

# IBM Power System

## POWER8 Facts and Features

April 29, 2014



IBM Power Systems™ servers and IBM BladeCenter® blade servers using IBM POWER7® and POWER7+® processors are described in a separate Facts and Features report dated July 2013 (POB03022-USEN-28).

IBM Power Systems™ servers and IBM BladeCenter® blade servers using IBM POWER6® and POWER6+™ processors are described in a separate Facts and Features report dated April 2010 (POB03004-USEN-14).

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These notes apply to the description tables for the pages which follow:

Y	Standard / Supported
Optional	Optionally Available / Supported
N/A or -	Not Available / Supported or Not Applicable
SOD	Statement of General Direction announced
SLES	SUSE Linux Enterprise Server
RHEL	Red Hat Enterprise Linux

a	One x8 PCIe slots must contain a 4-port 1Gb Ethernet LAN available for client use
b	Use of expanded function storage backplane uses one PCIe slot
c	Backplane provides dual high performance SAS controllers with 1.8 GB write cache expanded up to 7.2 GB with compression plus Easy Tier function plus two SAS ports for running an EXP24S drawer
d	Full benchmark results are located at <a href="http://ibm.com/systems/power/hardware/reports/system_perf.html">ibm.com/systems/power/hardware/reports/system_perf.html</a>
e	Option is supported on IBM i only through VIOS.
f	For simplicity in calculating maximum and consistently describing the max across the Scale-out Servers, the 12-bay backplane is assumed. A higher max with the expanded function backplane is possible.
g	USB-2 ports have limited client usage. IBM i clients can use a port to communicate with a UPS
*	Not available in PowerKVM environment

For additional connectivity information, please reference the IBM Sales Manual for more information on I/O features and adapters.

## Why Power Systems?

Powerful forces—mobile, cloud and big data & analytics—are redefining how business gets done. Leaders are leveraging these forces to deepen relationships with customers and partners, drive new efficiencies and expand business models. IBM is the right partner to help you:

### **Leverage systems that optimize big data and analytics performance.**

Power Systems are designed for big data—from operational to computational to business and cognitive Watson solutions—are optimized for performance and can scale to support demanding and growing workloads. Capitalize on the currency of data by finding business insights faster and more efficiently. And gain the elasticity you need to handle the varying analytics initiatives your business requires.

### **Realize the true potential of enterprise cloud.**

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### **Revolutionize the way IT is created and consumed.**

Power architecture is at the heart of the OpenPOWER Foundation, a community that's taking advantage of an open technology platform to help organizations create new opportunities and design next-generation applications to drive business success. The first to adopt open server technology, Power Systems help you more quickly and easily deliver a broader set of services and incorporate new technologies using the same technology footprint

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**Power S812L**

<b>Product Line</b>	<b>IBM Power S812L</b>
Machine type	8247-21L
System packaging	19" rack drawer (2U)
Microprocessor type	64-bit POWER8
# of processor sockets per server	1
Processor options	3.42 GHz (10)   10
GHz (cores/socket)   # of cores	3.02 GHz (12)   12
EnergyScale	Y
Level 2 (L2) cache per core	512 KB
Level 3 (L3) cache per core	8 MB
System memory (minimum - maximum) (1600 MHz DDR3)	16 GB – 512 GB
Active Memory Expansion	N/A
<b>Reliability, availability, serviceability</b>	
Chipkill memory	Y
Service processor	Y
Hot-swappable disks/ SSD	Y
Dynamic Processor Deallocation	Y*
Processor Instruction Retry	Y*
Alternate Processor Recovery	Y*
Hot-plug concurrent maintenance	Y*
PCIe slots	Y*
Redundant hot-plug power	Y
Redundant hot-plug cooling	Y
Node Add, Node Repair, Memory Upgrade	N/A
Dual VIOS	Optional*
<b>Capacity and expandability</b>	
Capacity on Demand (CoD)	N/A
PowerVM PowerLinux Edition	Optional
PowerKVM Edition	Optional
PowerVM Standard Edition	N/A
PowerVM Enterprise Edition	N/A
Max logical partitions/micro-partitions	240
System unit PCIe Gen3 low profile slots <sup>a</sup>	4 PCIe x8 2 PCIe x16
PCIe expansion I/O drawer	0, but SOD
System unit disk/SSD bays with standard or split backplane	12 SFF-3 or 6+6 SFF-3
System unit disk/SSD bays with expanded function backplane and dual IOA with 7.2GB write cache <sup>b, c</sup>	8 SFF-3 plus optional EXP24S attachment for an additional 24 SFF-2 bays
Slimline DVD bay	1
Maximum TB storage in system unit	14.4 TB (with 12x 1.2 TB disks)
Maximum EXP24S storage drawers	14
Maximum EXP24S SAS bays	336 SFF-2
Maximum total SAS bays (system unit + EXP24S)	348
Max TB storage (system unit + EXP24s)	417 TB using 348x 1.2 TB disk drives
<b>Performance<sup>d</sup></b>	
AIX rPerf	N/A
GHz (cores/socket): perf (# cores)	N/A
IBM i CPW	N/A
GHz (cores/socket): perf (# cores)	N/A

**Power S822 and Power S822L**

<b>Product Line</b>	<b>IBM Power S822</b>	<b>IBM Power S822L</b>
Machine type	8284-22A	8247-22L
System packaging	19" rack drawer (2U)	19" rack drawer (2U)
Microprocessor type	64-bit POWER8	64-bit POWER8
# of processor sockets per server	2	2
Processor options	3.89 GHz (6)   6 or 12 GHz (cores/socket)   # of cores	3.42 GHz (10)   20 3.02 GHz (12)   24
EnergyScale	Y	Y
Level 2 (L2) cache per core	512 KB	512 KB
Level 3 (L3) cache per core	8 MB	8 MB
System memory (minimum - maximum) (1600 MHz DDR3)	16 GB – 512 GB (1 DCM) 32 GB – 1024 GB (2 DCM)	32 GB -1024 GB
Active Memory Expansion	Optional	N/A
<b>Reliability, availability, serviceability</b>		
Chipkill memory	Y	Y
Service processor	Y	Y
Hot-swappable disks	Y	Y
Dynamic Processor Deallocation	Y	Y*
Processor Instruction Retry	Y	Y*
Alternate Processor Recovery	Y	Y*
Hot-plug concurrent maintenance	Y	Y*
PCIe slots	Y	Y*
Redundant hot-plug power	Y	Y
Redundant hot-plug cooling	Y	Y
Node Add, Node Repair, Memory Upgrade	N/A	N/A
Dual VIOS	Optional	Optional*
<b>Capacity and expandability</b>		
Capacity on Demand (CoD)	N/A	N/A
PowerVM PowerLinux Edition	N/A	Optional
PowerVM Standard Edition	Optional	N/A
PowerVM Enterprise Edition	Optional	N/A
PowerKVM Edition	N/A	Optional
Max logical partitions/micro-partitions	400	480
System unit max PCIe Gen3 low profile slots °	5 PCIe x8 4 PCIe x16	5 PCIe x8 4 PCIe x16
PCIe expansion I/O drawer	0, but SOD	0, but SOD
System unit disk/SSD bays with standard or split backplane	12 SFF-3 or 6+6 SFF-3	12 SFF-3 or 6+6 SFF-3
System unit disk/SSD bays with expanded function backplane and dual IOA with 7.2GB write cache and Easy Tier function <sup>b, c</sup>	8 SFF-3 plus 6 1.8-inch SSD bays plus optional EXP24S attachment for an additional 24 SFF-2 bays	8 SFF-3 plus 6 1.8-inch SSD bays plus optional EXP24S attachment for an additional 24 SFF-2 bays
Slimline DVD bay	1	1
Maximum TB storage in system unit	14.4 TB (with 12x 1.2 TB disks)	14.4 TB (with 12x 1.2 TB disks)
Maximum EXP24S storage drawers	14	14
Maximum EXP24S SAS bays	336 SFF-2	336 SFF-2
Maximum total SAS bays (system unit + EXP24S)	348	348
Max TB storage (system unit + EXP24s)	417 TB using 348x 1.2 TB disk drives	417 TB using 348x 1.2 TB disk drives
<b>Performance<sup>a</sup></b>		
AIX rPerf	3.89 GHz (6): 120.8 3.42 GHz (10): 177.8 3.89 GHz (12): 235.6 3.42 GHz (20): 346.7	N/A
IBM i CPW	N/A	N/A
GHz (cores/socket): perf (# cores)		

## Power S814 and Power S824

Product Line	IBM Power S814	IBM Power S824
Machine type	8286-41A	8286-42A
System packaging	19" rack drawer (4U)	19" rack drawer (4U)
Microprocessor type	64-bit POWER8	64-bit POWER8
# of processor sockets per server	1	2
Processor options GHz (cores/socket)   # of cores	3.02 GHz (6)   6 3.72 GHz (8)   8	3.89 GHz (6)   6 or 12 4.15 GHz (8)   8 or 16 3.52 GHz (12)   24
EnergyScale	Y	Y
Level 2 (L2) cache per core	512 KB	512 KB
Level 3 (L3) cache per core	8 MB	8 MB
System memory (minimum - maximum) (1600 MHz DDR3)	16 GB – 512 GB	32 GB - 512 GB (1 DCM) 32 GB – 1024 GB (2 DCM)
Active Memory Expansion	Optional	Optional
<b>Reliability, availability, serviceability</b>		
Chipkill memory	Y	Y
Service processor	Y	Y
Hot-swappable disks	Y	Y
Dynamic Processor Deallocation	Y	Y
Processor Instruction Retry	Y	Y
Alternate Processor Recovery	Y	Y
Hot-plug concurrent maintenance PCIe slots	Y	Y
Redundant hot-plug power	Y	Y
Redundant hot-plug cooling	Y	Y
Node Add, Node Repair, Memory Upgrade	N/A	N/A
Dual VIOS	Optional	Optional
<b>Capacity and expandability</b>		
Capacity on Demand (CoD)	N/A	N/A
PowerVM PowerLinux Edition	N/A	N/A
PowerKVM Edition	N/A	N/A
PowerVM Standard Edition	Optional	Optional
PowerVM Enterprise Edition	Optional	Optional
Max logical partitions/micro-partitions	160	480
System unit PCIe Gen3 full high slots <sup>a</sup>	5 PCIe x8 2 PCIe x16	7 PCIe x8 4 PCIe x16
PCIe expansion I/O drawer	0, but SOD	0, but SOD
System unit disk/SSD bays with standard or split backplane	12 SFF-3 or 6+6 SFF-3	12 SFF-3 or 6+6 SFF-3
System unit disk/SSD bays with expanded function backplane and dual IOA with 7.2GB write cache <sup>b,c</sup>	18 SFF-3 plus optional EXP24S attachment for an additional 24 SFF-2 bays	18 SFF-3 plus 8 1.8-inch SSD bays plus optional EXP24S attachment for an additional 24 SFF-2 bays
Slimline DVD bay	1	1
Maximum TB storage in system unit	21.6 TB (with 18x 1.2 TB disks)	24.7 TB (with 18x 1.2 TB disks plus 8x 387 GB SSD)
Maximum EXP24S storage drawers	14	14
Maximum EXP24S SAS bays	336 SFF-2	336 SFF-2
Maximum total SAS bays (system unit + EXP24S) <sup>f</sup>	348 <sup>f</sup>	348 <sup>f</sup>
Max TB storage (system unit + EXP24s) <sup>f</sup>	417 TB using 348x 1.2 TB disk drives <sup>f</sup>	417 TB using 348x 1.2 TB disk drives <sup>f</sup>
<b>Performance<sup>d</sup></b>		
AIX rPerf GHz (cores/socket): perf (# cores)	3.02 GHz (6): 97.5 3.72 GHz (8): 143.9	3.89 GHz (6) : 120.8 4.15 GHz (8) : 166 3.89 GHz (12) : 235.6 4.15 GHz (16) : 323.6 3.52 GHz (24) : 421.9
IBM i CPW GHz (cores/socket): perf (# cores)	3.02 GHz (6): 59,500 3.72 GHz (8): 85,500	3.89 GHz (6) : 72,000 4.15 GHz (8) : 94,500 3.89 GHz (12) : 130,000 4.15 GHz (16) : 173,500 3.52 GHz (24) : 230,500

**System Unit Details (Power Systems S Class Servers )**

System Unit Details	Power S812L	Power S822 Power S822L	Power S814	Power S824
POWER8 DCM sockets	1	2	1	2
Number of DCMs	1	1 or 2 for S822 2 for S822L	1	1 or 2
Max memory DIMM slots	8	16 (with 2 DCM)	8	16 (with 2 DCM)
Max memory bandwidth	192 GB/sec	384 GB/sec	192 GB/sec	384 GB/sec
Integrated ports				
System/serial (RJ45)	1	1	1	1
USB-2 ports <sup>g</sup>	2	2	2	2
USB-3 ports	4 (2 front & 2 rear)			
HMC ports (RJ45)	2	2	2	2
Ethernet adapter ports <sup>a</sup>	4x 1Gb	4x 1Gb	4x 1Gb	4x 1Gb
SAS bays in system unit				
2.5-inch (disk/SSD)	12 or 8 SFF-3	12 or 8 SFF-3	12 or 18 SFF-3	12 or 18 SFF-3
1.8-inch (SSD)	0	0 or 6	0	0 or 8
Media bays				
DVD-RAM slimline	1	1	1	1
HH for tape	N/A	N/A	N/A	N/A
Integrated SAS storage controllers for disk/SSD/DVD				
	Y	Y	Y	Y
Base backplane	1 (zero write cache)			
Split backplane	2 (zero write cache)			
Expanded function backplane <sup>b, c</sup>	Dual IOA (7.2 GB write cache) <sup>b, c</sup>	Dual IOA (7.2 GB write cache) <sup>b, c</sup>	Dual IOA (7.2 GB write cache) <sup>b, c</sup>	Dual IOA (7.2 GB write cache) <sup>b, c</sup>
Easy Tier function	Y with expanded function backplane			
Optional EXP24S ports	Y with expanded function backplane			
PCIe Gen3 adapter slots	6	9 (w/ 2 DCM)	7	11 (w/ 2 DCM)
PCIe x8	4	5	5	7
PCIe x16	2	4	2	4
Max PCIe bus speed (GHz)	10.0 (Gen3)	10.0 (Gen3)	10.0 (Gen3)	10.0 (Gen3)
Max I/O bandwidth	96 GB/sec	96 GB/sec per DCM	96 GB/sec	96 GB/sec per DCM
LED diagnostics	Y	Y	Y	Y

Storage backplane notes: Integrated SAS controllers are based on latest IBM patented SAS RAID adapter technology. All backplane options offer RAID 0, 1, 5, 6, 10 capabilities plus hot spare capability. Write cache is mirrored for protection and physically is two 1.8 GB DRAM caches offering up to 7.2 GB effective capacity with compression. One optional EXP24S storage drawer attachment is to two SAS ports on rear of server which are provided with the expanded function backplane. The EXP24S is external to the system unit taking 2U rack space and attached via SAS cables and provides 24 SSF-2 SAS bays for disk or for SSD.

### Server I/O Drawers

Drawer	Server Attachment	PCI Slots per Drawer	Bays per Drawer	Available to order	Max Drawers per server	Drawer Footprint
EXP24S (#5887 / #EL1S)	via SAS	0	24 SFF-2 SAS	Y	14	19" rack 2U
PCIe Gen3 I/O Drawer	N/A	SOD	N/A	SOD	N/A	N/A

### Server I/O Drawer Attachment

Server Drawer <sup>1</sup>	Power S812L	Power S822 Power S822L	Power S814	Power S824
EXP24S	Max 14	Max 14	Max 14	Max 14

## Physical Planning Characteristics (Power System S Class Servers)

Note: More comprehensive information may be found in the IBM Site and Hardware Planning document at <http://www.ibm.com/support/knowledgecenter/POWER8/p8hdx/POWER8welcome.htm> . Plus, additional summary information can be found in the IBM Sales Manual for each server at [ibm.com/common/ssi](http://ibm.com/common/ssi) . Note the knowledgecenter document may not be available until Mid May, 2014.

Server	Power S812L	Power S822 Power S822L	Power S814	Power S824
Packaging	19" rack drawer (2U)	19" rack drawer (2U)	19" rack drawer (4U) + Tower	19" rack drawer (4U)
Voltage (AC) single phase	100 -127 200 - 240	200 – 240	Tower: 100-127 200-240 Rack: 200 - 240	200 - 240
Power supply	N +1 standard	N +1 standard	N +1 standard	N +1 standard
Maximum altitude				
feet	10000	10000	10000	10000
meters	3048	3048	3048	3048

Racks	7014-S25 or #0555	7014-T00 or #0551	7014-T42 or #0553	7014-B42	7965-94Y Slim Rack
	25U	36U	42U	42U	42U
Height					
inches	49.0	71.0 – 75.8	79.3	79.3	78.8
millimeters	1344	1804 – 1926	2015	2015	2002
Width (can vary depending on use of side panels)					
inches	23.8	24.5 – 25.4	24.5 - 25.4	24.5 - 25.4	23.6
millimeters	605	623 – 644	623 - 644	623 - 644	600
Depth (can vary depending on door options selected)					
inches	39.4	41.0 – 45.2	41.0 - 45.2	41.0 - 55.5	43.1 – 48.2
millimeters	1001	1042 – 1098	1043 - 1098	1042 - 1409	1095 - 1224

## Warranty<sup>1</sup> / Installation

Warranty Service Levels	Power S812L	Power S822 Power S822L	Power S814	Power S824
24x7 with two hour service objective <sup>2</sup>	Optional	Optional	Optional	Optional
24x7 with four hour service objective	Optional	Optional	Optional	Optional
9x5 with four hour service objective	Optional	Optional	Optional	Optional
9x5 next-business-day	Standard <sup>3</sup>	Standard <sup>3</sup>	Standard <sup>3</sup>	Standard <sup>3</sup>
<b>Warranty Period</b>	3 years	3 years	3 years	3 years
<b>Server install<sup>4</sup></b>	CSU	CSU	CSU	CSU

1. These warranty terms and conditions are for the United States and may be different in other countries. Consult your local IBM representative or IBM Business Partner for country-specific information.

2. Available in selected cities.

3. Mandatory Customer Replaceable Unit (CRU) and On-site service.

4. CSU = Customer Set Up, IBI = Installation by IBM For server hardware only. Note except for 795 I/O, feature I/O drawers added later as MES are CSU.

**Power S Class Servers Software Support**

Power Systems Software	Power S812L	Power S822	Power S822L	Power S814	Power S824
Software Tier	Small	Small	Small	Small	Small
<b>PowerVM™</b>					
PowerVM Linux Edition	Supported	N/A	Supported	N/A	N/A
PowerVM Express	N/A	N/A	N/A	N/A	N/A
PowerVM Standard and Enterprise Editions	N/A	Supported	N/A	Supported	Supported
<b>PowerKVM</b>	Supported	N/A	Supported	N/A	N/A
<b>AIX</b>					
AIX 6.1 *	N/A	Supported	N/A	Supported	Supported
AIX 7.1 *	N/A	Supported	N/A	Supported	Supported
<b>IBM i</b>					
IBM i Software Tier	N/A	N/A	N/A	Small P10 <sup>3</sup>	Small P20 <sup>3</sup>
IBM i 7.1 TR8 *	N/A	N/A	N/A	Supported	Supported
IBM i 7.2 *	N/A	N/A	N/A	Supported	Supported
<b>Linux</b>					
Red Hat Enterprise Linux 6.5 *	Supported	Supported	Supported	Supported	Supported <sup>4,5</sup>
SUSE Linux Enterprise Server 11 *	Supported SP1	Supported SP1	Supported SP1	Supported SP1	Supported <sup>4,5</sup> SP1
Ubuntu 14.04	Supported	N/A	Supported	N/A	N/A
<b>PowerHA™</b>					
PowerHA SystemMirror for AIX 6.1 <sup>2</sup> Standard and Enterprise Editions	N/A	Supported	N/A	Supported	Supported
PowerHA SystemMirror for AIX 7 <sup>2</sup> Standard Edition	N/A	Supported	N/A	Supported	Supported
PowerHA SystemMirror for i 6.1	N/A	N/A	N/A	Supported	Supported
PowerHA SystemMirror for i 7.1 Standard and Enterprise Editions	N/A	N/A	N/A	Supported	Supported

\* Or later version

1 – Note that AIX 6.1 and AIX 7.1 Express Edition may be used for partitions of up to 4 cores and 8 GB of memory per core.

2 – PowerHA SystemMirror for AIX 6.1 is supported on AIX 5.3, AIX 6.1 and AIX 7.1. PowerHA SystemMirror for AIX 7 is supported with both AIX 6.1 and AIX 7.1

3 – P10 requires user entitlements and includes 5250 Enterprise Enablement capability. P20 does not have user entitlements and 5250 Enterprise Enablement is ordered as an optional hardware feature code.

The performance information contained herein is current as of the date of this document. All performance benchmark values and estimates are provided "AS IS" and no warranties or guarantees are expressed or implied by IBM. Buyers should consult other sources of information, including system benchmarks, to evaluate the performance of a system they are considering.

rPerf (Relative Performance) is an estimate of commercial processing performance relative to other IBM UNIX® systems. It is derived from an IBM analytical model which uses characteristics from IBM internal workloads, TPC and SPEC benchmarks. The rPerf model is not intended to represent any specific public benchmark results and should not be reasonably used in that way. The model simulates some of the system operations such as CPU, cache and memory. However, the model does not simulate disk or network I/O operations.

rPerf estimates are calculated based on systems with the latest levels of AIX and other pertinent software at the time of system announcement. Actual performance will vary based on application and configuration specifics. The IBM eServer™ pSeries® 640 is the baseline reference system and has a value of 1.0. Although rPerf may be used to approximate relative IBM UNIX commercial processing performance, actual system performance may vary and is dependent upon many factors including system hardware configuration and software design and configuration. Variations in incremental system performance may be observed in commercial workloads due to changes in the underlying system architecture. For additional information about rPerf, contact your local IBM office or IBM authorized reseller.

Commercial Processing Workload (CPW) is a relative measure of performance of systems running the IBM i operating system. Performance in client environments may vary. The value is based on maximum configurations. For a complete description Please refer to the "IBM Power Systems Performance Capabilities Reference - IBM i operating system" at the following Web site of CPW and the CPW rating for IBM Power Systems:

[www.ibm.com/systems/power/software/i/management/performance/resources.html](http://www.ibm.com/systems/power/software/i/management/performance/resources.html)

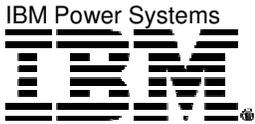
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SPEC – <http://www.spec.org>

TPC – <http://www.tpc.org>

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- Contact your IBM sales representative or IBM Business Partner
- Access the Power Systems Products and Services page on IBM's World Wide Web server at [ibm.com/systems/power](http://ibm.com/systems/power) and then select the appropriate hardware or software option
- Product announcement letters and Sales Manual containing more details on hardware and software offerings are available at [ibm.com/common/ssi](http://ibm.com/common/ssi)
- More detailed benchmark and performance information is available at [ibm.com/systems/p/hardware/benchmarks](http://ibm.com/systems/p/hardware/benchmarks) , [ibm.com/systems/p/hardware/system\\_perf.html](http://ibm.com/systems/p/hardware/system_perf.html) and at [ibm.com/systems/i/solutions/perfmgmt/resource.html](http://ibm.com/systems/i/solutions/perfmgmt/resource.html) .



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All performance information was determined in a controlled environment. Actual results may vary. Performance information is provided "AS IS" and no warranties or guarantees are expressed or implied by IBM.

When referring to storage capacity, total TB equals total GB divided by 1000; accessible capacity may be less.

The IBM home page on the Internet can be found at [ibm.com](http://ibm.com).

This brochure provides detailed technical specifications of all IBM POWER8 processor-based Power Systems servers in a tabular, easy-to-scan format for easy comparison between systems. These systems are UNIX (AIX), IBM i and Linux operating system servers. Not all features listed in this document are available on all three operating systems.

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