



I/O enhancements for IBM Power Systems

Table of contents

1	Overview	11	Product number
2	Key prerequisites	14	Publications
2	Planned availability date	15	Technical information
3	Description	16	Terms and conditions
10	Statement of general direction	17	Prices

At a glance

The following IBM® Power Systems™ I/O enhancements improve performance, price-to-performance ratios, functionality, and virtualization:

- Cost-effective 6-pack and 4-pack SSD packages
- IBM i 6.1 native I/O support of POWER7+™ servers
- PCIe Gen2 2-port 16 Gb Fibre Channel Adapter
- PCIe Gen2 4-port adapter; two ports 10 Gb CNA and 2 ports 1 GbE
- Integrated multifunction card with 10 Gb CNA and 10 GbE RJ-45 ports
- Expanded support for the EXP30 Ultra SSD I/O drawer (#EDR1), more models, and IBM i 7.1
- LTO-6 tape drives
- 1.5 TB RDX cartridge
- Left/right PDU specify in a rack

Overview

New SSD 6- and 4-packs, IBM i 6.1.1 native I/O support, high-performance PCIe Gen2 adapters, a new multifunction card, LTO-6, RDX, and other enhancements expand Power® System I/O capabilities.

Two new SSD packages offer ordering convenience and price savings for new servers. One 6-pack SSD feature #ESR2/ESR4 orders the equivalent of six #ES02/ES04 387 GB SSDs for the EXP30 Ultra SSD I/O Drawer, but has a lower price. Multiple 6-pack features can be ordered with a new server. One 4-pack SSD features orders the equivalent of four 387 GB SSDs for SAS bays in a system unit or in an I/O drawer, but has a lower price compared to ordering four #ES0A/ES0B/ES0C/ES0D features. A maximum of one 4-pack feature (#ESRA/ESRB/ESRC/ESRD) can be ordered with a new server.

IBM i 6.1.1 native I/O support is available for the POWER7+ 710/720/730/740 and POWER7+ 770/780. By ordering the chargeable #EB34 hardware feature, you can natively support I/O with i 6.1. The capability of virtually attaching I/O for i 6.1 through VIOS or through IBM i 7.1 is available without feature #EB34.

Support for the existing #EDR1 EXP30 Ultra SSD I/O Drawer is expanded to include the POWER7+ 710/720/730/740/750/760. For additional model support refer to the [Statement of general direction](#) . Software support is also expanded to include IBM i 7.1 TR6 native support.

The two-port PCIe2 16 Gb Fibre Channel Adapter provides twice the bandwidth per port of an 8 Gb Fibre Channel adapter. Both a full high (#EN0A) and a low profile

(#EN0B) adapter are offered for the POWER7+ 710/720/730/740/750/760. Refer to the [Statement of general direction](#) included in this announcement for additional model support.

The four-port PCIe2 Converged Network Adapter (CNA) provides two 10 Gb FCoE/CNA optical SR ports plus two 1 Gb RJ45 Ethernet ports. Both a full high (#EN0H) and a low profile (#EN0J) adapter are offered for the POWER7+ 710/720/730/740/750/760. Refer to the [Statement of general direction](#) included in this announcement for additional model support.

The new integrated multifunction card for the Power 750/760 includes four Ethernet, two USB, and one serial port without using a PCIe slot. With feature #EN10, two of the four Ethernet ports are 10 Gb copper twinax ports with CNA capability and two are 10 Gb RJ45 with Ethernet capability. With feature #EN11, two of the four Ethernet ports are 10 Gb optical SR ports with CNA capability and two are 10 Gb RJ45 with Ethernet capability. CNA means that both Ethernet NIC and Fibre Channel over Ethernet (FCoE) protocols are simultaneously supported. Features #EN10 and #EN11 are similar to the previously announced integrated multifunction cards #1768 and #1769 on the Power 770/780 that offer the same total number of ports, but there are two key enhancements. First, CNA capability may help reduce the overall number of adapters and PCIe slots required on the server, lowering the total cost. Second, the feature #EN10/EN11 RJ45 ports are capable of 10 GbE or 1 GbE instead of just 1 GbE. For additional model support refer to the [Statement of general direction](#).

A half-high LTO-6 tape drive feature #EU11 delivers increased capacity of up to 2.5 TB (uncompressed) or 6.25 TB (typical compression) and enables increased performance of up to 240 MB/s. It is supported in the Power 720/740 "C" and "D" model system units and in the Power 750 "B" model system unit and in the Power 795 1U storage drawer (#5724).

A 1.5 TB RDX cartridge feature #EU15 delivers 50% more capacity than the largest cartridge previously available. It is supported in the #EU03/EU04/EU23 and #1103/1104/1123 RDX docking stations.

A new no-charge specify feature #ERLR can enhance rack PDU power cord cabling and redundancy in 7014 racks. The specify code instructs IBM configurator tools and Manufacturing that an even number of PDUs should be provided and that equipment with two power supplies should have one power supply/power cord plugged into a PDU on the left and the other power supply/power cord plugged into a PDU on the right.

Key prerequisites

Refer to the sales manual for individual feature requirements.

Planned availability date

- February 15, 2013, for features #EB28, #EB2B, #EB2H, #EB2J, #EB2K, #ECB8, and #ECB9
- February 20, 2013, for features #EB34, #EHSS, #EL2Z, #ESR2, #ESRA, #ESRB, #ESRC, #ESRD, #EU11, #EU15, #EU17, and #EU18
- March 15, 2013, for features #1883, #1884, #EQ52, and #ERLR
- March 29, 2013, for features #ER0B and #ER0C
- April 12, 2013, for feature #EU11 on Power 795 server (9119-FHB)
- July 19, 2013, for feature #ESR2 on machine type-models 9117-MMC and 9179-MHC

Description

SSD 6-pack and 4-pack

SSD package feature codes offer you ordering convenience and price savings. One 6-pack can deliver up to 140,000 IOPS in just 1/5th of a 1U drawer, and one 4-pack can deliver up to 90,000 IOPS.

There are two sets of package features. Six-pack features for 1.8-inch 387 GB SSD are used for feature #EDR1 or #5888 EXP30 Ultra SSD I/O Drawer. Four-pack features for 2.5-inch (SSF) 387GB SSD are used for a system unit, feature #5802/5803 12X-attached I/O drawer, or feature #5887 EXP24S storage enclosure.

You can order multiple 6-pack features per system. However, these features can only be ordered with a new server order. MES orders are not offered. One 6-pack SSD feature #ESR2 orders the equivalent of six #ES02 387 GB SSDs. One 6-pack SSD feature #ESR4 orders the equivalent of six #ES04 387 GB SSDs. Feature #ESR2 (AIX/Linux/VIOS) and #ESR4 (IBM i) ship identical hardware, but the different features help the IBM configurator tools understand how the drives will be used.

A maximum of five 6-pack features can be ordered for each EXP30 Ultra SSD I/O Drawer on the server order. Single SSD features and 6-pack SSD features can be mixed on the same EXP30 Ultra SSD I/O Drawer; however, each Ultra Drawer has a maximum capacity of 30 SSD. For example, an order of three 6-packs plus three single SSD features is equivalent to 21 SSDs, which is less than the 30 SSD maximum of a single Ultra Drawer.

You can order a single 4-pack feature per system only with a new server order. MES orders are not offered. One #ESRA/ESRB feature code orders the equivalent of four #ES0A/ES0B features and can be placed in an SFF-1 bay of a system unit or #5802/5803 I/O Drawer. One #ESRC/ESRD feature code orders the equivalent of four #ES0C/ES0D features and can be placed in an SFF-2 bay of a feature #5887 EXP24S Drawer. Feature #ESRA (AIX/Linux/VIOS) and #ESRB (IBM i) ship identical hardware, but the different features help the IBM configurator tools understand how the drives will be used. Likewise, #ESRC (AIX/Linux/VIOS) and #ESRD (IBM i) ship identical hardware.

Single SSD features and 4-pack SSD features can be on the same server. However, there can only be one 4-pack SSD feature on the server. The maximum total of #EDRA + #EDRB + #EDRC + #EDRD feature codes is one.

I/O enhancements for IBM i

For more information, refer to Software Announcement [A13-0047](#), dated February 5, 2013 .

IBM i 6.1 native I/O support of the POWER7+ 710, 720, 730, 740, 770, and 780 is announced. Enablement is through a modestly priced #EB34 hardware feature code ordered on the server. IBM i 6.1 is available on these servers without feature #EB34, but without feature #EB34, all I/O is accessed through either an IBM i 7.1 partition or through VIOS. Other IBM i I/O enhancements are covered later in this announcement letter under the specific I/O.

Expanded EXP30 Ultra SSD I/O Drawer support

In addition to the new 6-pack features described earlier in this announcement letter, two key enhancements are provided.

First, the existing feature #EDR1 EXP30 Ultra SSD I/O Drawer is supported on additional server models. In addition to the POWER7+ 770/780, the POWER7+ 710/720/730/740/750/760 and the POWER7+ PowerLinux™ 7R2 (8246-L2T) support its attachment.

Second, IBM i 7.1 TR6 enables native support of the EXP30 Ultra SSD I/O drawer (#EDR1) on the POWER7+ 720/730/740/750/760/770/780 (not the 710). IBM i support through VIOS is not available; however, IBM i can virtualize the #EDR1 resources to other partitions if needed.

For a description of feature #EDR1 and specific feature codes and ordering structures, refer to Hardware Announcement [A13-0082](#), dated February 5, 2013 .

Detailed description follows in this announcement letter.

Solid-state drive (SSD) or flash technology can offer a much larger number of input/output operations per second (IOPS) compared to spinning disk drive (HDD) technology, and can therefore slash I/O-bound batch window times, improve interactive or query response time, and even make previously performance-impractical applications work well. Depending on the workload, it can range from 66X to 250X more IOPS with an SSD versus an HDD.

Additionally, a small set of SSDs can offer energy, cooling, and footprint savings by replacing a much larger set of HDDs. By combining SSDs and HDDs in the same partition or application, you can leverage the performance capability of SSD technology on hot data or files and leverage the HDD technology's lower cost per gigabyte on cold data or files. Hot SSD plus cold HDD usage can often provide the best overall system price-to-performance ratio.

The EXP30 Ultra SSD I/O Drawer provides ultra-dense packaging and ultra-high performance for up to 30 SSDs without requiring a PCI slot. The Ultra Drawer requires only 1U (1 EIA) of standard 19-inch rack space, while delivering up to 11.6 TB of capacity using 387 GB SSDs. This ultra-dense packaging is more than twice the density of the feature #5887 EXP24S Drawer, which offers 24 drives in 2U of space, plus space needed for prerequisite SAS controllers/adapters.

Also, up to 48 additional HDDs located in up to two downstream EXP24S Disk Drawers (#5887) can be directly attached to the Ultra Drawer under AIX®, Linux™, or VIOS. This delivers up to 43.2 TB additional capacity using 900 GB HDD in only 4U additional rack space (2U per EXP24S drawer). Thus, in just 5U space (one EXP30 Ultra Drawer and two EXP24S drawers), up to 54.8 TB capacity can be enabled. IBM i 7.1 TR6 also supports attaching downstream EXP24S drives, but has a maximum of one downstream EXP24S drawer and therefore a maximum of up to 24 additional HDDs.

The EXP30 Ultra SSD I/O Drawer (#EDR1) delivers up to 480,000 IOPS (read only), up to 410,000 IOPS (60% read/40% write), or up to 325,000 IOPS (100% write). It enables up to 4.5 GBps bandwidth from the SSD. All of this is possible in just 1U of space -- ultra performance in an ultra-dense package. Compared to a small form factor (SFF) 15,000 rpm HDD, which typically offers 200 to 400 IOPS and needs space in a 2U form factor, the EXP30 Ultra SSD I/O Drawer is far advanced.

Integrated into each EXP30 Ultra SSD I/O Drawer are two powerful IBM-designed SAS controllers with very large 3.1 GB write cache. These ultra controllers work as a pair, providing redundancy and protection of the write cache contents. The controllers use the latest and most powerful IBM SAS adapter technology and employ high-performance hardware and firmware technology. Use of IBM's active/active SAS technology enables each controller to be the optimized controller for one or more RAID arrays and delivers higher aggregate performance.

The 387 GB SSD (#ES02/#ES04) used in the EXP30 Ultra SSD I/O drawer uses high-performance, industrial-strength eMLC technology. These SSDs are packaged as 1.8-inch SAS drives, which can be added to or removed concurrently while the drawer is in use. The drives are formatted to 528 byte sectors, which allows SCSI T10 standardized data integrity fields to exist on every block of data. JBOD mode (512 byte sectors) is not supported.

Feature #ES02 and #ES04 are identical SSDs, but have different feature code numbers to help IBM Configuration tools and IBM Manufacturing tool better

understand the configuration you need. Feature #ES02 is used for AIX , Linux , and VIOS. Feature #ES04 is used for IBM i.

With AIX , Linux , and VIOS, the SSDs can be protected using RAID 0, RAID 5, RAID 6, or RAID 10 by operating system mirroring (LVM). RAID 1 function is enabled by creating RAID 10 with two drives. With IBM i, the SSDs must be protected using RAID 5, RAID 6, or by operating system mirroring. Hot spare is also supported for all operating environments with RAID 5 or RAID 6. RAID 5 arrays of up to 30 drives can be configured, but to use the higher performance of active/active functionality, an even number of RAID arrays is recommended.

When you configure an EXP30 Ultra SSD I/O drawer, a minimum of six SSDs is required per drawer. The SSD can be used like any SAS drive, including boot drives or load source drives.

IBM was the first server vendor to offer Enterprise Multilevel Cell (eMLC) flash memory technology, which blends enterprise-class performance and reliability characteristics of MLC flash storage. The #ES02/ES04 387 GB SSD builds upon this base and uses advances in both the SSD device controller flash memory management and in eMLC technology itself to deliver even better value propositions. Like IBM's earlier eMLC SSD, the drives are designed for more sustained performance levels and extended endurance or reliability. For example, the Power Systems 387 GB IBM eMLC SSD modules were designed to provide 24x7 usage daily for at least five years even when running write-intensive levels. Typical client usage is expected to be much lower, especially regarding the average percentage of writes, and thus drive life span can be much longer.

The following environments are required for support of the #EDR1 EXP30 Ultra SSD drawer:

(Note that the POWER7+ 710/720/730/740/750/760 system may require later levels)

- 7.6 firmware level, or later
- AIX 7.1 with the 7100-02 Technology Level, or later
- AIX 7.1 with the 7100-01 Technology Level and Service Pack 6, or later
- AIX 7.1 with the 7100-00 Technology Level and Service Pack 8, or later
- AIX 6.1 with the 6100-08 Technology Level, or later
- AIX 6.1 with the 6100-07 Technology Level and Service Pack 6, or later
- AIX 6.1 with the 6100-06 Technology Level and Service Pack 10, or later
- IBM i 7.1 with TR6 or later (Native support only. IBM i + VIOS is not supported)
- Red Hat Enterprise Linux 6.3 for POWER® , or later
- SUSE Linux Enterprise Server 11 Service Pack 2, or later, with current maintenance updates available from SUSE to enable all planned functionality
- VIOS V2.2.2.0
- VIOS V2.2.1.5

You can find the required driver update for Linux at

<http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/info/LinuxAlerts.html>

Each of the two integrated SAS controllers in the EXP30 Ultra SSD I/O drawer requires a connection to a GX++ PCIe2 Adapter located in the Power server GX++ slot. The EXP30 Ultra SSD I/O Drawer is attached directly to the Power System GX++ slot for higher bandwidth. If a GX++ PCIe2 Adapter is used in the GX++ slot, the GX++ slot cannot be used for an I/O loop.

Like the Power 770 (9117-MMD) and Power 780 (9179-MHD), the Power 750 (8408-E8D) and Power 760 (9109-RMD) use a dual-port GX++ PCIe2 Adapter (#1914). The Power 720 (8202-E4D) and Power 740 (8205-E6D) also use a dual-port GX++ PCIe2 Apdater (#EJ03). One dual-port GX++ PCIe2 Adapter can support

both connections to the EXP30 Ultra SSD I/O Drawer's two SAS controllers. For redundancy, one Ultra Drawer can attach to two different GX++ PCIe Adapters, using just one port on each GX++ PCIe Adapter.

The Power 710 (8231-E1D) and Power 730 (8231-E2D) use a single-port GX++ PCIe2 Adapter (#EJ0H). One single-port GX++ PCIe2 Adapter can support just one connection to one of the EXP30 Ultra SSD I/O Drawer's two SAS controllers. To enable the required second connection for the EXP30 Ultra SSD Drawer two SAS controllers, a second GX++ PCIe2 Adapter must be used. A single Power 730 can have two #EJ0H adapters, but the Power 710 has a just one GX++ slot and thus can have a maximum of one #EJ0H adapter.

The connection between the GX++ PCIe adapter in the server's GX++ slot and the EXP30 Ultra SSD I/O Drawer's integrated SAS controller is through a PCIe cable, 1.5 meter (#EN05), 3 meter (#EN07), or 8 meter (#EN08). Two cables are required, one for each integrated SAS controller. The 8 meter cable (#EN08) is supported on the Power 750/760/770/780, but not on the Power 710/720/730/740.

For redundancy, one Ultra Drawer can attach to two different GX++ PCIe Adapters, using just one port on each GX++ PCIe Adapter. These two GX++ PCIe Adapters are typically in one server.

For high-availability configurations in an AIX or Linux environment, an Ultra Drawer can be attached to two different GX++ PCIe Adapters located on two different servers. For example, one Ultra Drawer can be attached to one port of a feature 1914 GX++ Adapter on a Power 750 and to one port of a feature 1914 GX++ Adapter on a Power 780. In another example, one Ultra Drawer can be attached to one port of a feature #EJ03 GX++ Adapter on a Power 740 and to one port of a feature #EJ03 GX++ Adapter on a Power 730. Typically, this would be done under control of AIX PowerHA® software in the same way an SAS adapter pair such as a pair of feature #5913 or a pair of feature #5805 can be attached. In this scenario, if one server fails, the other server can access all the SAS drives controlled by the Ultra Drawer's integrated SAS controllers. To assist IBM configurator tools in recognizing this scenario, two specify feature numbers are used for each EXP30 Ultra SSD I/O Drawer shared across two servers, feature #5925 and feature #5927.

IBM i does not support the placement of GX++ PCIe2 Adapters in different servers. Thus, IBM i does not support the use of the Ultra SSD Drawer on the Power 710.

The 30 SAS SSD bays are always physically one set of drives, even though there may be multiple RAID arrays in this one set. With two or more RAID arrays, each RAID array can be optimized to either of the integrated SAS controllers to take advantage of active/active performance improvements through the read/write bandwidth of both adapters.

In all the above scenarios, the two integrated Ultra SAS controllers work as a pair to protect the write cache contents. If one of the controllers fails or the controller's PCI cable or its GX++ PCIe2 Adapter fails, the write cache contents are written out to the SAS SSD drives and caching is disabled. The remaining SAS adapter is designed to continue working without using the write cache. This helps ensure that write cache contents do not become a possible single point of failure and data loss. Full access to all the devices and RAID protection is maintained through the remaining integrated Ultra SAS controller. When the pairing is reestablished, write cache usage resumes. Note that the SAS controller's performance for many workloads can be noticeably reduced if the write cache is not being used. To help alert the operations staff of the problem, multiple error messages are posted, advising of the missing pairing for write cache.

The write cache contents are also protected against power failures. Super capacitors in the integrated SAS controllers provide power to write out cache content to integrated nonvolatile flash memory in the integrated SAS controllers if power is lost. Because batteries are not used, no battery maintenance is required.

Four SAS ports on the rear of the EXP30 Ultra Drawer (#EDR1) enable up to two EXP24S Disk Drawers (#5887) to be attached, supporting up to 48 SAS bays. Two ports are labeled T1 and two are labeled T2. Two EX SAS cables (#5926 (1.5m),

#3675 (3m), or #3680 (6m)) attach the Ultra Drawer (#EDR1) and each EXP24S Disk Drawer (#5887). These two cables provide two connections to each EXP24S Drawer for redundancy and performance. One EXP24S Drawer (#5887) is attached to the T1 ports. A second EXP24S is attached to the T2 ports. The integrated SAS controllers drive both the SSD in the Ultra Drawer and the HDD in the EXP24S (#5887). SSDs are not supported in the EXP24S in this configuration. The EXP24S must be in mode 1. One EXP24S cannot be attached to two different Ultra Drawers. AIX, Linux, and VIOS support using two downstream EXP24s and IBM i supports using one downstream EXP24S.

No-charge specify feature #9388 communicates to IBM Manufacturing that a feature #5887 EXP24S will be attached to the SSD Ultra Drawer.

The EXP30 Ultra Drawer (#5888) remains the EXP30 option for the Power 710/730 (8231-E1C/E2C), or Power 720 (8202-E4C), or Power 740 (8205-E6C), which do not support firmware level 7.6. The EXP30 Ultra Drawer (#EDR1) is used for the POWER7+ 710/720/730/740/750/760/770/780/L2T.

The feature #EDR1 EXP30 Ultra drawer has extensive redundancy and concurrent maintenance capability. It includes redundant fans, redundant power supplies, and redundant integrated SAS controllers. There are redundant SAS paths all the way from the GX++ adapter to the SAS drives. Concurrent maintenance is supported for fans, power supplies, SAS controllers, and SSD SAS bays. PCI cables between the system unit and Ultra Drawer can also be disconnected and reconnected, but will require the associated GX slot and the imbedded SAS controller to be reset as part of the reconnect procedure. The POWER7+ 770/780 GX++ PCI adapters initially do not have concurrent maintenance support, but this CHARM support is planned for first half 2013. The POWER7+ 710/720/730/740/750/760 require scheduled downtime if the GX++ adapter is to be removed or added.

EXP24S Disk Drawers (#5887) can be attached, detached, or replaced concurrently downstream of the EXP30 Ultra Drawer, but both imbedded SAS controllers must be taken offline. Thus, unless redundant EXP30 Ultra Drawers have been implemented, or unless the temporary loss of EXP30 access is insignificant to the configuration, scheduled downtime should be expected.

PCIe2 16Gb Fibre Channel Adapter

The dual-port PCIe Gen2 16 Gb Fibre Channel Adapter provides a high-bandwidth connection to a Fibre Channel switch. There are two feature codes, #EN0A (full high) and #EN0B (low profile). Each port delivers up to 16 Gb bandwidth. Thus, the bandwidth of one feature #EN0A/EN0B adapter is approximately equivalent to the bandwidth of two #5735/5273 dual-port 8 Gb FC adapters. Or the bandwidth of one feature #EN0A/EN0B is approximately equivalent to the bandwidth of one #5729/EN0Y quad-port 8 Gb adapter.

Each 16 Gb adapter port can sense and match the speed of the switch connection running at 16 Gb, 8 Gb or 4 Gb. Direct device support is not provided. The adapter is supported in Gen2 slots of the POWER7+ 710/720/730/740/750/760 ("D" models). The #EN0A/EN0B adapter has not been tested in PCIe Gen1 slots and is not supported in Gen1 slots.

For cabling type and length limitations refer to the feature code description in the sales manual. The cabling is the same as that used for an 8 Gb FC adapter and basically the same that as used for a 10 Gb Ethernet optical SR cabling.

Note that the entire adapter (both ports) is owned by one partition. If owned by VIOS, then VIOS can then virtualize these ports to other partitions.

NPIV support is provided through VIOS.

Minimum software support levels are:

- AIX 7.1 with the 7100-02 Technology Level and Service Pack 2, or later.
- AIX 6.1 with the 6100-08 Technology Level and Service Pack 2, or later.

- AIX 6.1 with the 6100-07 Technology Level and Service pack 7, or later (available March 29, 2013).
- IBM i 6.1 with 6.1.1 machine code, or later. VIOS required. Both the VSCSI and NPIV protocols are supported.
- SUSE Linux Enterprise 11 Service Pack 2, or later.
- VIOS 2.2.2.2.

PCIe2 4-port (10 Gb FCoE & 1 GbE) SR and RJ45

This combination 10 Gb plus 1 Gb adapter can potentially help consolidate two or more adapters, saving PCIe slots and adapters. This four-port PCIe Gen2 adapter gives you two 10 Gb CNA/FCoE ports plus two 1 Gb Ethernet ports. There are two feature codes, #EN0H (full high) and #EN0J (low profile).

A converged network adapter (CNA) is physically a 10 Gb Ethernet adapter, but a CNA port can run both Ethernet NIC traffic and simultaneously run Fibre Channel traffic (Fibre Channel over Ethernet). Handling both data streams (NIC and FC) makes it possible to reduce the number and type of adapters, cables, and switches in your data center.

Two of the ports are 10 Gb CNA/FCoE ports using SR fiber optical cabling. They are SFP+ ports with an optical transceiver already installed in the adapter. No other SFP + transceiver type should be used. The other two ports are 1 Gb RJ45 ports using standard CAT5/CAT6A Ethernet cabling.

The adapter is supported in Gen2 slots of the POWER7+ 710/720/730/740/750/760 ("D" models). The #EN0H/EN0J adapter has not been tested in PCIe Gen1 slots and is not supported in Gen1 slots.

The 10 Gb ports of #EN0H/EN0J are like the PCIe Gen1 CNA/FCoE adapter (#5708/5270), which also delivers two 10 Gb ports. Assuming placement in PCIe Gen2 slots, both the #5708/5270 and #EN0H/EN0J offer similar CNA bandwidth. However, two additional 1 Gb ports on the #EN0H/EN0J may eliminate the need for a separate 1 Gb Ethernet adapter, such as the 2-port #5767/5281 or the 4-port #5899/5260.

Note that the entire adapter (all four ports) is owned by one partition. If owned by VIOS, then VIOS can then virtualize these ports to other partitions. NPIV support is provided through VIOS.

For cabling information refer to the feature code description in the sales manual.

Minimum software support levels are:

- AIX 7.1 with the 7100-02 Technology Level and Service Pack 2, or later.
- AIX 6.1 with the 6100-08 Technology Level and Service Pack 2, or later.
- AIX 6.1 with the 6100-07 Technology Level and Service pack 7, or later (available March 29, 2013).
- SUSE Linux Enterprise 11 Service Pack 2, or later.
- IBM i 6.1 with 6.1.1 machine code, or later. VIOS required. The Ethernet NIC capability is supported, but the FCoE capability is not supported.
- VIOS 2.2.2.2

Integrated multifunction card for the POWER7+ 750/760

For feature #EN10/EN11 description details, refer to Hardware Announcements [A13-0082](#), dated February 5, 2013 and [A13-0088](#), dated February 5, 2013 .

These new integrated multifunction cards are the first on Power Systems to enable 10GBASE-T cabling through RJ45 ports. CAT-6A cabling can offer lower-cost connections to 10 Gb Ethernet switches compared to Optical SR or Copper twinax cabling. Each RJ45 port also offers additional configuration flexibility to be used for

either 1 Gb, 10 Gb, or 100 Gb data streams. These are the first multifunction cards to offer CNA/FCoE capability.

Note that all four Ethernet ports of the Multifunction Card are owned by one partition. If owned by VIOS, then VIOS can then virtualize these ports to other partitions. NPIV support is provided through VIOS.

For minimum software support levels refer to Hardware Announcements [A13-0082](#), dated February 5, 2013 and [A13-0088](#), dated February 5, 2013 .

Note that IBM i supports the Ethernet ports of this card only through VIOS and does not support the FCoE capability on these ports. IBM i natively supports the USB ports, but does not support the serial port.

Ultrium-6 or LTO-6

LTO-6 drives offer significantly more capacity than LTO-5. Using LTO-6 media, LTO-6 drives deliver up to 2.5 TB uncompressed capacity or assuming typical compression, up to 6.25 TB capacity. LTO-5 offers up to 1.5 TB uncompressed or up to 3 TB with typical compression. Plus LTO-6 drives are rated at up to 160 MB/sec versus the LTO-5's 140 MB/sec.

The #EU11 feature code orders a LTO-6 SAS half-high (HH) tape drive, which can be placed in the Power 720/740 "C" and "D" model system units and in the Power 750 "B" system unit or in the Power 795 #5724 1U Storage drawer. In a system unit HH bay, the drive is controlled by the integrated SAS controller. For servers that do not have an empty HH bay, you can order an SAS LTO-6 drive with the IBM 7226-1U3 Multimedia Drawer and attached to a #5901/5278 PCIe Dual-x4 SAS Adapter.

For ordering convenience, feature #EU17 ships one LTO-6 tape cartridge and #EU18 ships a set of five LTO-6 tape cartridges.

For additional information and for minimum software support levels, refer to the feature code description in the sales manual.

1.5 TB RDX Removable Disk Cartridge

The #EU15 feature code includes a 1.5 TB RDX cartridge, significantly larger capacity than offered previously. The cartridge is supported on all the RDX docking stations announced earlier, #EU03/EU04/EU23 and #1103/1104/1123. Feature #EU15 offers an addition capacity option for those clients using this strategic entry save/restore media option.

The other supported RDX cartridges are:

- Feature #EU01 - 1 TB
- Feature #1107 - 500 GB
- Feature #EU08 - 320 GB
- Feature #1106 - 160 GB (withdrawn from marketing, but supported in docking station)

For additional information and for minimum software support levels, refer to the feature code description.

Left/Right PDU Redundancy Specify

This optional no-charge specify feature #ERLR instructs the IBM configurator and manufacturing systems that a left/right approach to power distribution units (PDUs) and power cables should be followed. The Power 7014 model T00, T42, and S25 can be ordered with feature #ERLR. It also means that redundant device power supplies and power cables should be used.

Many clients find that cabling is simpler and cleaner with this approach, though it can sometimes require additional PDUs. There can be greater confidence that both

power supplies of a single system unit or I/O unit are not plugged into the same PDU.

This specify feature can be used instead of feature #9459 PDU/PWR and Power Cord Redundancy specify. Feature #9459 and #ERLR accomplish the same thing when there are only two PDUs. However, to provide a lower priced configurations when there are more than two PDUs, feature #9459 might use an odd number of PDUs. While redundant from the device power supply perspective, an odd number of PDUs can be confusing to understand the implications of cutting power to more than one PDU in the rack and can more easily lead to plugging future power cords less than optimally.

Left/Right designation is easy to understand for vertically mounted PDUs. If more PDUs that can be vertically mounted are ordered in a rack, then the additional PDUs are horizontally mounted. Then feature #ERLR will use pairs of horizontally PDUs located in the bottom of the rack and plug the two power cords from one device into the both PDUs (one cord per PDU).

Note that eConfig does not plan to support the use of this feature until March 13, 2013.

Statement of general direction

IBM intends to support the following I/O in the Power 770/780 "C" and "D" models (9117-MMC/MMD and 9179-MHC/MHD) and also plans to support this I/O via VIOS 2.2.1.6 and AIX 7.1 TL 1:

- Feature #EN0A/EN0B 16 Gb Fibre Channel Adapter
- Feature #EN0H/EN0J 4-port (10 Gb FCoE + 1 Gb Ethernet) Adapter
- Feature #EN10/EN11 Integrated Multifunction Card.

IBM also intends to support the EXP30 Ultra SSD Drawer (#EDR1) on the Power 770/780 "C" models (9117-MMC and 9179-MHC) later in 2013.

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Red Hat statement of direction

IBM intends to continue to work with Red Hat to provide support for the GX++ 2-port 10Gb FCoE CNA SR Optical Adapter (#EN22) and the GX++ 2-port 16Gb Fibre Channel Adapter (#EN23) with an upcoming Red Hat Enterprise Linux 6 release. For additional questions about the availability of this release and supported hardware servers, consult the Red Hat Hardware Catalog at

<https://hardware.redhat.com>

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Reference information

Refer to the following Hardware Announcements:

- [A12-0798](#), dated October 3, 2012
- [A12-0521](#), dated July 10, 2012
- [A12-1015](#), dated November 20, 2012

Product number

The following are newly announced features on the specific models of the IBM Power Systems 7893 machine type:

Planned availability date: February 15, 2013

New features

Description	MT	Model	Feature
SFP+ Transceiver	7893	92X	EB28
1m (3.3-ft), IBM Passive QSFP+ to QSFP+ Cable (DAC)	7893	92X	EB2B
3m (9.8-ft), IBM Passive QSFP+ to QSFP+ Cable (DAC)	7893	92X	EB2H
10m (30.3-ft), IBM Passive QSFP+ MTP Optical Cable	7893	92X	EB2J
30m (90.3-ft), IBM Passive QSFP+ MTP Optical Cable	7893	92X	EB2K
IBM SFP 1000Base-LX LR Fiber Transceiver	7893	92X	ECB8
IBM SFP+ LR Fiber Transceiver	7893	92X	ECB9

The following are newly announced features on the specific models of the IBM Power Systems 1457, 7893, 7895, 8202, 8205, 8231, 8233, 8236, 8246, 8406, 9117, 9119, 9179 machine type:

Planned availability date: February 20, 2013

New features

Description	MT	Model	Feature
IBM i 6.1.1 Native I/O Enablement	9117	MMD	EB34
	9179	MHD	
	7895	23X	
	8246	L1C	
	8246	L1S	
SPSS on Power Solution Indicator	8246	L2C	EL2Z
	8246	L2S	
	8202	E4C	
	8205	E6C	
	8231	E1C	
Six ES02 387GB 1.8" SAS SSD for AIX/Linux with eMLC	8231	E2C	ESR2
	9117	MMD	
	9179	MHD	
	8202	E4C	
	8205	E6C	
Four ES0A 387GB SFF-1 SSD for AIX/Linux with eMLC	8231	E1C	ESRA
	8231	E2C	
	8233	E8B	
	8236	E8C	
	9117	MMC	
	9117	MMD	
	9119	FHB	
	9179	MHC	
	9179	MHD	
	8202	E4C	
	8205	E6C	
Four ES0B 387GB SFF-1 SSD for IBM i with eMLC	8231	E1C	ESRB
	8231	E2C	
	8233	E8B	
	8236	E8C	
	9117	MMC	
	9117	MMD	
	9119	FHB	
	9179	MHC	
	9179	MHD	
	8202	E4C	
	8205	E6C	
Four ES0C 387GB SFF-2 SSD for AIX/Linux with eMLC	8231	E1C	ESRC
	8231	E2C	
	8233	E8B	
	8236	E8C	
	9117	MMC	
	9117	MMD	
	9119	FHB	
	9179	MHC	
	9179	MHD	
	8202	E4C	
	8205	E6C	
Four ES0D 387GB SFF-2 SSD for IBM i with eMLC	8231	E1C	ESRD
	8231	E2C	
	8233	E8B	
	8236	E8C	
	9117	MMC	
	9117	MMD	
	9119	FHB	
	9179	MHC	
	9179	MHD	
	8202	E4C	
	8205	E6C	
2.5/6.25TB LTO-6 SAS Tape Drive, Half-high	8202	E4C	EU11
	8205	E6C	
1.5TB Removable Disk Drive Cartridge	1457	7FL	EU15
	7891	73X	
	7891	74X	
	7895	22X	
	7895	23X	
	7895	42X	

	8202	E4B	
	8202	E4C	
	8205	E6B	
	8205	E6C	
	8231	E1C	
	8231	E2B	
	8231	E2C	
	8233	E8B	
	8236	E8C	
	8246	L1C	
	8246	L1S	
	8246	L2C	
	8246	L2S	
	8406	70Y	
	8406	71Y	
	9117	MMB	
	9117	MMC	
	9117	MMD	
	9179	MHB	
	9179	MHC	
	9179	MHD	
2.5 TB LTO-6 Tape Cartridge	8202	E4C	EU17
	8205	E6C	
5-Pack of #EU17	8202	E4C	EU18
	8205	E6C	

The following are newly announced features on the specific models of the IBM Power Systems 7014, 8231 machine type:

Planned availability date: March 15, 2013

New features

Description	MT	Model	Feature
73.4 GB 15K RPM SAS SFF Disk Drive	8231	E1C	1883
69.7 GB 15K RPM SAS SFF Disk Drive	8231	E1C	1884
Quantity 150 of #1752 (900GB SFF-2 disk)	8231	E2C	EQ52
Left/Right PDU Redundancy	7014	S25	ERLR
	7014	T00	
	7014	T42	

The following are newly announced features on the specific models of the IBM Power Systems 7014 machine type:

Planned availability date: March 29, 2013

New features

Description	MT	Model	Feature
Rack Content Specify: 1455-48T	7014	B42	ER0B
	7014	S25	
	7014	T00	
	7014	T42	
Rack Content Specify: 1455-64F	7014	B42	ER0C
	7014	S25	
	7014	T00	
	7014	T42	

The following is a newly announced feature on the specific models of the IBM Power Systems 9119 machine type:

Planned availability date: April 12, 2013

New feature

Description	MT	Model	Feature
2.5/6.25TB LTO-6 SAS Tape Drive, Half-high	9119	FHB	EU11

The following is a newly announced feature on the specific models of the IBM Power Systems 9117 and 9179 machine type:

Planned availability date: July 19, 2013

New feature

Description	MT	Model	Feature
Six ES02 387GB 1.8" SAS SSD for AIX/Linux with eMLC	9117 9179	MMC MHC	ESR2

Publications

No publications are shipped with these features.

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Select your country, and then select the product as the category.

Technical information

Specified operating environment

Physical specifications

For physical specifications refer to the sales manual.

Homologation

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Planning information

Security, auditability, and control

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Increased uptime: The Electronic Service Agent tool is designed to enhance the Warranty or Maintenance Agreement by providing faster hardware error reporting and uploading system information to IBM Support. This can translate to less wasted

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For more information on how to utilize the power of IBM Electronic Services, contact your IBM Systems Services Representative, or visit

<http://www.ibm.com/support/electronic>

Terms and conditions

MES discount applicable

Yes

Equal to the volume commitment discount

Field installable feature

Yes

Warranty period

These features assume the same warranty or maintenance terms as the machine in which they are installed for the full warranty or maintenance period announced for such machine.

Customer setup

Yes, except for feature #EU11 under machine-type model 9119-FHB

Machine code

Same license terms and conditions as base machine

Prices

The following are newly announced features on the specific models of the IBM Power Systems 1457, 7014, 7891, 7893, 7895, 8202, 8205, 8231, 8233, 8236, 8246, 8406, 9117, 9119, 9179 machine type:

Description Machine Type	Model Number	Feature Numbers	Both/ Support	RP CSU MES
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1.5TB Removable Disk Cartridge				
	7FL	EU15	Both	Yes No

Description Machine Type	Model Number	Feature Numbers	Both/ Support	RP CSU MES
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Rack Content Specify: 1455-48T				
	B42	ER0B	Initial	Yes No
	S25		Initial	Yes No
	T00		Initial	Yes No
	T42		Initial	Yes No

Rack Content Specify: 1455-64F				
	B42	ER0C	Initial	Yes No
	S25		Initial	Yes No
	T00		Initial	Yes No
	T42		Initial	Yes No

Left/Right PDU Redundancy				
	S25	ERLR	Initial	Yes No
	T00		Initial	Yes No
	T42		Initial	Yes No

Description Machine Type	Model Number	Feature Numbers	Both/ Support	RP CSU MES
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1.5TB Removable Disk Cartridge				
	73X	EU15	Both	Yes No
	74X		Both	Yes No

Description Machine Type	Model Number	Feature Numbers	Both/ Support	RP CSU MES
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SFP+ Transceiver				
	92X	EB28	Both	Yes No
1m Passive QSFP+ to QSFP+ Cbl				
	92X	EB2B	Both	Yes No
3m Passive QSFP+ to QSFP+ Cbl				
	92X	EB2H	Both	
10m QSFP+ MTP Optical Cable				
	92X	EB2J	Both	Yes No
30m QSFP+ MTP Optical Cable				
	92X	EB2K	Both	
SFP 1000Base-LX LR Fiber Trans				
	92X	ECB8	Both	Yes No
IBM SFP+ LR Fiber Transceiver				
	92X	ECB9	Both	Yes No

Description Machine Type	Model Number	Feature Numbers	Both/ Support	RP CSU MES
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SPSS on Pwr Sol Ind	23X	EHSS	Initial	Yes	No
1.5TB Removable Disk Cartridge	22X	EU15	Both	Yes	No
	23X		Both	Yes	No
	42X		Both	Yes	No

Description Machine Type 8202	Model Number	Feature Numbers	Both/ Support	RP CSU	MES
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Six ES02 387GB 1.8" SAS AIX/Li	E4C	ESR2	Initial	Yes	No
Four ES0A 387GB SFF-1 SSD AIX	E4C	ESRA	Initial	Yes	No
Four ES0B 387GB SFF-1 SSD IBMi	E4C	ESRB	Initial	Yes	No
Four ES0C387GB SFF-2 SSD AIX	E4C	ESRC	Initial	Yes	No
Four ES0D 387GB SFF-2 SSD IBMi	E4C	ESRD	Initial	Yes	No
2.5/6.25TB LTO-6 SAS Tape Dr H	E4C	EU11	Both	Yes	No
1.5TB Removable Disk Cartridge	E4B	EU15	MES	Yes	No
	E4C		Both	Yes	No
2.5 TB LTO-6 Tape Cartridge	E4C	EU17	Both	Yes	No
5-Pack of #EU17	E4C	EU18	Both	Yes	No

Description Machine Type 8205	Model Number	Feature Numbers	Both/ Support	RP CSU	MES
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Six ES02 387GB 1.8" SAS AIX/Li	E6C	ESR2	Initial	Yes	No
Four ES0A 387GB SFF-1 SSD AIX	E6C	ESRA	Initial	Yes	No
Four ES0B 387GB SFF-1 SSD IBMi	E6C	ESRB	Initial	Yes	No
Four ES0C387GB SFF-2 SSD AIX	E6C	ESRC	Initial	Yes	No
Four ES0D 387GB SFF-2 SSD IBMi	E6C	ESRD	Initial	Yes	No
2.5/6.25TB LTO-6 SAS Tape Dr H	E6C	EU11	Both	Yes	No
1.5TB Removable Disk Cartridge	E6B	EU15	MES	Yes	No
	E6C		Both	Yes	No
2.5 TB LTO-6 Tape Cartridge	E6C	EU17	Both	Yes	No
5-Pack of #EU17	E6C	EU18	Both	Yes	No

Description Machine Type 8231	Model Number	Feature Numbers	Both/ Support	RP CSU	MES
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Quantity 150 of #1752	E2C	EQ52	Both	Yes	No
Six ES02 387GB 1.8" SAS AIX/Li	E1C	ESR2	Initial	Yes	No
	E2C		Initial	Yes	No
Four ES0A 387GB SFF-1 SSD AIX	E1C	ESRA	Initial	Yes	No

	E2C		Initial	Yes	No
Four ES0B 387GB SFF-1 SSD IBMi	E1C	ESRB	Initial	Yes	No
	E2C		Initial	Yes	No
Four ES0C387GB SFF-2 SSD AIX	E1C	ESRC	Initial	Yes	No
	E2C		Initial	Yes	No
Four ES0D 387GB SFF-2 SSD IBMi	E1C	ESRD	Initial	Yes	No
	E2C		Initial	Yes	No
1.5TB Removable Disk Cartridge	E1C	EU15	Both	Yes	No
	E2B	MES		Yes	No
	E2C		Both	Yes	No

Description	Model	Feature	Both/	RP
Machine Type 8233	Number	Numbers	Support	CSU MES

Four ES0A 387GB SFF-1 SSD AIX	E8B	ESRA	Initial	Yes	No
Four ES0B 387GB SFF-1 SSD IBMi	E8B	ESRB	Initial	Yes	No
Four ES0C387GB SFF-2 SSD AIX	E8B	ESRC	Initial	Yes	No
Four ES0D 387GB SFF-2 SSD IBMi	E8B	ESRD	Initial	Yes	No
1.5TB Removable Disk Cartridge	E8B	EU15	Both	Yes	No

Description	Model	Feature	Both/	RP
Machine Type 8236	Number	Numbers	Support	CSU MES

Four ES0A 387GB SFF-1 SSD AIX	E8C	ESRA	Initial	Yes	No
Four ES0C387GB SFF-2 SSD AIX	E8C	ESRC	Initial	Yes	No
1.5TB Removable Disk Cartridge	E8C	EU15	Both	Yes	No

Description	Model	Feature	Both/	RP
Machine Type 8246	Number	Numbers	Support	CSU MES

PCIe2 LP 2-Port 10GbE RoCE SR	L1C	EL2Z	Both	Yes	No
	L1S		Both	Yes	No
	L2C		Both	Yes	No
	L2S		Both	Yes	No
1.5TB Removable Disk Cartridge	L1C	EU15	Both	Yes	No
	L1S		Both	Yes	No
	L2C		Both	Yes	No
	L2S		Both	Yes	No

Description	Model	Feature	Both/	RP
Machine Type 8406	Number	Numbers	Support	CSU MES

1.5TB Removable Disk Cartridge	70Y	EU15	Both	Yes	No
	71Y		Both	Yes	No

Description Machine Type	Model Number	Feature Numbers	Both/ Support	RP CSU MES
IBM i 6.1.1 Native I/O Enablement	MMD	EB34	Both	Yes No
Six ES02 387GB 1.8" SAS AIX/Li	MMC	ESR2	Initial	Yes No
	MMD		Initial	Yes No
Four ES0A 387GB SFF-1 SSD AIX	MMC	ESRA	Initial	Yes No
	MMD		Initial	Yes No
Four ES0B 387GB SFF-1 SSD IBMi	MMC	ESRB	Initial	Yes No
	MMD		Initial	Yes No
Four ES0C387GB SFF-2 SSD AIX	MMC	ESRC	Initial	Yes No
	MMD		Initial	Yes No
Four ES0D 387GB SFF-2 SSD IBMi	MMC	ESRD	Initial	Yes No
	MMD		Initial	Yes No
1.5TB Removable Disk Cartridge	MMB	EU15	MES	Yes No
	MMC		Both	Yes No
	MMD		Both	Yes No

Description Machine Type	Model Number	Feature Numbers	Both/ Support	RP CSU MES
Four ES0A 387GB SFF-1 SSD AIX	FHB	ESRA	Initial	Yes No
Four ES0B 387GB SFF-1 SSD IBMi	FHB	ESRB	Initial	Yes No
Four ES0C387GB SFF-2 SSD AIX	FHB	ESRC	Initial	Yes No
Four ES0D 387GB SFF-2 SSD IBMi	FHB	ESRD	Initial	Yes No
2.5/6.25TB LTO-6 SAS Tape Dr H	FHB	EU11	Both	No No

Description Machine Type	Model Number	Feature Numbers	Both/ Support	RP CSU MES
IBM i 6.1.1 Native I/O Enablement	MHD	EB34	Both	Yes No
Six ES02 387GB 1.8" SAS AIX/Li	MHC	ESR2	Initial	Yes No
	MHD		Initial	Yes No
Four ES0A 387GB SFF-1 SSD AIX	MHC	ESRA	Initial	Yes No
	MHD		Initial	Yes No
Four ES0B 387GB SFF-1 SSD IBMi	MHC	ESRB	Initial	Yes No
	MHD		Initial	Yes No
Four ES0C387GB SFF-2 SSD AIX	MHC	ESRC	Initial	Yes No
	MHD		Initial	Yes No
Four ES0D 387GB SFF-2 SSD IBMi	MHC	ESRD	Initial	Yes No
	MHD		Initial	Yes No
1.5TB Removable Disk Cartridge	MHB	EU15	MES	Yes No
	MHC		Both	Yes No
	MHD		Both	Yes No

The following are features already announced for the IBM Power Systems 8231 machine type:

Description	Model	Feature	Both/	RP		
Machine Type	8231	Number	Numbers	Support	CSU	MES
73.4 GB	15K RPM SAS SFF Disk D	E1C	1883	Support	Yes	No
69.7 GB	15K RPM SAS SFF Disk D	E1C	1884	Support	Yes	No

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