AND SUPPORT

NOTE: For more details on Dell Service Plans please to go to: www.dell.com/service/service_plans

3 Year Warranty ¹ Next Business Day On-site ² (3-3-3)	Standard
ProSupport	Optional

¹ For a copy of our guarantees or limited warranties, please write Dell USA L.P., Attn: Warranties, One Dell Way, Round Rock, TX 78682. For more information, visit www.dell.com/warranty.

² Service may be provided by third-party. Technician will be dispatched if necessary following phone-based troubleshooting. Subject to parts availability, geographical restrictions and terms of service contract. Service timing dependent upon time of day call placed to Dell. U.S. only.

DETAILED ENGINEERING SPECIFICATIONS

SYSTEM DIMENSIONS (PHYSICAL)

NOTE: System Weight and Shipping Weight is based on a typical configuration and may vary based on actual configuration. A typical configuration includes: one graphics card one hard drive, one optical drive.

Chassis Volume (liters)	50.1
Typical Chassis Weight (pounds/kilograms)	53.6 lbs/ 24.3 kg
Chassis Dimensions: (HxWxD)	
Height (inches/centimeters)	17.05 in / 43.3 cm
Width (inches/centimeters)	8.58 in / 21.8 cm
Depth (inches/centimeters)	22.29 in / 56.6 cm
Shipping Weight (pounds/kilograms - includes packaging materials)	65.00 lb. / 29.48 kg
Packaging Parameters (HxWxD)	
Height (inches/centimeters)	24.25 in/ 61.6 cm
Width (inches/centimeters)	14.25 in / 36.2 cm
Depth (inches/centimeters)	29.25 in / 74.3 cm

SYSTEM EXPANSION SLOTS

Slot	Type	Voltage supported	Max Height (in,cm)	Max Length (in, cm)	Max Wattage	Cards Supported
1	PCIe x8 Gen 3 open ended slot	3.3V / 12V	Standard Height 4.38 in / 11.13 cm	Full Length 12.28in / 31.20cm	25	Storage, UltraSpeed Duo, Tera2 Host Card, 10G NIC
2	PCIe x16 Gen 3	3.3V / 12V	Standard Height 4.38 in / 11.13 cm	Full Length 12.28in / 31.20cm	300*	Graphics
3	PCIe x16 (x1) Gen 3	3.3V / 12V	Standard Height 4.38 in / 11.13 cm	Full Length 12.28in / 31.20cm	25	Tera2 Host Card, 1GbE NIC, 2.5/5GbE NIC, Serial Port
4	PCIe x 16 Gen 3	3.3V / 12V	Standard Height 4.38 in / 11.13 cm	Full Length 12.28in / 31.20cm	300*	Graphics, UltraSpeed Quad, Tera2 Host Card, 10G NIC, Serial, Thunderbolt
5	PCIe x16 (x4) Gen 3	3.3V / 12V	Standard Height 4.38 in / 11.13 cm	Full Length 12.28in / 31.20cm	25	Tera2 Host Card, 1GbE NIC, Serial Port, 2.5/5GbE NIC, Thunderbolt
	Mechanical Slot	n/a				
6	PCIe x16 Gen 3	3.3V / 12V	Standard Height 4.38 in / 11.13 cm	Full Length 12.28in / 31.20cm	225*	Only available when optional 2nd CPU is present Graphics, UltraSpeed Duo, UltraSpeed Quad, or Tera2
7	PCIe x16 Gen 3	3.3V / 12V	Standard Height 4.38 in / 11.13 cm	Full Length 12.28in / 31.20cm	225*	Only available when optional 2nd CPU is present. Graphics, UltraSpeed Duo, UltraSpeed Quad, or Tera2

***Total allowed graphics power is up to 750W - via 3 x16 slots @250W (future 2x 300W or 375W).**

- 220V input with the 1400Watt PSU is recommended for 750W configurations.
- 750W configurations have the following restriction: max 2x 150 watt processors **or** no LRDIMMs 3x Graphics card configs require the 2nd CPU to be installed.
- The 7920 Tower system ships with 3x 6+2 pin (8) aux power connectors. The 3rd 6+2 Pin connector is located at top of the system with the 2 additional PCIe x16 slots associated with and requiring the 2nd CPU.
- 4x WX7100 and 4x P4000 and dual WX9100 (future) configurations ship with additional aux power connectors. All supported graphics cards and configurations ship with required aux power connectors.

SYSTEM LEVEL ENVIRONMENTAL AND OPERATING CONDITIONS, PSU

Temperature	
Operating	10° to 35° C (50° to 95° F)
Non-Operating (Storage)	-40° to 65° C (-40° to 149° F)
Relative Humidity	20% to 80% (non-condensing)
Maximum vibration	
Operating	5 to 350 Hz at 0.0002 G ² /Hz
Non-Operating	5 to 500 Hz at 0.001 to 0.01 G ² /Hz
Maximum Shock	
Operating	40 G +/- 5% with pulse duration of 2 msec +/- 10% (equivalent to 51 cm/sec [20 in/sec])
Non-Operating	105 G +/- 5% with pulse duration of 2 msec +/- 10% (equivalent to 127 cm/sec [50 in/sec])
Maximum Altitude	
Operating	-15.2 to 3048 m (-50 to 10,000 ft)
Non-Operating	-15.2 to 10,668 m (-50 to 35,000 ft)

POWER

NOTE: These form factors utilize a more efficient Active Power Factor Correction (APFC) power supply. Dell recommends only Universal Power Supplies (UPS) based on Sine Wave output for APFC PSUs, not an approximation of a Sine Wave, Square Wave, or quasi-Square Wave. If you have questions, please contact the manufacture to confirm the output type.

	Specifications
Power Supply Wattage	1400W (for AC input voltages of 181—240 Vac) 1100W (for AC input voltages of 108—180 Vac) 1000W (for AC input voltages of 100—107 Vac)
AC input Voltage Range	100 - 240 Vac
AC input current (low ac range/high AC range)	15.0 A / 8.0 A
AC input Frequency	50 Hz / 60Hz
AC holdup time (80% load)	16 MSEC
Average Efficiency (Energy Star 5.2 Compliant)	87 – 90 – 87% @ 20 – 50 – 100% load
DC parameters	
+12.0v output	12V; 91.6A 116.7A
+12.0v auxiliary output	8.0A
-12.0v output	0.5A
Max total power	1400W
BTUs/h (based on PSU max wattage)	4777 BTU
Power Supply Fan	60*25mm (x2)
Compliance:	
0.5 watt requirement	Yes
Climate Savers / 80Plus Compliant	Yes
FEMP (CECP) Standby Power Compliant	Yes

POWER (CONT), HDD CONTROLLERS**3.0V CMOS BATTERY**

Brand	Type	Voltage	Composition	Life
MITSUBISHI	CR-2302	3V	Lithium	Continuous Discharge Under 15 kΩ Load to 2.5V End-Voltage: 1000 hours or longer
SHUNWO	CR2302	3V	Lithium	Continuous Discharge Under 15 kΩ Load to 2V End-Voltage: 990 hours or longer
JHT	CR2302	3V	Lithium	Continuous Discharge Under 15 kΩ Load to 2.5V End-Voltage: 1000 hours or longer

BROADCOM MEGARAID PCI-E CONTROLLERS

	MegaRAID(R) 9440-8I	MegaRAID(R) 9460-8I
	Upgrade Option	Upgrade option
RAID Levels	RAID 0, 1, 5, 10	RAID 0, 1, 5, 10
HDD I/F	SATA + SAS, NVMe	SATA + SAS, NVMe
Data transfer rates	SAS—Up to 12 Gb/s per port SATA—Up to 6Gb/s per port NVMe – PCIe Gen3 from MR7.4	SAS—Up to 12 Gb/s per port SATA—Up to 6Gb/s per port NVMe – PCIe Gen3 from MR7.4
SAS controller	SAS3408	SAS3516
Cache size	None	4 GB 2133MHz DDR4 SDRAM
Battery/Cache Protection	N/A	SuperCAP (CacheVault Flash backup)
PCI card type	3.3V PCI-e 3.0 x8	3.3V PCI-e 3.0 x8
Dimensions	6.127" x 2.712" (155.65 mm x 68.90 mm)	6.127" x 2.712" (155.65 mm x 68.90 mm)

AUDIO—INTEGRATED

REALTEK ALC3234 HIGH DEFINITION AUDIO

REALTEK ALC3234 HIGH DEFINITION AUDIO	
High Definition Stereo support	X
Number of channels	2
Number of Bits / Audio resolution	16, 20, and 24-bit resolution
Sampling rate (recording/playback)	Support 44.1K/48K/96K/192 kHz sample rates
Signal to Noise Ratio	95 dB DAC outputs, 90 dB for ADC inputs
Analog Audio	X
Dolby Digital	
THX	
Digital out (S/PDIF)	
Audio Jack Impedance	
Microphone	32K ohms
Line-In	32K ohms
Line-Out	200 ohms
Headphone	1 ohm
Internal Speaker Power Rating	2.3 Watts (max) / 2.0 Watts (typ)

COMMUNICATIONS—INTEGRATED LAN

INTEL® I219 GIGABIT1 ETHERNET LAN 10/100/1000

INTEL® I219 GIGABIT1 ETHERNET LAN 10/100/1000	
External Connector Type	RJ45
Data Rates supported	10/100/1000 Mbps
Controller Details	
Controller bus architecture	Intel direct-connect
Integrated memory	N/A
Data transfer mode (example Bus-Master DMA)	N/A
Power consumption (full operation per data rate connection speed)	690mW (Max.)
Power consumption (standby operation)	107mW (Max.)
IEEE standards compliance (example 802.1P)	802.3
Hardware Certifications (example FCC, B, GS mark...)	N/A
Boot ROM Support	EEPROM (located in SPI)
Network Transfer Mode (example Full Duplex, Half Duplex)	
Network Transfer Rate (example 10BASE-T (half-duplex) 10 Mbps 10BASE-T (full-duplex) 20 Mbps 100BASE-TX (half-duplex) 100 Mbps 100BASE-TX (full-duplex) 200 Mbps 1000BASE-T (full-duplex) 2000 Mbps)	10 Mb (full/half-duplex) 100 Mb (full/half-duplex) 1000 Mb (full-duplex)

COMMUNICATIONS—INTEGRATED LAN (CONT.)

INTEL® I217-LM GIGABIT1 ETHERNET LAN 10/100/1000 (CONT.)

Environmental	
Operating System Driver Support	Same as System
Manageability (examples WOL, PXE)	WOL, PXE 2.1
Management Capabilities Alerting	Intel® Standard Manageability, Intel Xeon Processor with vPro Technology

¹ This term does not connote an actual operating speed of 1 Gb/sec. For high speed transmission, connection to a Gigabit Ethernet server and network infrastructure is required.

COMMUNICATIONS—INTEGRATED LAN CONT'D

Intel® I210 1Gb Ethernet Adapter

Connector Type	RJ45
Data Rates supported	10/100/1000 Mbps copper
Controller Details	
Controller bus architecture (example PCIe 1.0a x1)	PCI Express* Gen 2.1 x1
Integrated memory	Dual 48K configurable TX/RX FIFO Buffers
Data transfer mode (example Bus-Master DMA)	Bus-Master DMA
Power consumption (full operation per data rate connection speed)	810mW
Power consumption (standby operation)	Less than 300mW
IEEE standards compliance (example 802.1P)	802.1p, 802.1q, 802.2, 802.3, 802.3ab
Hardware Certifications (example FCC, B, GS mark...)	FCC B, UL, CE, VCCI, BSMI, CTICK, KCC
Boot ROM Support	Disabled
Network Transfer Mode (example Full Duplex, Half Duplex)	
Network Transfer Rate (example 10BASE-T (half-duplex) 10 Mbps 10BASE-T (full-duplex) 20 Mbps 100BASE-TX (half-duplex) 100 Mbps 100BASE-TX (full-duplex) 200 Mbps 1000BASE-T (full-duplex) 2000 Mbps)	10BASE-T (half-duplex) 10 Mbps* 10BASE-T (full-duplex) 20 Mbps* 100BASE-TX (half-duplex) 100 Mbps* 100BASE-TX (full-duplex) 200 Mbps* 1000BASE-T (full-duplex) 2000 Mbps* * Depends on the system environment.

Environmental	
Operating System Driver Support	Sam as System
Manageability (examples WOL, PXE)	WOL, PXE2.1, ACPI v1.1
Management Capabilities Alerting (example ASF 2.0)	None

Intel® 10GbE PCIe Ethernet Server Adapter X550-T2

Intel® 10GbE PCIe Ethernet Server Adapter X550-T2	
Connector Type	2X RJ45
Data Rates supported	100Mb/1GbE/2.5GbE/5GbE/10GbE
Controller Details	
Controller bus architecture (example PCIe 1.0a x1)	PCI Express* Gen 3 x4
Data transfer mode (example Bus-Master DMA)	Bus-Master DMA
Power consumption (full operation per data rate connection speed)	13W
Power consumption (standby operation)	Less than 300mW
IEEE standards compliance (example 802.1P)	802.3an, 802.3, P802.3bz, 1149.6, 802.3ap, 1149.1, 802.1Q, 1588, P802.1AE, 802.3az, 802.1BR, 802.Qbg, 802.1Qaz, 802.1Qbb, 802.1BR, 802.1p, 802.1AS
Hardware Certifications (example FCC, B, GS mark...)	FCC B, UL, CE, VCCI, BSMI, CTICK, KCC
Boot ROM Support	Disabled
Network Transfer Mode (example Full Duplex, Half Duplex)	
Network Transfer Rate (example 10BASE-T (half-duplex) 10 Mbps 10BASE-T (full-duplex) 20 Mbps 100BASE-TX (half-duplex) 100 Mbps 100BASE-TX (full-duplex) 200 Mbps 1000BASE-T (full-duplex) 2000 Mbps	1000BASE-T (full-duplex) 2000 Mbps Max* 2.5G NBASE-T (full-duplex) 5000 Mbps Max* 5G NBASE-T (full-duplex) 10000 Mbps Max* 10GBASE-T (full-duplex) 20000 Mbps Max* * Depends on the system environment.
Environmental	
Operating System Driver Support	Windows 7 32/64, Windows 8.1 64, Red Hat Linux 7.0,
Manageability (examples WOL, PXE)	WfM, DMI 2.0, WMI, SNMP, RIS, PXE 2.0
Management Capabilities Alerting (example ASF 2.0)	None

Aquantia

Aquantia	
Connector Type	1X RJ45
Data Rates supported	100Mb/1GbE/2.5GbE/5GbE
Controller Details	
Controller bus architecture (example PCIe 1.0a x1)	PCI Express* Gen 3 x1
Data transfer mode (example Bus-Master DMA)	Bus-Master DMA
Power consumption (full operation per data rate connection speed)	3.5W
Power consumption (standby operation)	Less than 300mW
IEEE standards compliance (example 802.1P)	802.3bs, 802.3, 802.1P, 802.1AE, 802.1QAV
Hardware Certifications (example FCC, B, GS mark...)	UL, CSA, LVD/CE, FCC, ICES, ACA, BSMI, RRL, VCCI
Boot ROM Support	Disabled

COMMUNICATIONS—5G NIC, USB 3.1 GEN 2 TYPE C PCIE CARD

Aquantia Continued

Aquantia Continued	
Network Transfer Mode (example Full Duplex, Half Duplex)	
Network Transfer Rate (example 10BASE-T (half-duplex) 10 Mbps 10BASE-T (full-duplex) 20 Mbps 100BASE-TX (half-duplex) 100 Mbps 100BASE-TX (full-duplex) 200 Mbps 1000BASE-T (full-duplex) 2000 Mbps)	1000BASE-T (full-duplex) 2000 Mbps Max* 2.5G NBASE-T (full-duplex) 5000 Mbps Max* 5G NBASE-T (full-duplex) 10000 Mbps Max* * Depends on the system environment.

Environmental

Environmental	
Operating System Driver Support	Windows 7 64, Windows 10 64,
Manageability (examples WOL, PXE)	WOL, ACPI, UEFI 2.3/2.5 and PXE 2.1
Management Capabilities Alerting (example ASF 2.0)	None

SUNIX USB-C 3.1 10G & DISPLAYPORT ALT-MODE PCI EXPRESS HOST CARD

SUNIX USB-C 3.1 10G & DISPLAYPORT ALT-MODE PCI EXPRESS HOST CARD	
External Connector Type	2 x USB-C, 1 x DP (input)
Port feature	1 Data only USB-C, 1 Full Feature USB-C, 1 DP in
Controller Details	
Data Transfer Rate	Super Speed+ (10Gbps), Super Speed (5Gbps), High Speed (480Mbps), Full Speed (12Mbps), Low Speed (1.5Mbps)
Controller type	Asmedia ASM1142
Data transfer mode (example Bus-Master DMA)	N/A
PCIe connector	PCIe Gen3 x1
Power from USB-3	5V/1.5A each
Card Power consumption max	18.3W

COMMUNICATIONS—ADD IN SERIAL PORT AND THUNDERBOLT 3.0 CARDS

Dell PCIe Serial FH/LP Card (DPWC100)	
Connector Type	RS-232
Data Rates supported	250Kbps
Controller Details	
Controller bus architecture (example PCIe 1.0a x1)	PCIe Gen 1.1 X1
Data transfer mode (example Bus-Master DMA)	Serial Bus
Power consumption (full operation per data rate connection speed)	1.05W + 12W (1A Configurable at 5V or 12V)
Power consumption (standby operation)	Less than 1.05W
Standards compliance (example 802.1P)	RS-232, Power COM port(5V/12V)
Hardware Certifications (example FCC, B, GS mark...)	FCC B, UL, CE, VCCI, BSMI, CTICK, KCC
Boot ROM Support	No
Operating System Driver Support	Windows 7 32/64, Windows 8.1 64 Red Hat Linux 7.0

Thunderbolt 3 PCIe Card	
Connector Type	Thunderbolt 3, DisplayPort
Data Rates supported	40Gb/s
Controller Details	
Controller bus architecture (example PCIe 1.0a x1)	PCIe Gen 3 X4
Data transfer mode (example Bus-Master DMA)	4× PCI Express 3.0, DisplayPort 1.2
Power consumption (full operation per data rate connection speed)	2.5W + 30W Device
Power consumption (standby operation)	300mW
Standard compliance (example 802.1P)	Thunderbolt 3, DP 1.2, USB 3.1 Gen2
Hardware Certifications (example FCC, B, GS mark...)	FCC B, UL, CE, VCCI, BSMI, CTICK, KCC
Boot ROM Support	No

Environmental	
Operating System Driver Support	Windows 7 32/64, Windows 8.1 / Windows 10 64
Manageability (examples WOL, PXE)	None
Management Capabilities Alerting (example ASF 2.0)	None

COMMUNICATIONS—PCoIP REMOTE ACCESS HOST SOLUTIONS

Dell PCIe Quad Display PCoIP Remote Access Host Card (Full height)

Connector Type	RJ45 x 1, mDP x 4
Displays supported	2 @ 2560 x 1600 or 4 @ 1920 x 1200
Imaging Performance	130 Mpps 60fps
Dongles supplied	mDP to DP x 4
Optional dongle for DMS59 to DVI graphics cards	DVI to mDP
Controller Details	
Controller bus architecture (example PCIe 1.0a x1)	PCIe Gen 1.1 X1
Data transfer mode (example Bus-Master DMA)	N/A
Integrated memory	Flash Memory:256 Mbit (parallel fastboot flash) System RAM:512MB DDR3 ECC
Power consumption (full operation per data rate connection speed)	13.15 W
Power consumption (standby operation)	N/A
Standards compliance (example 802.1P)	802.1x, DisplayPort
Hardware Certifications (example FCC, B, GS mark...)	FCC B, UL, CE, VCCI, BSMI, CTICK, KCC
Boot ROM Support	No
Operating System Driver Support (Web down load—not factory installed)	Windows 7 32/64, Windows 8.1/Win 10 64 Red Hat Linux 7.0, 7.2

Dell PCIe Dual display PCoIP Remote Access Host Card, (half height/full height bracket)

Connector Type	RJ45 x 1, mDP x 2
Displays supported	1 @ 2560 x 1600 or 2 @ 1920 x 1200
Imaging Performance	130 Mpps 60fps
Dongles supplied	mDP to DP x 2
Optional dongle for DMS59 to DVI graphics cards	DVI to mDP
Controller Details	
Controller bus architecture (example PCIe 1.0a x1)	PCIe Gen 1.1 X1
Data transfer mode (example Bus-Master DMA)	N/A
Integrated memory	Flash Memory:256 Mbit (parallel fastboot flash) System RAM:512MB DDR3 ECC
Power consumption (full operation per data rate connection speed)	13.15 W
Power consumption (standby operation)	N/A
Standards compliance (example 802.1P)	802.1x, DisplayPort
Hardware Certifications (example FCC, B, GS mark...)	FCC B, UL, CE, VCCI, BSMI, CTICK, KCC
Boot ROM Support	No
Operating System Driver Support (Web down load—not factory installed)	Windows 7 32/64, Windows 8.1/Win 10 64 Red Hat Linux 7.0, 7.2, 7.3

GRAPHICS

NVIDIA NVS 310	
PCIe slot width	1 slot full height and available in half height for SFF chassis
Memory	1 GB DDR3
Open GL	4.1
Open CL	Not supported
DirectX	11.0
Vulcan	
PCIe support	x16 Gen2
Max Resolution (# of DisplayPorts used)	2560x1600 (DisplayPort) 1920x1200 (using DP to DVI-I video adapter)
Maximum Monitors using DP Multi-Stream (monitor to monitor connections)	2
Maximum monitors (direct connection)	2
Max # of 4Kx2K displays @ 60hz	0
Max # of 5120x2880 pixel displays @ 60hz	0
Video connectors	two DisplayPorts 1.1
Included video adapters (with systems or customer kits)	2 DisplayPort to SL-DVI-I
Aux power connectors needed	None
Maximum power	19.5 W

GRAPHICS

NVIDIA NVS 315	
PCIe slot width	1 slot full height and available in half height for SFF chassis
Memory	1 GB DDR3
Open GL	4.1
Open CL	Not supported
DirectX	11.0
Vulcan	Not supported
PCIe support	x16 Gen2
Max Resolution (# of DisplayPorts used)	2560x1600 (using DMS59 to DisplayPort adapter) 1920x1200 (using DMS50 to DVI-I adapter)
Maximum Monitors using DP Multi-Stream (monitor to monitor connections)	2
Maximum monitors (direct connection)	2
Max # of 4Kx2K displays @ 60hz	0
Max # of 5120x2880 pixel displays @ 60hz	0
Video connectors	1 DMS-59
Included video adapters (with systems or customer kits)	1 DMS-59 to dual SL-DVI-I
Aux power connectors needed	None
Maximum power	19.5 W

GRAPHICS

NVIDIA QUADRO P400	
PCIe slot width	1 slot full height and available in half height for SFF chassis
Memory (GDDR5)	2 GB
Open GL	4.5
Open CL	yes
DirectX	11.2
Vulcan	1.0
PCIe support	x16 Gen3
Max Resolution (# of DisplayPorts used)	5120x2880 24bpp @ 60hz
Maximum Monitors using DP Multi-Stream (monitor to monitor connections)	3
Maximum monitors (direct connection)	3
Max # of 4Kx2K displays @ 60hz	3
Max # of 5120x2880 pixel displays @ 60hz	1
Max # of 7280x4320 pixel displays @ 60hz	0
Video connectors	three mini-DisplayPorts 1.4
Included video adapters (with systems or customer kits)	None
Aux power connectors needed	None
Maximum power	30 W

GRAPHICS

NVIDIA QUADRO P600	
PCIe slot width	1 slot full height and available in half height for SFF chassis
Memory (GDDR5)	2 GB
Open GL	4.5
Open CL	yes
DirectX	11.2
Vulcan	1.0
PCIe support	x16 Gen3
Max Resolution (# of DisplayPorts used)	5120x2880 24bpp @ 60hz
Maximum Monitors using DP Multi-Stream (monitor to monitor connections)	4
Maximum monitors (direct connection)	4
Max # of 4Kx2K displays @ 60hz	4
Max # of 5120x2880 pixel displays @ 60hz	4
Max # of 7280x4320 pixel displays @ 60hz	0
Video connectors	four mini-DisplayPorts 1.4
Included video adapters (with systems or customer kits)	None
Aux power connectors needed	None
Maximum power	40 W

GRAPHICS

NVIDIA QUADRO P1000	
PCIe slot width	1 slot full height and available in half height for SFF chassis
Memory (GDDR5)	4 GB
Open GL	4.5
Open CL	yes
DirectX	12.0
Vulcan	1.0
PCIe support	x16 Gen3
Max Resolution (# of DisplayPorts used)	5120x2880 24bpp @60hz (one DisplayPort)
Maximum Monitors using DP Multi-Stream (monitor to monitor connections)	4
Maximum monitors (direct connection)	4
Max # of 4Kx2K displays @ 60hz	4
Max # of 5120x2880 pixel displays @ 60hz	4
Max # of 7280x4320 pixel displays @ 60hz	0
Video connectors	four mini-DisplayPorts 1.4
Included video adapters (with systems or customer kits)	None
Aux power connectors needed	None
Maximum power	47 W

GRAPHICS

RADEON PRO WX 2100	
PCIe slot width	1 slot full height and available in half height for SFF chassis
Memory (GDDR5)	2 GB
Open GL	4.5
Open CL	2.0
DirectX	12.0
Vulcan	1.0
PCIe support	x16 Gen3
Max Resolution (# of DisplayPorts used)	5120x3200, 24bpp, 60Hz 3840x4320, 24bpp, 60Hz (half 8K)
Maximum Monitors using DP Multi-Stream (monitor to monitor connections)	5
Maximum monitors (direct connection)	3
Max # of 4Kx2K displays @ 60hz	3 (1 display @120Hz)
Max # of 5120x2880 pixel displays @ 60hz	1
Max # of 7280x4320 pixel displays @ 60hz	0
Video connectors	2 miniDP 1.4 + one DisplayPort 1.4
Included video adapters (with systems or customer kits)	None
Aux power connectors needed	None
Maximum power	50 W

GRAPHICS

RADEON PRO WX 3100	
PCIe slot width	1 slot full height and available in half height for SFF chassis
Memory (GDDR5)	4 GB
Open GL	4.5
Open CL	2.0
DirectX	12.0
Vulcan	1.0
PCIe support	x16 Gen3
Max Resolution (# of DisplayPorts used)	5120x3200, 24bpp, 60Hz 3840x4320, 24bpp, 60Hz (half 8K)
Maximum Monitors using DP Multi-Stream (monitor to monitor connections)	5
Maximum monitors (direct connection)	3
Max # of 4Kx2K displays @ 60hz	3 (1 display @120Hz)
Max # of 5120x2880 pixel displays @ 60hz	1 (dual DP cables)
Max # of 7280x4320 pixel displays @ 60hz	0
Video connectors	2 miniDP 1.4 + one DisplayPort 1.4
Included video adapters (with systems or customer kits)	None
Aux power connectors needed	None
Maximum power	50 W

GRAPHICS

NVIDIA QUADRO P2000	
PCIe slot width	1
Memory (GDDR5)	5 GB
Open GL	4.5
Open CL	
DirectX	12.0
Vulcan	1.0
PCIe support	x16 Gen3
Max Resolution (# of DisplayPorts used)	5120x2880 24bpp @60hz (one DisplayPort)
Maximum Monitors using DP Multi-Stream (monitor to monitor connections)	4
Maximum monitors (direct connection)	4
Max # of 4Kx2K displays @ 60hz	4 (4 @ 120Hz)
Max # of 5120x2880 pixel displays @ 60hz	4
Max # of 7280x4320 pixel displays @ 60hz	0
Video connectors	four DisplayPorts 1.4
Included video adapters (with systems or customer kits)	None
Aux power connectors needed	None
Maximum power	75 W

GRAPHICS

NVIDIA QUADRO P4000	
PCIe slot width	1
Memory (GDDR5)	8 GB
Open GL	4.5
Open CL	
DirectX	12.0
Vulcan	1.0
PCIe support	x16 Gen3
Max Resolution (# of DisplayPorts used)	5120x2880 24bpp @60hz (one DisplayPort)
Maximum Monitors using DP Multi-Stream (monitor to monitor connections)	4
Maximum monitors (direct connection)	4
Max # of 4Kx2K displays @ 60hz	4 (4 @ 120Hz)
Max # of 5120x2880 pixel displays @ 60hz	4
Max # of 7280x4320 pixel displays @ 60hz	0
Video connectors	four DisplayPorts 1.4 One stereo (optional)
Included video adapters (with systems or customer kits)	None
Aux power connectors needed	None
Maximum power	105 W

GRAPHICS

RADEON PRO WX 4100	
PCIe slot width	1 slot full height and available in half height for SFF chassis
Memory (GDDR5)	4 GB
Open GL	4.5
Open CL	2.0
DirectX	12.0
Vulcan	1.0
PCIe support	x16 Gen3
Max Resolution (# of DisplayPorts used)	5120x2880 30bpp @ 60hz
Maximum Monitors using DP Multi-Stream (monitor to monitor connections)	4
Maximum monitors (direct connection)	4
Max # of 4Kx2K displays @ 60hz	4 (1 display @120Hz)
Max # of 5120x2880 pixel displays @ 60hz	2 (dual DP cables)
Max # of 7280x4320 pixel displays @ 60hz	1 (dual DP cables)
Video connectors	four DisplayPorts 1.4
Included video adapters (with systems or customer kits)	None
Aux power connectors needed	None
Maximum power	50 W

GRAPHICS

RADEON PRO WX 5100	
PCIe slot width	1
Memory (GDDR5)	8 GB
Open GL	4.5
Open CL	2.0
DirectX	12.0
Vulcan	1.0
PCIe support	x16 Gen3
Max Resolution (# of DisplayPorts used)	7680x4320 30bpp @60hz (two DisplayPorts)
Maximum Monitors using DP Multi-Stream (monitor to monitor connections)	4
Maximum monitors (direct connection)	4
Max # of 4Kx2K displays @ 60hz	4 (1 display @120hz)
Max # of 5120x2880 pixel displays @ 60hz	2 (dual DP cables)
Max # of 7280x4320 pixel displays @ 60hz	1 (dual DP cables)
Video connectors	four DisplayPorts 1.4
Included video adapters (with systems or customer kits)	None
Aux power connectors needed	None
Maximum power	75 W

GRAPHICS

RADEON PRO WX 7100	
PCIe slot width	1
Memory (GDDR5)	8 GB
Open GL	4.5
Open CL	2.0
DirectX	12.0
Vulcan	1.0
PCIe support	x16 Gen3
Max Resolution (# of DisplayPorts used)	7680x4320 30bpp @60hz (two DisplayPorts)
Maximum Monitors using DP Multi-Stream (monitor to monitor connections)	4
Maximum monitors (direct connection)	4
Max # of 4Kx2K displays @ 60hz	4 (1 display @120hz)
Max # of 5120x2880 pixel displays @ 60hz	2 (dual DP cables)
Max # of 7280x4320 pixel displays @ 60hz	1 (dual DP cables)
Video connectors	four DisplayPorts 1.4
Included video adapters (with systems or customer kits)	None
PCIe Aux power connectors needed	6-pin
Maximum power	130 W

GRAPHICS

RADEON PRO WX 9100	
PCIe slot width	2
Memory (GDDR5)	16 GB HMB2
Open GL	4.5
Open CL	2.0
DirectX	12.0
Vulcan	1.0
PCIe support	x16 Gen3
Max Resolution (# of DisplayPorts used)	7680x4320 @ 60Hz (two DisplayPorts)
Maximum Monitors using DP Multi-Stream (monitor to monitor connections)	6
Maximum monitors (direct connection)	6
Max # of 4Kx2K displays @ 60hz	6 (2 displays @120Hz)
Max # of 5120x2880 pixel displays @ 60hz	3 (dual DP cables)
Max # of 7280x4320 pixel displays @ 60hz	1 (dual DP cables)
Video connectors	6 mini-DisplayPort 1.4
Included video adapters (with systems or customer kits)	None
PCIe Aux power connectors needed	8 pin + 6 pin
Maximum power	250 W

GRAPHICS

RADEON PRO SSG	
PCIe slot width	2
Memory (GDDR5)	2TB SSD + 16 GB HBM2
Open GL	4.5
Open CL	2.0
DirectX	12.0
Vulcan	1.0
PCIe support	x16 Gen3
Max Resolution (# of DisplayPorts used)	7680x4320 @ 60Hz (two DisplayPorts)
Maximum Monitors using DP Multi-Stream (monitor to monitor connections)	6
Maximum monitors (direct connection)	6
Max # of 4Kx2K displays @ 60hz	6 (2 displays @120Hz)
Max # of 5120x2880 pixel displays @ 60hz	3 (dual DP cables)
Max # of 7280x4320 pixel displays @ 60hz	1 (dual DP cables)
Video connectors	6 mini-DisplayPort 1.4
Included video adapters (with systems or customer kits)	None
PCIe Aux power connectors needed	8 pin + 6 pin
Maximum power	275 W

GRAPHICS

NVIDIA QUADRO P5000	
PCIe slot width	2
Memory (GDDR5)	16GB GDDR5X
Open GL	4.5
Open CL	2.0
DirectX	12.0
Vulcan	1.0
PCIe support	x16 Gen3
Max Resolution (# of DisplayPorts used)	7680x4320 24bpp @120hz (four DisplayPorts) 7680x4320 24bpp @60Hz (two DisplayPorts)
Maximum Monitors using DP Multi-Stream (monitor to monitor connections)	4
Maximum monitors (direct connection)	4
Max # of 4Kx2K displays @ 60hz	4
Max # of 5120x2880 pixel displays @ 60hz	4
Max # of 7280x4320 pixel displays @ 60hz	1 (dual DP cables)
Video connectors	One Dual Link DVI-I Four DisplayPorts One Stereo (optional) SYNC connector
Included video adapters (with systems or customer kits)	None
card to card connectors	SLI bridge
PCIe Aux power connectors needed	8-pin
Maximum power	180 W

GRAPHICS

NVIDIA QUADRO P6000	
PCIe slot width	2
Memory (GDDR5)	24GB GDDR5X
Open GL	4.5
Open CL	
DirectX	12.0
Vulcan	1.0
PCIe support	x16 Gen3
Max Resolution (# of DisplayPorts used)	7680x4320 24bpp @120hz (four DisplayPorts) 7680x4320 24bpp @60Hz (two DisplayPorts)
Maximum Monitors using DP Multi-Stream (monitor to monitor connections)	4
Maximum monitors (direct connection)	4
Max # of 4Kx2K displays @ 60hz	4
Max # of 5120x2880 pixel displays @ 60hz	4
Max # of 7280x4320 pixel displays @ 60hz	1 (dual DP cables)
Video connectors	One Dual Link DVI-I Four DisplayPorts One Stereo (optional) SYNC connector
Included video adapters (with systems or customer kits)	None
card to card connectors	SLI bridge
PCIe Aux power connectors needed	8-pin (ships with an adapter for 8pin to dual PCIe 6-pin for system power)
Maximum power	250W

GRAPHICS

NVIDIA QUADRO GP100	
PCIe slot width	2
Memory (GDDR5)	16 GB HMB2
Open GL	4.5
Open CL	
DirectX	12.0
Vulcan	1.0
PCIe support	x16 Gen3
Max Resolution (# of DisplayPorts used)	7680x4320 24bpp @120hz (four DisplayPorts) 7680x4320 24bpp @60Hz (two DisplayPorts)
Maximum Monitors using DP Multi-Stream (monitor to monitor connections)	4
Maximum monitors (direct connection)	4
Max # of 4Kx2K displays @ 60hz	4
Max # of 5120x2880 pixel displays @ 60hz	4
Max # of 7280x4320 pixel displays @ 60hz	1 (dual DP cables)
Video connectors	One Dual Link DVI-I Four DisplayPorts One Stereo (optional) SYNC connector
Included video adapters (with systems or customer kits)	None
card to card connectors	1 or 2 NVLink
PCIe Aux power connectors needed	8-pin (ships with an adapter for 8pin to dual PCIe 6-pin for system power)
Maximum power	235W

HARD DRIVES¹

3.5" 500GB SATA 7200 RPM HDD POST RTS	
Capacity (bytes)	500,107,862,016
Dimensions inches (W x D x H)	Approximately (4.00 x 5.787 x 1.028 inches)
Interface type and Maximum speed	SATA Up to 6Gb/s
Internal buffer size	16 MB NCQ
Rotational Speed	7200 RPM
Logical Blocks	976,773,168
Power Source	
Power Consumption (reference only)	Idle 5.0W, Active 10.0W
Spin Up Current (reference only)	5V (1A) ,12V (2A)

3.5" 1TB SATA 7200 RPM HDD	
Capacity (bytes)	1,000,204,886,016
Dimensions inches (W x D x H)	Approximately (4.00 x 5.787 x 1.028 inches)
Interface type and Maximum speed	SATA Up to 6Gb/s
Internal buffer size	32 MB NCQ
Rotational Speed	7200 RPM
Logical Blocks	1,953,525,168
Power Source	
Power Consumption (reference only)	Idle 5.0W, Active 10.0W
Spin Up Current (reference only)	5V (1A) ,12V (2A)

¹ For hard drives, GB means 1 billion bytes ; actual capacity varies with preloaded material and operating environment and will be less.

HARD DRIVES¹**3.5" 2TB SATA 7200 RPM HDD**

3.5" 2TB SATA 7200 RPM HDD	
Capacity (bytes)	2,000,398,934,016
Dimensions inches (W x D x H)	Approximately (4.00 x 5.787 x 1.028 inches)
Interface type and Maximum speed	SATA Up to 6Gb/s
Internal buffer size	32 MB NCQ
Rotational Speed	7200 RPM
Logical Blocks	3,907,029,168
Power Source	
Power Consumption (reference only)	Idle 5.0W, Active 10.0W
Spin Up Current (reference only)	5V (1A) ,12V (2A)

3.5" 4TB SATA 5X00 RPM HDD

3.5" 4TB SATA 5X00 RPM HDD	
Capacity (bytes)	4TB
Dimensions inches (W x D x H)	4 x 5.79 x 1.028
Interface type and Maximum speed	6Gbps SATA3
Internal buffer size	64MB
Average Seek Time	12ms
Rotational Speed	5X00 RPM
Logical Blocks	7,814,037,168
Power Source	
Power Consumption (reference only)	Idle 5W, Active 10 W
Spin Up Current (reference only)	12V (2A)

¹ For hard drives, GB means 1 billion bytes ; actual capacity varies with preloaded material and operating environment and will be less.

HARD DRIVES¹ (CONT.)**2.5" 500GB SATA 7200 RPM HDD**

Capacity (bytes)	500,107,862,016
Dimensions inches (W x D x H)	Approximately (2.75 x 3.94 x 0.374 inches)
Interface type and Maximum speed	SATA Up to 3Gb/s
Internal buffer size	16 MB
Rotational Speed	7200 RPM
Logical Blocks	976,773,168
Power Source	
Power Consumption (reference only)	Idle 0.70W, Active 3.25W
Spin Up Current (reference only)	5V (1000 mA)

2.5" 500GB¹ SATA 7,200 RPM OPAL SED WITH FIPS HDD

Capacity (bytes)	500GB
Dimensions inches (W x D x H)	2.75 x 3.95 x 0.278
Interface type and Maximum speed	6Gbps SATA3
Internal buffer size	16MB
Rotational Speed	5400RPM
Logical Blocks	976,773,168
Power Source	
Power Consumption (reference only)	Idle 0.7W, Active 3.25W
Spin Up Current (reference only)	5V (1A)

¹ For hard drives, GB means 1 billion bytes ; actual capacity varies with preloaded material and operating environment and will be less.

HARD DRIVES¹ (CONT.)

2.5" 300GB SAS 15K RPM HDD	
Capacity (bytes)	300GB
Dimensions inches (W x D x H)	Approximately (2.75 x 3.94 x 0.374 inches)
Interface type and Maximum speed	SAS Up to 6Gb/s
Internal buffer size	32MB
Rotational Speed	15,000 RPM
Power Source	
Power Consumption (reference only –typical)	9.0W
Spin Up Current (reference only)	Not Specified

2.5" 600GB SAS 15K RPM HDD	
Capacity (bytes)	600GB
Dimensions inches (W x D x H)	69.85mm x 100.45mm x 15mm
Interface type and Maximum speed	SAS Up to 6Gb/s
Internal buffer size	64MB
Rotational Speed	15,000 RPM
Power Source	
Power Consumption (reference only –typical)	9.0W
Spin Up Current (reference only)	Not Specified

¹ For hard drives, GB means 1 billion bytes ; actual capacity varies with preloaded material and operating environment and will be less.

HARD DRIVES¹ (CONT.)

2.5" 900GB SAS 15K RPM HDD	
Capacity (bytes)	900GB
Dimensions inches (W x D x H)	Approximately (2.75 x 3.94 x 0.374 inches)
Interface type and Maximum speed	SAS Up to 6Gb/s
Internal buffer size	16MB Minimum
Rotational Speed	10,000 RPM
Power Source	
Power Consumption (reference only)	Active 9.0W
Spin Up Current (reference only)	Not Specified

2.5" 1.8TB SAS 10,000 RPM HDD	
Capacity (bytes)	1.8TB
Dimensions inches (W x D x H)	Approximately (2.75 x 3.94 x 0.374 inches)
Interface type and Maximum speed	SAS Up to 6Gb/s
Internal buffer size	16MB Minimum
Rotational Speed	10,000 RPM
Power Source	
Power Consumption (reference only)	Active 9.0W
Spin Up Current (reference only)	Not Specified

¹ For hard drives, GB means 1 billion bytes ; actual capacity varies with preloaded material and operating environment and will be less.

OPTICAL DRIVES

	8x Slimline DVD-ROM	8x Slimline DVD +/- R/W¹	16x Half Height DVD +/- R/W¹
External Dimensions inches/ centimeters (Without Bezel – W x H x D)	128.0 mm (5.04)/ 12.7mm (0.5 in)/ 126.1mm (4.97in)	128.0 mm (5.04)/ 12.7mm (0.5 in)/ 126.1mm (4.97in)	148.2mm(6in)/42mm (2in)/ 171 (max)
Weight (max) pounds/kilograms	140g	140g	700g
Interface type and speed	SATA 1.5Gbit/s	SATA 1.5Gbit/s	SATA 1.5Gbit/s
Disc Capacity	Standard	Standard	Standard
Internal buffer size	supplier dependent	supplier dependent	supplier dependent
Access Times (typical)	supplier dependent	supplier dependent	supplier dependent
Writes	NA	8x DVD/ 24x CD	16x DVD/48x CD
Reads	8x DVD/ 24x CD	8x DVD/ 24x CD	16x DVD/48x CD
Power Source			
DC Power Requirements	5V	5V	12V, 5V
DC Current	1300mA	1300mA	800mA (12V)/ 1100mA (5V)

	8X Half Height BD-RE
External Dimensions (Without Bezel - W x H x D)	148.2mm x 42mm x 171 (6.0x2.0x7.7 inches)
Weight (max) pounds/kilograms	700g
Interface type and speed	SATA 1.5Gbit/s
Disc Capacity	Standard
Internal buffer size	0.5 MB
Access Times (typical)	supplier dependent
Writes	8X BD/16x DVD/48x CD
Reads	8X BD/16x DVD/48x CD

¹ Discs burned with this drive may not be compatible with some existing drives and players; using DVD+R media provides maximum compatibility.

BIOS DEFAULTS– SUBJECT TO CHANGES WITH NEW RELEASES

System Configuration	Integrated NIC:	Enabled
	Integrated NIC2:	Enabled
	Serial Port:	COM1
	SATA Operation:	AHCI
	SAS RAID Controller	Enabled
	Drives	(All enabled by default)
	SMART Reporting:	Disabled
	USB Configuration::	Enable Boot Support/Front USB Ports/ Rear USB Ports/USB3 Ports
	Audio:	Enabled
	Memory Map IO above 4GB	Disabled (Auto)
	Thunderbolt	Disabled
	Miscellaneous Devices	PCI Slot Enabled
	PCI MMIO Space Size	Small
	HDD Fans:	(depends on system configuration)
Video	Primary Video Slot	Auto
Performance	Multiple Core Support:	All (depends on system configuration)
	Intel® SpeedStep™:	Enabled
	C States Control:	Enabled
	Limit CPUID	Enabled
	Intel TurboBoost	Enabled
	Non-Uniform Memory Access:	Enabled
	HyperThread control:	Enabled
	Cache Prefetch:	Enable Hardware Prefetch and Adjacent Cache Line Prefetch
RMT:	Enabled	
Virtualization Support	Virtualization:	Enabled
	VT for Direct I/O:	Enabled
	Trusted Execution	Disabled
Security	Strong Password	Enabled
	Password Configuration	Min=4, Max=32
	Password Bypass	Disabled
	Password Change	Allow Non-Admin Password Changes
	TPM Security	Disabled
	Computrace	Deactivate
	CPU XD Support	Enable CPU XD Support
	OROM Keyboard Access	Enable
	Admin Setup Lockout	Enable
Secure Boot	Secure Boot Enable	Disabled
	Expert Key Management	Disabled
Power Management	AC Recovery:	Power Off
	Auto On Time:	Disabled
	Deep Sleep Control:	Disabled
	Fan Speed Control:	Auto
	USB Wake Support	Disabled
	Block Sleep	Disabled
Wake on LAN:	Disabled	

BIOS DEFAULTS (CONT.)

Maintenance	Service Tag:	Set by the factory
	Asset Tag:	Optional User Entry
	SERR Message:	Enabled
System Logs	System Logs	List
Engineering Configurations	ASPM	Auto
	PCI-e Link Speed	Auto (Gen3)

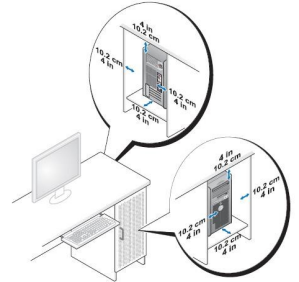
CHASSIS ENCLOSURE & VENTILATION REQUIREMENTS

ENCLOSURE VENTILATION

If your enclosure has doors, they need to be of a type that allows at least 30% airflow through the enclosure (front and back).

ENCLOSURE MINIMUM CLEARANCE

Leave a 10.2 cm (4 in.) minimum clearance on all vented sides of the computer to permit the airflow required for proper ventilation.



ENCLOSURE DOOR AREA

The intake and exhaust door areas should be, at a minimum, the same size as the system intake and exhaust areas.

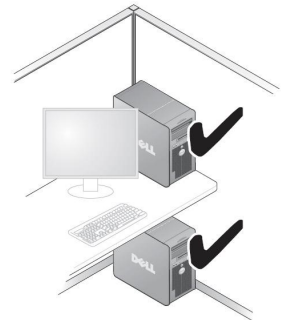
RECOMMENDED ENCLOSURE

Do not install your computer in an enclosure that does not allow airflow. This restricts the airflow and impacts your computer's performance, possibly causing it to overheat.



OPEN DESK MINIMUM CLEARANCE

If your computer is installed in a corner, on a desk, or under a desk, leave at least 5.1 cm (2 in.) clearance from the back of the computer to the wall to permit the airflow required for proper ventilation.



REGULATORY COMPLIANCE AND ENVIRONMENTAL

Product related conformity assessment and regulatory authorizations including Product Safety, Electromagnetic Compatibility (EMC), Ergonomics, and Communication Devices relevant to this product may be viewed at www.dell.com/regulatory_compliance. The Regulatory Datasheet for this product is located at http://www.dell.com/regulatory_compliance.

Details of Dell's environmental stewardship program to conserve product energy consumption, reduce or eliminate materials for disposal, prolong product life span and provide effective and convenient equipment recovery solutions may be viewed at www.dell.com/environment. Product related conformity assessment, regulatory authorizations, and information encompassing Environmental, Energy Consumption, Noise Emissions, Product Materials Information, Packaging, Batteries, and Recycling relevant to this product may be viewed by clicking the Design for Environment link on the webpage.



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October 3, 2017

Subject: Statement of Volatility – Dell Precision 5820/7820/7920 Tower

The Dell Precision 5820/7820/7920 Tower contains both volatile and non-volatile (NV) components. Volatile components lose their data immediately upon removal of power from the component. Non-volatile components continue to retain their data even after the power has been removed from the component.

The following memory components are present in the 5820/7820/7920 Tower:

BIOS Configuration

The BIOS information is stored in one flash IC, 32 MByte. This device is identified as SPI_1 on the motherboard. This part contains the boot code and data necessary to take the hardware from a power-off or low-power state to a state where it is ready to be managed by the operating system. No information pertaining to user applications or data is stored in this device, however, they do store administrator and/or hard drive encryption passwords if those features are enabled by the user.

Embedded Controller

The Embedded Controller contains a 4 Mbit of SPI flash IC and is identified as SPI_2 on the motherboard. The EC contains the software necessary to manage low-level control functions on the motherboard such as thermal control. No information pertaining to user applications or data is stored in the SPI_2 device.

The embedded controller also contains 320 kBytes of volatile memory space and 128 Bytes of RTC backed SRAM. The contents of this memory space are lost when power is removed from the system.

PCH CMOS

The PCH, identified as US1H, contains a 256 Byte battery-backed memory. This memory contains custom configuration data required by the BIOS to boot the system. It does not store passwords or other user level data. The contents of this space are lost, after several minutes, if the coin-cell battery is removed from the motherboard.

TPM (Trusted Platform Module) Security Device

This device (identified as UF1) stores TPM configuration data used by the hardware and the security software offered by Dell. Encrypted user keys generated by the TPM device for use by the security software are stored in this NVM.

CPLD

The CPLD IC is a factory-programmed Logic Device that incorporates various low-level hardware logic functions into a single device. It is in location UO1A on the 7920 Tower, and CLPD0 on the 7820 and 5820 Tower motherboard. No information pertaining to user applications or data is stored on the CPLD. The CPLD contains 90 kBytes of flash memory; however, this memory is left blank initially and is only used for debug information. The CPLD can be reprogrammed during BIOS flash update. The BIOS flash update is not capable of writing to this location.

The following memory components are present in the 7920 Tower only:

Ethernet Controller EEPROM

The Ethernet Controller EEPROM is identified as UL3 on the motherboard. It is a 32 Mbit device. The Ethernet Controller EEPROM stores driver information and the system MAC addresses. It does not store password, IP address, domain name, system ID, or similar information.

All other components on the motherboard will lose data once power is removed from the system. Primary power loss (unplug the power cord) will destroy all user data in the main system memory (DDR4 DIMMs) and the on-board graphics and storage interface devices.

However, the user should note that under some circumstances (for example, cold temperatures) the DDR4 DIMMs may retain their data for a significant amount of time – up to several minutes. That may potentially allow the DIMMs to be removed from one system and installed in another without loss of the data contained in them.

Secondary power loss (removing the on board coin-cell battery) will destroy system data in the PCH (platform controller hub), including time-of-day information.

There are other volatile and non-volatile components on the devices or peripherals attached to the motherboard:

The Video Card contains volatile and non-volatile memory components. The volatile frame buffer memory will lose data once power is removed. The non-volatile memory (Video BIOS) stores only video card setup information. The video BIOS is not accessible by the user.

The CD-RW/Diskette Drives/DVD-R/W/Blu Ray DVD-R/W are input/output devices, whereas the DVD-ROM is an input device only. All data is processed through cache (volatile) memory. Any associated internal NVRAM is factory programmed, does not contain any user data, and is not accessible by the user.

The SAS and/or SATA Hard Drives and optional storage controller cards store non-volatile data. All data is processed through cache (volatile) memory. Any associated internal NVRAM is factory programmed, does not contain any user data, and is not accessible by the user. These devices may be removed.

The Monitor may retain “Burn-In” images after long periods of displaying static data. If any burn-in images exist, they can readily be seen using simple procedures. NV memory components are used for storing monitor calibration/configuration data & are not accessible by the user.

The DIMMs in the system do contain a small EEPROM that is used for memory identification purposes and for error logging. It does not contain any user data and is not accessible by the customer.

The Voltage Regulators in the system contain a small FW space for power up parameters. It does not contain any user data and is not accessible by the customer.

The CPU Riser for the 7820 Tower and the High Speed Backplanes do contain a small CPLD for power up and device management. They do not contain any user data and are not accessible by the customer.

To help clarify memory volatility and data retention in situations where the system is put in different ACPI power states, the following information is provided regarding ACPI power states S0, S1, S3, S4 and S5:

- S0 state is the working state where the dynamic RAM is maintained and is read/write by the processor.
- S1 state is a low wake-up latency sleeping state. In this state, no system context is lost (CPU or chip set) and hardware maintains all system contexts.
- S3 is called "suspend to RAM" state or stand-by mode. In this state the dynamic RAM is maintained. Dell systems will be able to go to S3 if the OS and the peripherals used in the system supports S3 state. Windows XP, Windows Vista and Windows 7 all support S3 state.
- S4 is called "suspend to disk" state or "hibernate" mode. There is no power. In this state, the dynamic RAM is not maintained. If the system has been commanded to enter S4, the OS will write the system context to a non-volatile storage file and leave appropriate context markers. When the system is coming back to the working state, a restore file from the non-volatile storage can occur. The restore file has to be valid. Dell systems will be able to go to S4 if the OS and the peripherals support S4 state. Windows 7 and Windows 8.1 support S4 state.
- S5 is the "soft" off state. There is no power. The OS does not save any context to wake up the system. No data will remain in any component on the system board, i.e. cache or memory. The system will require a complete boot when awakened. Since S5 is the shut off state, coming out of S5 requires power on which clears all registers.

The Dell Precision 5820/7820/7920 Tower supports all of the above states, except S1.

Please direct any questions to the undersigned

Very truly yours;

Dell Marketing L.P.