Lenovo Intelligent Cluster portfolio is enhanced with new InfiniBand products from Mellanox

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At a glance

Lenovo® Intelligent Cluster portfolio includes new Extended Data Rate (EDR) InfiniBand products from Mellanox.

The Intelligent Cluster offering solutions are built on:

- Rack-optimized servers and storage products from Lenovo
- Industry-leading interconnections
- Lenovo service options: three-year on-site[1] limited warranty

These solutions offer easy-to-order, robust, factory-built configurations supported by Lenovo.

[1] You may be asked certain diagnostic questions before a technician is sent.

Overview

Intelligent Cluster solutions, based on leading-edge technology, deliver high performance with award-winning energy and space efficiencies.

These comprehensive solutions can help simplify and expedite deployment of a Linux™ or Microsoft™ Windows™ high-performance computing (HPC) cluster. Lenovo combines all hardware, software, services, and support into a single integrated product offering, providing the benefit of a single point of contact for the entire cluster and virtually eliminating the need to manage multiple vendors for individual components.

The Intelligent Cluster is an outstanding choice for any organization that recognizes the economic advantages of a reduced time to deployment of an HPC cluster, but has concerns about the time and technical resources required for the end-to-end implementation.

New offerings for Intelligent Cluster portfolio

Mellanox

- Mellanox SB7700 EDR 36-port switch (0724-01X,HCS and 0724-02X,HCT)

  The Mellanox SB7700 is a 1U, 36-port, managed EDR 100 Gbps InfiniBand Switch. It is a high-performance fabric solution delivering up to 7 Tbps of nonblocking bandwidth with 130 ns port-to-port latency.

- Mellanox EDR InfiniBand optical and passive copper cables

Note: The information in Lenovo announcement letters is subject to change without notice, consult the *Sales Manual,* or your Lenovo marketing representative or reseller. Copies are available upon request.

Key prerequisites

Device drivers, as required.

Planned availability date

March 10, 2015

Description

Lenovo Intelligent Cluster

Computing applications or environments often have more requirements than an individual computer or server can address. These requirements may be best addressed by several computers working together. A cluster is a group of interconnected individual computers, working together on a single problem, or consolidating workloads from multiple servers. Although these computers can operate individually, they are managed from a single point of control using cluster management software.

The Intelligent Cluster offering, a high-performance scalable cluster, is built on:

- Intel Xeon™ processors
- NeXtScale nx360, Flex System, and rack-optimized servers

The Intelligent Cluster supports SUSE Linux Enterprise Server (SLES) 11.3 (64-bit) service pack 3, and Red Hat Enterprise Linux 6.5. All hardware components are configured and integrated into racks in the factory prior to shipment. You must obtain the prerequisite version of the Linux operating system and device drivers as specified by Lenovo.

- Either you or a qualified Business Partner can install the required software.
- You can use the optional installation services to have Lenovo install the operating system, device drivers, and General Parallel File System (GPFS™).

For intensive storage applications, Lenovo provides a service for all cluster hardware components and Lenovo software during the applicable warranty period. The Lenovo Intelligent Cluster warranty support does not include support for the software. Software service and support can be purchased separately through an optional Lenovo Support Line service.

Flex System

Flex System Enterprise Chassis

The Flex System Enterprise Chassis offers compute, networking, and storage capabilities. With the ability to handle up 14 compute nodes, intermixing the Enterprise Chassis provides flexibility and tremendous compute capacity in a 10U package. Additionally, the rear of the chassis accommodates four high-speed networking switches. With interconnecting compute nodes, networking, and storage using a high-performance and scalable mid-plane, Enterprise Chassis can support 40 Gb speeds.

The ground-up design of the Enterprise Chassis reaches new levels of energy efficiency through innovations in power, cooling, and air flow. Simpler controls and innovative designs allow the Enterprise Chassis to break free of "one size fits all" energy schemes.

The capability to support the workload demands of tomorrow's workloads is built in with a new I/O architecture, which provides choice and flexibility in fabric and speed. With the ability to use Ethernet, InfiniBand, FC, FCoE, and iSCSI, the Enterprise Chassis is uniquely positioned to meet the growing and future I/O needs of large and small businesses.

NeXtScale nx360 M5

NeXtScale System is the next generation of dense computing. It is an open, flexible, and simple data center solution for users of technical computing, grid deployments, analytics workloads, and large-scale cloud and virtualization infrastructures.

NeXtScale System is built with industry-standard components to create flexible configurations of servers, chassis, and networking switches that integrate easily in a standard 19-inch rack. It is a general purpose platform that provides flexibility, creating unique and differentiated solutions using off-the-shelf components, such as standard PCIe adapters, networking switches, and cables. Front access to servers, networking cables, and switches enables ease of serviceability and reduces chances of miscabling. Additionally, front access allows users to stay at the front of racks in the cold aisle instead at the back in the hot aisle.

Customized solutions for your applications can be configured to meet your specific business needs for optimum compute power, GPU or coprocessor acceleration, and storage with your choice of I/O and networking. Since the NeXtScale platform is optimized for standard racks, it allows the mixing of high-density NeXtScale server offerings and non-NeXtScale components within the same cluster rack.

You can purchase a fully integrated NeXtScale solution from Lenovo, or procure piece parts or a complete solution through your preferred Business Partner.

If purchased through Intelligent Cluster, Lenovo manufacturing sites will fully integrate the components on site and test them as a complete solution before shipping the rack to your location. When you receive the rack, it is removed from the packaging, placed in its proper location, powered up, and connected to the network in minimal time. Lenovo personnel will confirm that the servers and network are functioning properly before acceptance.

In addition, the integrated NeXtScale solution will undergo Linpack testing on the nodes; clients who require the benchmarking results can be provided HPL output data that was obtained during the test.

NeXtScale System is scalable and extendable with multigeneration upgrades to protect and maximize IT investments.

New and enhanced offerings for Intelligent Cluster portfolio

The Intelligent Cluster offerings include the following expanded array of hardware from other vendors, along with new features to help boost productivity for data centers.

Switches

Note: Information about usage of 'PSE', 'oPSE', and 'SE' switch airflow appears at end of 1U switch descriptions.

- Port-side exhaust (PSE) airflow is typically installed in an enterprise rack such as the Lenovo 1410 rack family.
- Opposite port-side exhaust (oPSE) airflow is installed when the switch will be in the same physical rack as a NeXtScale installation.

- Side exhaust (SE) airflow is evaluated on a case by case basis for rack support, but typically will install in a 1410 rack and may have certain racking limitations.

The suffixes do not necessarily determine rack support. Each switch is evaluated on its own merit for rack support.

Mellanox

Mellanox SB7700 36-port nonblocking managed EDR 100 Gbps InfiniBand Switch (0724-01X and 02X)

Built with Mellanox's latest SwitchIB InfiniBand switch device, EDR uses efficient 64/66 encoding while increasing the per lane signaling rate to 25 Gbps. The SB7700 provides up to thirty-six 100 Gbps full bidirectional bandwidth per port. These stand-alone switches are an ideal choice for top-of-rack leaf connectivity or for building small to extremely large-sized clusters. The SB7700 InfiniBand Switch enables large sized clusters. The SB7700 InfiniBand Switch enables efficient computing with features such as static routing, adaptive routing, and congestion control. These features ensure the maximum effective fabric bandwidth by eliminating congestion hot spots.

The SB7700 is a top of the rack design, created for performance, serviceability, energy savings and high-availability. The SB7700 InfiniBand Switch has redundant power supplies 1+1) and fan draws (N+1) both with air shutters for achieving maximal thermal protection.

There are two models being release to support both PSE (Port Side Exhaust) and OPSE (Opposite port-side exhaust)

Benefits

- High performing switch platform
- Designed for energy and cost savings
- Quick and easy setup and management
- Optimizes performance by removing fabric congestions
- Backward compatible to FDR technology

Key features

- Performance:
  - Thirty-six EDR 100 Gbps ports in a 1U switch
  - 7 Tbps aggregate switch throughput
  - 130 ns switch latency
- Optimized design:
  - Nineteen-inch rack mountable chassis, 1U with redundant power supplies and fan units:
  - 1+1 redundant and hot-swappable power
  - N+1 redundant and hot-swappable fans
  - AC power supplies
  - 80 gold+ and Energy Star certified power supplies
  - Dual-core x86 CPU
- Physical characteristics:
  - Dimensions: 1.72 in. (H) x 16.84 in. (W) x 27 in. (D)

Lenovo racks

- Intelligent Cluster 42U 1100 mm Enterprise Rack (1410-PRB) and Expansion Rack (1410-ERB)

  Lenovo 42U 1100 mm Enterprise V2 Rack

  The Lenovo 42U 1100 mm V2 Rack is an industry-standard 19-inch rack that supports Flex and rack-mountable System x servers and options. This 42U rack conforms to the EIA-310-D industry standard for 19-inch, type A rack cabinets, and has outriggers (stabilizers), allowing for movement of even large loads.

  Features include:

  - Perforated front door that allows for air flow.
  - Six side-wall compartments that support 1U-high power distribution units (PDUs) and switches without taking up valuable rack space.
  - Cable management slots that route Velcro strips around cables.
  - Easy-to-install-and-remove side panels standard on the 4PX models.
  - Front door that can be hinged on either side, providing flexibility to open in either direction.
  - Rear door that improves access and serviceability.
  - Front and rear doors and side panels that include locks and keys to help secure servers.
  - Heavy duty casters with outriggers (stabilizers) that come with the 42U Dynamic Rack for added stability, allowing movement of large loads.
  - Tool-less 0U PDU rear channel mounting (1U PDU requires screws) that reduces installation time and increases accessibility.

Lenovo Intelligent Cluster ecosystem

Intelligent Cluster 42U 1200 mm Deep Primary and Expansion Racks

Lenovo 42U 1200 mm Deep Rack offerings are industry-standard 19-inch server cabinets that are designed for high-availability System x designed for high availability System x environments. They are optimized to help maximize floor space, expedite installation, simplify cable management, and increase accessibility for improved serviceability. With a depth of 1200 mm (approximately 47 inches), these racks offer expansive rear channels with tool-less button mounts for virtually effortless installation of up to six Lenovo 0U vertical rack strip power distribution units (PDUs). Alternatively, these racks can easily accommodate vertical cable organizers or mounting of other equipment.

Lenovo Dynamic Racks enable you to receive your System x solutions fully integrated in the rack and ready to instantly deploy into your data center. Dynamic Racks are designed to affordably, safely, and securely handle shipping fully loaded configurations up to 950 kg (2,100 lb), which can help to increase your efficiency by reducing the time and cost that is associated with typical server deployments. However, if you do not need to ship the rack fully loaded, Lenovo offers cost-effective static offerings that are ideal when doing on-site integration.

The racks contain the following items:

- One rack
- Rear and front doors
- Side panels (except expansion racks ship without side panels)
- Shipping pallet and ramp
- Removable outriggers
- Keys for the rack doors and side panels
- One front stabilizer bracket
- Two bolt-down brackets/side stabilizers

- Hardware kit containing miscellaneous rack components
- Hardware kit for attaching the expansion rack to a rack suite (expansion racks only)

Features include:

42U 600 mm x 1200 mm designs

- Cost-effective 42U static (nonship loadable) and dynamic (fully ship loadable) static models
- Designed for high-availability System x environments
- Standard single floor tile width of 600 mm to complement current raised-floor data center designs
- Depth of 1200 mm for improved cable management and air circulation
- Compliance with the EIA-310-D industry standard for 19-inch, type A rack cabinets

Rear cable management:

- Expansive rear channels with tool-less button mounts for virtually effortless installation of up to six Lenovo 0U vertical rack strip PDUs, or to accommodate vertical cable organizers or mounting of other equipment.
- Zero U mounting design conserves valuable EIA space for IT equipment, simplifies cable management, reduces installation time, and increases accessibility.

Side pockets: Six sidewall compartments support installation of 1U PDUs and switches without unnecessarily taking up valuable rack space.

Overhead cable access: Front cable access portals and a large rear adjustable opening provide improved overhead cable management.

Standard stabilizers: Standard front and side stabilizers enable static rack stability when equipment is routinely installed, removed, or accessed.

Adjustable leveling pads: Four easily adjustable leveling pads ensure stability and prevent rolling on casters.

U markings: Clear U markings on mounting rails aid in space planning and installation.

Casters: 42U cabinets are less than 2 m (6.56 ft) in height on casters. Fixed front and rear swivel heavy duty casters can easily accommodate the maximum load capacity, while still being less than 2 m (6.56 ft) in height to allow the 42U rack models to fit under most doorways.

Perforated doors: Perforated front and rear doors enable maximum airflow.

Split rear door: Split rear door design improves access and serviceability.

Secure doors and panels: Lockable doors and side panels provide a more secure environment for equipment and data.

Quick release hinges: Quick release hinge design allows the front door to easily be mounted on either side of the cabinet; this provides for flexible placement alternatives by allowing the door to open in either direction.

42U dynamic ship load offerings:

- Affordable 42U dynamic rack models that support shipping of ready for instant deployment fully integrated solutions up to 952.54 kg (2,100 lb)
- Robust frame, mounting rails, and shock reusable packaging to help protect the heaviest loads in transit
- Integrated outriggers for dynamic tilt stability and safety at maximum loads

Expansion cabinets: All the primary Lenovo 1200 mm Deep Rack offerings have corresponding expansion cabinets. These models ship without side panels and include baying kits for seamless creation of a suite of racks.

42U Enterprise Rack (1410-4RX)

This specially designed 42U rack is one of two racks that can be used in Lenovo Intelligent Cluster configurations.

This rack features base stabilizers to enable shipment from the factory with Lenovo Intelligent Cluster components, such as power units, nodes, switches, cables, and consoles, mounted in position and with intrarack cabling installed according to applicable Lenovo Intelligent Cluster racking rules.

The Enterprise Rack is designated as Lenovo-installed for easy on-site installation. This designation, coupled with the factory integration services and optional on-site installation and verification of software, results in a ready-to-run cluster system. The cost of the hardware installation is included in the price of the rack. The cost of software installation by Lenovo or a qualified Business Partner is not included.

Expansion cabinets: All the primary Lenovo 1200 mm Deep Rack offerings have corresponding expansion cabinets. These models ship without side panels and include baying kits for seamless creation of a suite of racks.

25U Standard Rack (1410-2RX)

This 25U rack addresses the requirements of smaller departmental cluster configurations.

It is shipped from the factory with Lenovo Intelligent Cluster components such as power units, nodes, switches, cables, and consoles mounted in position and with intrarack cabling installed according to applicable Intelligent Cluster racking rules.

The 1410-2RX rack is designated as Lenovo-installed for easy on-site installation. This designation, coupled with the factory integration services and optional on-site installation and verification of software, results in a ready-to-run cluster system. The cost of the hardware installation is included in the price of the rack. The cost of software installation by Lenovo or a qualified Business Partner is not included.

Power and cooling advantages for Lenovo Intelligent Cluster

The Lenovo energy management portfolio meets the challenge of increasing power and thermal efficiency, while helping reduce costs on many levels. Inside the system, all System x servers start with Calibrated Vectored Cooling™ technology. This feature allows dual paths of air to each component, helping to improve uptime and longevity, and reducing wasteful air movement and heat generation. It can be coupled with more energy-efficient power supplies.

For clusters within a rack, System x servers are designed to work at full density in a well-planned rack solution. They can also operate at extended temperature ranges to keep the system up and running, even in some cases in extreme temperature and many potential failure conditions. Lenovo rack-based cluster solutions are engineered to optimize air flow and prevent undesirable recirculation within the rack, so that servers can run in optimal temperature conditions.

For dense data center environments, Lenovo delivers smart rack-level heat solutions, such as the super-efficient Lenovo Rear Door Heat eXchanger. The water-cooled door can dissipate heat generated from the back of the rack to reduce the overall room temperature. With this combination of benefits at the server and data center level, Lenovo systems can offer strong power and cooling benefits to Lenovo Intelligent Cluster clients.

Lenovo Rear Door Heat eXchanger (32R0712)

The Rear Door Heat eXchanger for Lenovo Enterprise Racks helps keep your growing data center at a safer temperature without adding air conditioning units. This unobtrusive solution brings more cooling capacity to areas where the heat is greatest, around racks of servers with multiple, more powerful processors.

Design simplicity delivers efficient cooling

The size and appearance of the Rear Door Heat eXchanger are similar to those of a standard rack acoustical 66 cm (26 in.) wide door. It adds a mere 10 cm (4 in.) to the depth of a rack, yet a single door may remove up to 50,000 Btu of heat (or approximately 15 kW). The door is designed to attach to a 42U-high Lenovo Enterprise Rack and swings wide to provide unrestricted access to electrical components. Sealed coils, filled with above-dewpoint, chilled water, passively remove a significant amount of the heat generated in a fully populated rack. This cooling efficiency may help eliminate the need for additional ac power and the associated construction cost.

Cluster Enablement Consulting for Lenovo Intelligent Cluster

Cluster Enablement Consulting is available at a flat-rate price per day that includes resource, travel, and expenses for predefined engagements.

The fee covers expenses for cluster enablement engagements of the following type:

- Staging and integration of cluster hardware and software components at the manufacturing site or another location
- Cluster integration into an existing cluster or cluster upgrades
- Customer acceptance testing
- Software installation and integration, including operating system, management software, file system, compilers, or client applications
- Instructor-led on-site training

Factory integration -- product customization services for Lenovo Intelligent Cluster

The Intelligent Cluster features several hardware validation and test services collectively referred to as product customization services. These services include the integration of hardware and software on System x servers in innovative manufacturing facilities. You can deploy systems in almost any IT environment. This means your IT resources can be better used elsewhere.

This statement is especially true for Linux cluster solutions. Given the complexity of a Linux cluster, you want the confidence that the solution arrives properly configured and ready to integrate in your data center. These options are integrated into the servers. Lenovo can install the chassis in an Enterprise Rack and have it shipped to you. Performing the same services on-site would take hours or even days.

In addition, Intelligent Cluster manufacturing offers specific services for the Lenovo Intelligent Cluster called Cluster Systems Validation and Test to confirm that all system settings are enabled and tested to enable smooth on-site deployment:

- Enable BIOS management
- Configure BIOS on each node
- Set up ASM and RSA
- Create disk partitioning
- Configure network, firewall, language, and time zone
- Configure services
- Set up storage
- Install terminal server

- Set up DNS
- Test, debug, and confirm that cluster is ready for operation

Lenovo has the skills and technology to offer this type of service. The Intelligent Cluster manufacturing product customization portfolio offers a tremendous value, especially for clients interested in complex offerings such as Linux cluster.

Installation and deployment services

The Intelligent Cluster solutions deployed in the 1410-4RX and 1410-2RX rack enclosures include on-site hardware installation and basic installation planning services for announced content.

Solution Enablement Consulting

Solution Enablement Consulting is available at a flat-rate price per day that includes resource, travel, and expenses for predefined engagements.

The fee covers expenses for solution enablement engagements of the following type:

- Staging and integration of hardware and software components at the manufacture site or another location
- Solution integration into an existing cluster or cluster upgrades
- Solution acceptance testing
- Software installation and integration, including operating system, management software, file system, compilers, or clients applications
- Instructor-led on-site training

Systems management

The System x product family offers systems management support for large scale-out compute environments through the integration of standards-based, scriptable interfaces. This support starts with the embedded Intelligent Platform Management Interface (IPMI) baseboard management controller (BMC).

For rapid diagnosis of problems, Intelligent Cluster solutions support Lenovo Dynamic System Analysis (DSA) preboot diagnostics, as well as online data collection for problem determination in supported Windows and Linux environments. Refer to the Dynamic System Analysis product documentation for additional detail on DSA features.

The compute nodes have been tested with the Extreme Cloud Administration Toolkit (xCAT), an open source community-based cluster administration tool set tailored to scale-out compute environments. You can download xCAT from SourceForge at

http://sourceforge.net/projects/xcat/

Also available, Lenovo Support for xCAT provides world-class technical support, delivering the support needed to confidently manage your large systems.

For additional information about xCAT, contact your Sales and Support Team, or visit

http://www-03.ibm.com/systems/software/xcat/support.html

Lenovo Intelligent Cluster - Product customization services

The following product customization services are included with Lenovo Intelligent Cluster.

For information, refer to the following table and contact your Lenovo representative.

Description	Part Number
Rack Assembly - 25U Rack	41Y4570
Rack Assembly - 42U Rack	25R4167
Rack Installation of 1U Component	25R4168
Rack Installation greater than 1U Component	25R4169
BladeCenter Chassis Configuration	58P8676
Cluster Hardware and Fabric Verification - 42U Rack	25R4170
Cluster Hardware and Fabric Verification - 25U Rack	40K9802
Cluster Enablement Consulting - 1 Day	26K7785

Applicable quantities are configuration-dependent and will be determined in the configuration process.

Accessibility by people with disabilities

A US Section 508 Voluntary Product Accessibility Template (VPAT) containing details on accessibility compliance can be requested at

http://www.ibm.com/able/product_accessibility/index.html

Product positioning

Lenovo Intelligent Cluster

The Intelligent Cluster is positioned within the Lenovo System x family of offerings as the platform of choice for high-value and high-performance scalable Linux cluster solutions.

Product number

The following are newly announced features on the specified models of the System x 0724 machine type:

Description	MT	Model	Feature
0724-HCS	0724	HCS	
0724-HCT	0724	HCT	
Flex SAP/BWA	0724	HCS HCT	A463
Mellanox SB7700 EDR IB Switch (PSE)	0724	HCS	ASQR
Mellanox SB7700 EDR IB Switch (oPSE)	0724	HCT	ASQS

The following are features already announced for the 0724 machine type:

Description	MT	Model	Feature
0724-HCS	0724	HCS	
0724-HCT	0724	HCT	
EMEA Long Leadtime Configurations	0724	HCS HCT	1763
Hungary CHW plant 9SH	0724	HCS HCT	1764
Guad CHW plant 9KQ	0724	HCS HCT	1765
ISTC CHW 9K2	0724	HCS HCT	1766
RTP CHW 9NR	0724	HCS HCT	1767
Offload Manufacturing to Guadalajara HVEC	0724	HCS HCT	1768
Offload Manufacturing to RTP HVEC	0724	HCS	1769

Offload Manufacturing to ISTC	0724	HCT HCS	1770
Capacity Scheduling Service	0724	HCT HCS	1772
Custom SLA Scheduling Service	0724	HCT HCS	1796
Custom Asset Tagging - Standard	0724	HCT HCS	2200
Custom Asset Tagging - Enhanced	0724	HCT HCS	2201
Request for Global Trade Number (UPC or EAN)	0724	HCT HCS	2207
Custom Unit Carton Label	0724	HCT HCS	2220
Custom Palletization	0724	HCT HCS	2221
Request for a new Vendor Logo Hardware	0724	HCT HCS	2247
Request for a Classic RPQ	0724	HCT HCS	2248
Rack Installation of 1U Component	0724	HCT HCS	2305
IntraRack CAT5E Cable Service	0724	HCT HCS	2323
Rack 01	0724	HCT HCS	3101
Rack 02	0724	HCT HCS	3102
Rack 03	0724	HCT HCS	3103
Rack 04	0724	HCT HCS	3104
Rack 05	0724	HCT HCS	3105
Rack 06	0724	HCT HCS	3106
Rack 07	0724	HCT HCS	3107
Rack 08	0724	HCT HCS	3108
Rack 09	0724	HCT HCS	3109
Rack 10	0724	HCT HCS	3110
Rack 11	0724	HCT HCS	3111
Rack 12	0724	HCT HCS	3112
Rack 13	0724	HCT HCS	3113
Rack 14	0724	HCT HCS	3114
Rack 15	0724	HCT HCS	3115
Rack 16	0724	HCT HCS	3116
Rack 17	0724	HCT HCS	3117
Rack 18	0724	HCT HCS	3118
Rack 19	0724	HCT HCS	3119
Rack 20	0724	HCT HCS	3120
Rack 21	0724	HCT HCS	3121
Rack 22	0724	HCT HCS	3122
Rack 23	0724	HCT HCS	3123
Rack 24	0724	HCT HCS	3124
Rack 25	0724	HCT HCS	3125

Rack 26	0724	HCT HCS	3126
Rack 27	0724	HCT HCS	3127
Rack 28	0724	HCT HCS	3128
Rack 29	0724	HCT HCS	3129
Rack 30	0724	HCT HCS	3130
Rack 31	0724	HCT HCS	3131
Rack 32	0724	HCT HCS	3132
Rack 33	0724	HCT HCS	3133
Rack 34	0724	HCT HCS	3134
Rack 35	0724	HCT HCS	3135
Rack 36	0724	HCT HCS	3136
Rack 37	0724	HCT HCS	3137
Rack 38	0724	HCT HCS	3138
Rack 39	0724	HCT HCS	3139
Rack 40	0724	HCT HCS	3140
Rack 41	0724	HCT HCS	3141
Rack 42	0724	HCT HCS	3142
Rack 43	0724	HCT HCS	3143
Rack 44	0724	HCT HCS	3144
Rack 45	0724	HCT HCS	3145
Rack 46	0724	HCT HCS	3146
Rack 47	0724	HCT HCS	3147
Rack 48	0724	HCT HCS	3148
Rack 49	0724	HCT HCS	3149
Rack 50	0724	HCT HCS	3150
Rack 51	0724	HCT HCS	3151
Rack 52	0724	HCT HCS	3152
Rack 53	0724	HCT HCS	3153
Rack 54	0724	HCT HCS	3154
Rack 55	0724	HCT HCS	3155
Rack 56	0724	HCT HCS	3156
Rack 57	0724	HCT HCS	3157
Rack 58	0724	HCT HCS	3158
Rack 59	0724	HCT HCS	3159
Rack 60	0724	HCT HCS	3160
Rack 61	0724	HCT HCS	3161
Rack 62	0724	HCT HCS	3162

Rack 63	0724	HCT HCS	3163
Rack 64	0724	HCT HCS	3164
Rack location U01	0724	HCT HCS	3201
Rack location U02	0724	HCT HCS	3202
Rack location U03	0724	HCT HCS	3203
Rack location U04	0724	HCT HCS	3204
Rack location U05	0724	HCT HCS	3205
Rack location U06	0724	HCT HCS	3206
Rack location U07	0724	HCT HCS	3207
Rack location U08	0724	HCT HCS	3208
Rack location U09	0724	HCT HCS	3209
Rack location U10	0724	HCT HCS	3210
Rack location U11	0724	HCT HCS	3211
Rack location U12	0724	HCT HCS	3212
Rack location U13	0724	HCT HCS	3213
Rack location U14	0724	HCT HCS	3214
Rack location U15	0724	HCT HCS	3215
Rack location U16	0724	HCT HCS	3216
Rack location U17	0724	HCT HCS	3217
Rack location U18	0724	HCT HCS	3218
Rack location U19	0724	HCT HCS	3219
Rack location U20	0724	HCT HCS	3220
Rack location U21	0724	HCT HCS	3221
Rack location U22	0724	HCT HCS	3222
Rack location U23	0724	HCT HCS	3223
Rack location U24	0724	HCT HCS	3224
Rack location U25	0724	HCT HCS	3225
Rack location U26	0724	HCT HCS	3226
Rack location U27	0724	HCT HCS	3227
Rack location U28	0724	HCT HCS	3228
Rack location U29	0724	HCT HCS	3229
Rack location U30	0724	HCT HCS	3230
Rack location U31	0724	HCT HCS	3231
Rack location U32	0724	HCT HCS	3232
Rack location U33	0724	HCT HCS	3233
Rack location U34	0724	HCT HCS	3234
Rack location U35	0724	HCT HCS	3235

Rack location U36	0724	HCT HCS	3236
Rack location U37	0724	HCT HCS	3237
Rack location U38	0724	HCT HCS	3238
Rack location U39	0724	HCT HCS	3239
Rack location U40	0724	HCT HCS	3240
Rack location U41	0724	HCT HCS	3241
Rack location U42	0724	HCT HCS	3242
Network Switch ID 01	0724	HCT HCS	3501
Network Switch ID 02	0724	HCT HCS	3502
Network Switch ID 03	0724	HCT HCS	3503
Network Switch ID 04	0724	HCT HCS	3504
Network Switch ID 05	0724	HCT HCS	3505
Network Switch ID 06	0724	HCT HCS	3506
Network Switch ID 07	0724	HCT HCS	3507
Network Switch ID 08	0724	HCT HCS	3508
Network Switch ID 09	0724	HCT HCS	3509
Network Switch ID 10	0724	HCT HCS	3510
Network Switch ID 11	0724	HCT HCS	3511
Network Switch ID 12	0724	HCT HCS	3512
Network Switch ID 13	0724	HCT HCS	3513
Network Switch ID 14	0724	HCT HCS	3514
Network Switch ID 15	0724	HCT HCS	3515
Network Switch ID 16	0724	HCT HCS	3516
Network Switch ID 17	0724	HCT HCS	3517
Network Switch ID 18	0724	HCT HCS	3518
Network Switch ID 19	0724	HCT HCS	3519
Network Switch ID 20	0724	HCT HCS	3520
Network Switch ID 21	0724	HCT HCS	3521
Network Switch ID 22	0724	HCT HCS	3522
Network Switch ID 23	0724	HCT HCS	3523
Network Switch ID 24	0724	HCT HCS	3524
Network Switch ID 25	0724	HCT HCS	3525
Network Switch ID 26	0724	HCT HCS	3526
Network Switch ID 27	0724	HCT HCS	3527
Network Switch ID 28	0724	HCT HCS	3528
Network Switch ID 29	0724	HCT HCS	3529
Network Switch ID 30	0724	HCT HCS	3530

0.6m Yellow Cat5e Cable	0724	HCT HCS	3791
1.5m Yellow Cat5e Cable	0724	HCT HCS	3792
3m Yellow Cat5e Cable	0724	HCT HCS	3793
10m Yellow Cat5e Cable	0724	HCT HCS	3794
25m Yellow Cat5e Cable	0724	HCT HCS	3795
0.6m Green Cat5e Cable	0724	HCT HCS	3796
1.5m Green Cat5e Cable	0724	HCT HCS	3797
3m Green Cat5e Cable	0724	HCT HCS	3798
10m Green Cat5e Cable	0724	HCT HCS	3799
25m Green Cat5e Cable	0724	HCT HCS	3800
0.6m Blue Cat5e Cable	0724	HCT HCS	3801
1.5m Blue Cat5e Cable	0724	HCT HCS	3802
3m Blue Cat5e Cable	0724	HCT HCS	3803
10m Blue Cat5e Cable	0724	HCT HCS	3804
25m Blue Cat5e Cable	0724	HCT HCS	3805
SAP-BWA Solution Code MFG Instruction	0724	HCT HCS	6125
1.5m, 10A/100-250V, C13 to IEC 320-C14 Rack Power Cable	0724	HCT HCS	6201
2.8m, 10A/100-250V, C13 to IEC 320-C20 Rack Power Cable	0724	HCT HCS	6204
4.3m, 10A/100-250V, C13 to IEC 320-C14 Rack Power Cable	0724	HCT HCS	6263
2.8m, 10A/100-250V, C13 to IEC 320-C14 Rack Power Cable	0724	HCT HCS	6311
Integrate Network Switch in MFG	0724	HCT HCS	7829
Customer Solution Center Services	0724	HCT HCS	7831
e1350 Special Bid Solution Component	0724	HCT HCS	7929
Consolidate Shipment	0724	HCT HCS	8031
e1350 Solution Component	0724	HCT HCS	8034
TAA Compliant Order	0724	HCT HCS	8067
Integrate in manufacturing	0724	HCT HCS	8971
Ship Uninstalled (Safety)	0724	HCT HCS	8972
System x Cluster Upgrade	0724	HCT HCS	A103
Integrated Solutions	0724	HCT HCS	A193
IntraRack CAT6 Cable Service	0724	HCT HCS	A1MR
10m CAT6 Yellow Cable	0724	HCT HCS	A1MS
10m CAT6 Green Cable	0724	HCT HCS	A1MT
10m CAT6 Blue Cable	0724	HCT HCS	A1MU
25m CAT6 Yellow Cable	0724	HCT HCS	A1MV

		HCT	
25m CAT6 Green Cable	0724	HCS	A1MW
		HCT	
25m CAT6 Blue Cable	0724	HCS	A1MX
		HCT	
High Performance Analytics Appliance	0724	HCS	A1NN
		HCT	
IBM GNRx Solution	0724	HCS	A3BB
		HCT	
IBM Application Ready Solutions	0724	HCS	A4P3
		HCT	
0.5m Mellanox EDR IB Passive Copper QSFP28 Cable	0724	HCS	ASQT
		HCT	
0.75m Mellanox EDR IB Passive Copper QSFP28 Cable	0724	HCS	ASQU
		HCT	
1m Mellanox EDR IB Passive Copper QSFP28 Cable	0724	HCS	ASQV
		HCT	
1.25m Mellanox EDR IB Passive Copper QSFP28 Cable	0724	HCS	ASQW
		HCT	
1.5m Mellanox EDR IB Passive Copper QSFP28 Cable	0724	HCS	ASQX
		HCT	
2m Mellanox EDR IB Passive Copper QSFP28 Cable	0724	HCS	ASQY
		HCT	
5m Mellanox EDR IB Optical QSFP28 Cable	0724	HCS	ASQZ
		HCT	
10m Mellanox EDR IB Optical QSFP28 Cable	0724	HCS	ASR0
		HCT	
15m Mellanox EDR IB Optical QSFP28 Cable	0724	HCS	ASR1
		HCT	
20m Mellanox EDR IB Optical QSFP28 Cable	0724	HCS	ASR2
		HCT	
30m Mellanox EDR IB Optical QSFP28 Cable	0724	HCS	ASR3
		HCT	
3m Mellanox EDR IB Passive Copper QSFP28 Cable	0724	HCS	ASRM
		HCT	
3m Mellanox EDR IB Optical QSFP28 Cable	0724	HCS	ASRN
		HCT	
50m Mellanox EDR IB Optical QSFP28 Cable	0724	HCS	ASRP
		HCT	

The following are features already announced for the 0724, 1410, 3331, 5460, 5462, 5463, 5465, 5467, 6241, 8721, 8753 machine types:

Description	MT	Model	Feature
0.5m Mellanox EDR IB Passive Copper QSFP28 Cable	0724	HCF	ASQT
		HCG	
		HCH	
		HCJ	
		HCP	
		HCQ	
		HCR	
0.5m Mellanox EDR IB Passive Copper QSFP28 Cable	1410	HEA	
		HEB	
		HPA	
		HPB	
		RC2	
		RC4	
0.5m Mellanox EDR IB Passive Copper QSFP28 Cable	3331	HC1	
0.5m Mellanox EDR IB Passive Copper QSFP28 Cable	5460	AC1	
0.5m Mellanox EDR IB Passive Copper QSFP28 Cable	5462	AC1	
0.5m Mellanox EDR IB Passive Copper QSFP28 Cable	5463	AC1	
0.5m Mellanox EDR IB Passive Copper QSFP28 Cable	5465	AC1	
0.5m Mellanox EDR IB Passive Copper QSFP28 Cable	5467	AC1	
0.5m Mellanox EDR IB Passive Copper QSFP28 Cable	6241	AC1	
		AC2	
0.5m Mellanox EDR IB Passive Copper QSFP28 Cable	8721	HC1	
0.5m Mellanox EDR IB Passive Copper QSFP28 Cable	8753	AC1	
0.75m Mellanox EDR IB Passive Copper QSFP28 Cable	0724	HCF	ASQU
		HCG	
		HCH	
		HCJ	

		HCP	
		HCQ	
		HCR	
0.75m Mellanox EDR IB Passive Copper QSFP28 Cable	1410	HEA	
		HEB	
		HPA	
		HPB	
		RC2	
		RC4	
0.75m Mellanox EDR IB Passive Copper QSFP28 Cable	3331	HC1	
0.75m Mellanox EDR IB Passive Copper QSFP28 Cable	5460	AC1	
0.75m Mellanox EDR IB Passive Copper QSFP28 Cable	5462	AC1	
0.75m Mellanox EDR IB Passive Copper QSFP28 Cable	5463	AC1	
0.75m Mellanox EDR IB Passive Copper QSFP28 Cable	5465	AC1	
0.75m Mellanox EDR IB Passive Copper QSFP28 Cable	5467	AC1	
0.75m Mellanox EDR IB Passive Copper QSFP28 Cable	6241	AC1	
		AC2	
0.75m Mellanox EDR IB Passive Copper QSFP28 Cable	8721	HC1	
0.75m Mellanox EDR IB Passive Copper QSFP28 Cable	8753	AC1	
1m Mellanox EDR IB Passive Copper QSFP28 Cable	0724	HCF	ASQV
		HCG	
		HCH	
		HCJ	
		HCP	
		HCQ	
		HCR	
1m Mellanox EDR IB Passive Copper QSFP28 Cable	1410	HEA	
		HEB	
		HPA	
		HPB	
		RC2	
		RC4	
1m Mellanox EDR IB Passive Copper QSFP28 Cable	3331	HC1	
1m Mellanox EDR IB Passive Copper QSFP28 Cable	5460	AC1	
1m Mellanox EDR IB Passive Copper QSFP28 Cable	5462	AC1	
1m Mellanox EDR IB Passive Copper QSFP28 Cable	5463	AC1	
1m Mellanox EDR IB Passive Copper QSFP28 Cable	5465	AC1	
1m Mellanox EDR IB Passive Copper QSFP28 Cable	5467	AC1	
1m Mellanox EDR IB Passive Copper QSFP28 Cable	6241	AC1	
		AC2	
1m Mellanox EDR IB Passive Copper QSFP28 Cable	8721	HC1	
1m Mellanox EDR IB Passive Copper QSFP28 Cable	8753	AC1	
1.25m Mellanox EDR IB Passive Copper QSFP28 Cable	0724	HCF	ASQW
		HCG	
		HCH	
		HCJ	
		HCP	
		HCQ	
		HCR	
1.25m Mellanox EDR IB Passive Copper QSFP28 Cable	1410	HEA	
		HEB	
		HPA	
		HPB	
		RC2	
		RC4	
1.25m Mellanox EDR IB Passive Copper QSFP28 Cable	3331	HC1	
1.25m Mellanox EDR IB Passive Copper QSFP28 Cable	5460	AC1	
1.25m Mellanox EDR IB Passive Copper QSFP28 Cable	5462	AC1	
1.25m Mellanox EDR IB Passive Copper QSFP28 Cable	5463	AC1	
1.25m Mellanox EDR IB Passive Copper QSFP28 Cable	5465	AC1	
1.25m Mellanox EDR IB Passive Copper QSFP28 Cable	5467	AC1	
1.25m Mellanox EDR IB Passive Copper QSFP28 Cable	6241	AC1	
		AC2	
1.25m Mellanox EDR IB Passive Copper QSFP28 Cable	8721	HC1	
1.25m Mellanox EDR IB Passive Copper QSFP28 Cable	8753	AC1	
1.5m Mellanox EDR IB Passive Copper QSFP28 Cable	0724	HCF	ASQX
		HCG	
		HCH	
		HCJ	
		HCP	
		HCQ	
		HCR	
1.5m Mellanox EDR IB Passive Copper QSFP28 Cable	1410	HEA	
		HEB	

		HPA	
		HPB	
		RC2	
		RC4	
1.5m Mellanox EDR IB Passive Copper QSFP28 Cable	3331	HC1	
1.5m Mellanox EDR IB Passive Copper QSFP28 Cable	5460	AC1	
1.5m Mellanox EDR IB Passive Copper QSFP28 Cable	5462	AC1	
1.5m Mellanox EDR IB Passive Copper QSFP28 Cable	5463	AC1	
1.5m Mellanox EDR IB Passive Copper QSFP28 Cable	5465	AC1	
1.5m Mellanox EDR IB Passive Copper QSFP28 Cable	5467	AC1	
1.5m Mellanox EDR IB Passive Copper QSFP28 Cable	6241	AC1	
		AC2	
1.5m Mellanox EDR IB Passive Copper QSFP28 Cable	8721	HC1	
1.5m Mellanox EDR IB Passive Copper QSFP28 Cable	8753	AC1	
2m Mellanox EDR IB Passive Copper QSFP28 Cable	0724	HCF	ASQY
		HCG	
		HCH	
		HCJ	
		HCP	
		HCQ	
		HCR	
2m Mellanox EDR IB Passive Copper QSFP28 Cable	1410	HEA	
		HEB	
		HPA	
		HPB	
		RC2	
		RC4	
2m Mellanox EDR IB Passive Copper QSFP28 Cable	3331	HC1	
2m Mellanox EDR IB Passive Copper QSFP28 Cable	5460	AC1	
2m Mellanox EDR IB Passive Copper QSFP28 Cable	5462	AC1	
2m Mellanox EDR IB Passive Copper QSFP28 Cable	5463	AC1	
2m Mellanox EDR IB Passive Copper QSFP28 Cable	5465	AC1	
2m Mellanox EDR IB Passive Copper QSFP28 Cable	5467	AC1	
2m Mellanox EDR IB Passive Copper QSFP28 Cable	6241	AC1	
		AC2	
2m Mellanox EDR IB Passive Copper QSFP28 Cable	8721	HC1	
2m Mellanox EDR IB Passive Copper QSFP28 Cable	8753	AC1	
5m Mellanox EDR IB Optical QSFP28 Cable	0724	HCF	ASQZ
		HCG	
		HCH	
		HCJ	
		HCP	
		HCQ	
		HCR	
5m Mellanox EDR IB Optical QSFP28 Cable	1410	HEA	
		HEB	
		HPA	
		HPB	
		RC2	
		RC4	
5m Mellanox EDR IB Optical QSFP28 Cable	3331	HC1	
5m Mellanox EDR IB Optical QSFP28 Cable	5460	AC1	
5m Mellanox EDR IB Optical QSFP28 Cable	5462	AC1	
5m Mellanox EDR IB Optical QSFP28 Cable	5463	AC1	
5m Mellanox EDR IB Optical QSFP28 Cable	5465	AC1	
5m Mellanox EDR IB Optical QSFP28 Cable	5467	AC1	
5m Mellanox EDR IB Optical QSFP28 Cable	6241	AC1	
		AC2	
5m Mellanox EDR IB Optical QSFP28 Cable	8721	HC1	
5m Mellanox EDR IB Optical QSFP28 Cable	8753	AC1	
10m Mellanox EDR IB Optical QSFP28 Cable	0724	HCF	ASR0
		HCG	
		HCH	
		HCJ	
		HCP	
		HCQ	
		HCR	
10m Mellanox EDR IB Optical QSFP28 Cable	1410	HEA	
		HEB	
		HPA	
		HPB	
		RC2	
		RC4	
10m Mellanox EDR IB Optical QSFP28 Cable	3331	HC1	

10m Mellanox EDR IB Optical QSFP28 Cable	5460	AC1	
10m Mellanox EDR IB Optical QSFP28 Cable	5462	AC1	
10m Mellanox EDR IB Optical QSFP28 Cable	5463	AC1	
10m Mellanox EDR IB Optical QSFP28 Cable	5465	AC1	
10m Mellanox EDR IB Optical QSFP28 Cable	5467	AC1	
10m Mellanox EDR IB Optical QSFP28 Cable	6241	AC1	
		AC2	
10m Mellanox EDR IB Optical QSFP28 Cable	8721	HC1	
10m Mellanox EDR IB Optical QSFP28 Cable	8753	AC1	
15m Mellanox EDR IB Optical QSFP28 Cable	0724	HCF	ASR1
		HCG	
		HCH	
		HCJ	
		HCP	
		HCQ	
		HCR	
15m Mellanox EDR IB Optical QSFP28 Cable	1410	HEA	
		HEB	
		HPA	
		HPB	
		RC2	
		RC4	
15m Mellanox EDR IB Optical QSFP28 Cable	3331	HC1	
15m Mellanox EDR IB Optical QSFP28 Cable	5460	AC1	
15m Mellanox EDR IB Optical QSFP28 Cable	5462	AC1	
15m Mellanox EDR IB Optical QSFP28 Cable	5463	AC1	
15m Mellanox EDR IB Optical QSFP28 Cable	5465	AC1	
15m Mellanox EDR IB Optical QSFP28 Cable	5467	AC1	
15m Mellanox EDR IB Optical QSFP28 Cable	6241	AC1	
		AC2	
15m Mellanox EDR IB Optical QSFP28 Cable	8721	HC1	
15m Mellanox EDR IB Optical QSFP28 Cable	8753	AC1	
20m Mellanox EDR IB Optical QSFP28 Cable	0724	HCF	ASR2
		HCG	
		HCH	
		HCJ	
		HCP	
		HCQ	
		HCR	
20m Mellanox EDR IB Optical QSFP28 Cable	1410	HEA	
		HEB	
		HPA	
		HPB	
		RC2	
		RC4	
20m Mellanox EDR IB Optical QSFP28 Cable	3331	HC1	
20m Mellanox EDR IB Optical QSFP28 Cable	5460	AC1	
20m Mellanox EDR IB Optical QSFP28 Cable	5462	AC1	
20m Mellanox EDR IB Optical QSFP28 Cable	5463	AC1	
20m Mellanox EDR IB Optical QSFP28 Cable	5465	AC1	
20m Mellanox EDR IB Optical QSFP28 Cable	5467	AC1	
20m Mellanox EDR IB Optical QSFP28 Cable	6241	AC1	
		AC2	
20m Mellanox EDR IB Optical QSFP28 Cable	8721	HC1	
20m Mellanox EDR IB Optical QSFP28 Cable	8753	AC1	
30m Mellanox EDR IB Optical QSFP28 Cable	0724	HCF	ASR3
		HCG	
		HCH	
		HCJ	
		HCP	
		HCQ	
		HCR	
30m Mellanox EDR IB Optical QSFP28 Cable	1410	HEA	
		HEB	
		HPA	
		HPB	
		RC2	
		RC4	
30m Mellanox EDR IB Optical QSFP28 Cable	3331	HC1	
30m Mellanox EDR IB Optical QSFP28 Cable	5460	AC1	
30m Mellanox EDR IB Optical QSFP28 Cable	5462	AC1	
30m Mellanox EDR IB Optical QSFP28 Cable	5463	AC1	
30m Mellanox EDR IB Optical QSFP28 Cable	5465	AC1	
30m Mellanox EDR IB Optical QSFP28 Cable	5467	AC1	

30m Mellanox EDR IB Optical QSFP28 Cable	6241	AC1	
		AC2	
30m Mellanox EDR IB Optical QSFP28 Cable	8721	HC1	
30m Mellanox EDR IB Optical QSFP28 Cable	8753	AC1	
3m Mellanox EDR IB Passive Copper QSFP28 Cable	0724	HCF	ASRM
		HCG	
		HCH	
		HCJ	
		HCP	
		HCQ	
		HCR	
3m Mellanox EDR IB Passive Copper QSFP28 Cable	1410	HEA	
		HEB	
		HPA	
		HPB	
		RC2	
		RC4	
3m Mellanox EDR IB Passive Copper QSFP28 Cable	3331	HC1	
3m Mellanox EDR IB Passive Copper QSFP28 Cable	5460	AC1	
3m Mellanox EDR IB Passive Copper QSFP28 Cable	5462	AC1	
3m Mellanox EDR IB Passive Copper QSFP28 Cable	5463	AC1	
3m Mellanox EDR IB Passive Copper QSFP28 Cable	5465	AC1	
3m Mellanox EDR IB Passive Copper QSFP28 Cable	5467	AC1	
3m Mellanox EDR IB Passive Copper QSFP28 Cable	6241	AC1	
		AC2	
3m Mellanox EDR IB Passive Copper QSFP28 Cable	8721	HC1	
3m Mellanox EDR IB Passive Copper QSFP28 Cable	8753	AC1	
3m Mellanox EDR IB Optical QSFP28 Cable	0724	HCF	ASRN
		HCG	
		HCH	
		HCJ	
		HCP	
		HCQ	
		HCR	
3m Mellanox EDR IB Optical QSFP28 Cable	1410	HEA	
		HEB	
		HPA	
		HPB	
		RC2	
		RC4	
3m Mellanox EDR IB Optical QSFP28 Cable	3331	HC1	
3m Mellanox EDR IB Optical QSFP28 Cable	5460	AC1	
3m Mellanox EDR IB Optical QSFP28 Cable	5462	AC1	
3m Mellanox EDR IB Optical QSFP28 Cable	5463	AC1	
3m Mellanox EDR IB Optical QSFP28 Cable	5465	AC1	
3m Mellanox EDR IB Optical QSFP28 Cable	5467	AC1	
3m Mellanox EDR IB Optical QSFP28 Cable	6241	AC1	
		AC2	
3m Mellanox EDR IB Optical QSFP28 Cable	8721	HC1	
3m Mellanox EDR IB Optical QSFP28 Cable	8753	AC1	
50m Mellanox EDR IB Optical QSFP28 Cable	0724	HCF	ASRP
		HCG	
		HCH	
		HCJ	
		HCP	
		HCQ	
		HCR	
50m Mellanox EDR IB Optical QSFP28 Cable	1410	HEA	
		HEB	
		HPA	
		HPB	
		RC2	
		RC4	
50m Mellanox EDR IB Optical QSFP28 Cable	3331	HC1	
50m Mellanox EDR IB Optical QSFP28 Cable	5460	AC1	
50m Mellanox EDR IB Optical QSFP28 Cable	5462	AC1	
50m Mellanox EDR IB Optical QSFP28 Cable	5463	AC1	
50m Mellanox EDR IB Optical QSFP28 Cable	5465	AC1	
50m Mellanox EDR IB Optical QSFP28 Cable	5467	AC1	
50m Mellanox EDR IB Optical QSFP28 Cable	6241	AC1	
		AC2	
50m Mellanox EDR IB Optical QSFP28 Cable	8721	HC1	
50m Mellanox EDR IB Optical QSFP28 Cable	8753	AC1	

nVidia Tesla K80	3331	HC1			AS4D

Options

Note: Applies to China only.

Description	Type	Mod	Feature	SEO Number	Part Number
0.5m Mellanox EDR IB Passive Copper QSFP28 Cable	3331	HC1	ASQT	00MP516	00MP516
0.75m Mellanox EDR IB Passive Copper QSFP28 Cable	3331	HC1	ASQU	00MP520	00MP520
1m Mellanox EDR IB Passive Copper QSFP28 Cable	3331	HC1	ASQV	00MP524	00MP524
1.25m Mellanox EDR IB Passive Copper QSFP28 Cable	3331	HC1	ASQW	00MP528	00MP528
1.5m Mellanox EDR IB Passive Copper QSFP28 Cable	3331	HC1	ASQX	00MP532	00MP532
2m Mellanox EDR IB Passive Copper QSFP28 Cable	3331	HC1	ASQY	00MP536	00MP536
5m Mellanox EDR IB Optical QSFP28 Cable	3331	HC1	ASQZ	00MP540	00MP540
10m Mellanox EDR IB Optical QSFP28 Cable	3331	HC1	ASR0	00MP544	00MP544
15m Mellanox EDR IB Optical QSFP28 Cable	3331	HC1	ASR1	00MP548	00MP548
20m Mellanox EDR IB Optical QSFP28 Cable	3331	HC1	ASR2	00MP552	00MP552
30m Mellanox EDR IB Optical QSFP28 Cable	3331	HC1	ASR3	00MP556	00MP556
3m Mellanox EDR IB Passive Copper QSFP28 Cable	3331	HC1	ASRM	00MP560	00MP560
3m Mellanox EDR IB Optical QSFP28 Cable	3331	HC1	ASRN	00MP563	00MP563
50m Mellanox EDR IB Optical QSFP28 Cable	3331	HC1	ASRP	00MP566	00MP566
nVidia Tesla K80	3331	HC1	AS4D	00KG133	00KG133

Note: The following are available only on the Lenovo Intelligent Cluster, NeXtScale, and iDataPlex.

Description	Machine Type	Model	Part number
Mellanox SB7700 EDR IB Switch (PSE)	0724	01X	072401X
Mellanox SB7700 EDR IB Switch (oPSE)	0724	02X	072402X

Note: Refer to the following list for usage of PSE, oPSE, and SE suffixes are being added to the end of 1U switch descriptions.

- Port-side exhaust (PSE) airflow is typically installed in an enterprise rack such as the Lenovo 1410 rack family.
- Opposite port-side exhaust (oPSE) airflow is typically installed in an iDataPlex rack.
- Side exhaust (SE) is typically installed in a iDataPlex rack but depending on the switch may be installed in an Enterprise rack.

The suffixes do not necessarily determine rack support. Each switch is evaluated on its own merit for rack support.

Additional part numbers previously announced are also supported by the Intelligent Cluster and iDataPlex. They are listed in the **Options** section. These parts, along with the newly announced parts, are supported only with the Intelligent Cluster and iDataPlex and are not validated or supported in other configurations unless specifically announced with those solutions. The only exception to this is the

0563-022. These parts are not to be sold outside of the Intelligent Cluster and iDataPlex Solution.

Important

The Intelligent Cluster is a highly customized solution that tests a best recipe of supported hardware and software components and code levels. In order to maintain full support of your Intelligent Cluster, it is important that the solution hardware and software levels remain at the best recipe level. Unless specifically directed to do so by the Lenovo Support team, do not apply any firmware or BIOS upgrades on your system or modify the software OS. In addition, do not add content to your cluster that is not part of the tested recipe and without contacting your sales team for an expert review of the content changes you would like to make.

You can review the supported code levels and hardware components for the Intelligent Cluster by visiting the support site and selecting Intelligent Cluster.

For information about the supported versions, visit

http://www-947.ibm.com/support/entry/portal/overview

Select downloads, and select the release of best recipe that is associated to the ship date of your Intelligent Cluster.

Publications

No national language support documents will be available for this product.

Services

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IBM® services include business consulting, outsourcing, hosting services, applications, and other technology management.

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For details on available IBM Business Continuity and Recovery Services, contact your Lenovo representative or visit

http://www.ibm.com/services/continuity

For details on education offerings related to specific products, visit

http://www.ibm.com/services/learning/ites.wss/zz/en?pageType=tp_search_new

Technical information

Physical specifications for the 1410-PRB Enterprise Rack

Approximate external dimensions

Lenovo 42U 1100 mm Enterprise V2 Dynamic Rack

- Height: 2009 mm (79.1 in.)

- Width: 604 mm (23.8 in.)
- Depth: 1100 mm (43.3 in.)
- Weight: 169 kg (372 lb), including outriggers

Lenovo Rear Door Heat eXchanger V2 for 9363 Rack - 1756-42X

- Height: 1950 mm (76.8 in.)
- Width: 600 mm (23.6 in.)
- Depth: 129 mm (5.0 in.)
- Weight: 39 kg (85 lb)

EMC compliance strategy

Typical configurations of the Linux cluster will be tested under the Class A requirement plus jurisdictional regulations for offer of sale in all markets.

- Title 47 CFR Part 15 Subpart B: US
- EN 55022; EN 55024: Europe
- AS/NZS CISPR 22: Australia/New Zealand
- VCCI: Japan
- ICES-003: Canada
- GB9254-2008: China
- MIC Notice No. 2000-79 and MIC Notice No. 200-80: Korea
- CISPR 22
- CISPR 24
- CNS 13438: Taiwan
- GOST: Russia

Product safety regulatory compliance strategy

The Intelligent Cluster will meet the jurisdictional regulations for offer of sale in all traditional and targeted markets.

- US: Certification to UL 60950-1:2005, Second Edition
- Canada: Certification to CSA C22.2 No. 60950-1-07, 2nd Edition, 2007-03
- U.K., Germany, France, Australia, New Zealand, Japan, Italy, Spain, Switzerland, Austria, Netherlands, Sweden, Norway, Belgium, and Korea: Certification to EN 60950-1:2006 + A11:2009
- Eastern Europe: CB scheme report and certification to EN 60950-1:2006 + A11:2009
- Russia and the CIS: GOST certification

Linux will also meet the NEC and regional code requirements identified in N-B2-4700-037, Power Systems™ National Requirements.

Operating environment

- Temperature: 16°C to 32°C (60.8°F to 89.6°F)
- Relative humidity: 8% to 80%
- Maximum wet bulb: 23°C
- Sound power: 7.5 bels LwAd (operating)[3], Category 1A (with four BladeCenters servers and an acoustics module) (for more configurations, refer to the BladeCenter *Planning and Installation Guide)*
- Sound pressure: No operator position
- Maximum altitude: 2,133.6 m (7,000 ft)

[3] If option machine type 4671-001 is selected, sound power is 8.3 bels.

Power requirements (per rack)

- Operating voltage: 200 - 240 V at 50/60 Hz
- Electrical output: 36 kW (maximum)
- Power source loading: 22 kVA (maximum)
- Thermal output: 20.9 kJ/s (71,400 Btu/hr) (maximum configuration)

When deploying the following network switches:

- Mellanox SX6512 FDR14 InfiniBand Switch 0724-024
- Mellanox SX6518 FDR14 InfiniBand Switch 0724-030
- Mellanox SX6536 FDR14 InfiniBand Switch 0724-025

The following Noise Hazard Notice notification applies:

Government regulations (such as those prescribed by OSHA or European Community Directives) may govern noise level exposure in the workplace and may apply to you and your server installation. This Lenovo system is available with an optional acoustical door feature that can help reduce the sound emitted from this system. The actual sound pressure levels in your installation depend upon a variety of factors, including the number of racks in the installation, the size, materials, and configuration of the room, the noise levels from other equipment, the room ambient temperature, and employees' location in relation to the equipment. Further, compliance with such government regulations also depends upon a variety of additional factors, including the duration of employees' exposure and whether employees wear hearing protection. Lenovo recommends that you consult with qualified experts in this field to determine whether you are in compliance with the applicable regulations.

Hardware requirements

For attended installation of an operating system, this server requires a compatible:

- USB keyboard
- USB mouse
- HDD
- Display

Unattended or remote installation may be performed without requiring some or all of these components. Review your unattended software installation program information for specific hardware configuration requirements.

For service, the server requires a compatible:

- USB keyboard
- USB mouse
- HDD
- Display

When having the unit serviced, plan to have these components attached to your server either directly or indirectly using a console.

Lift specifications

The following models require a lift tool.

- Mellanox
  - 0724-014, -015, -018, -024, -025, -026, -030
  - 0724-HC7, -HC8, -HCB, -HCH, -HCJ, -HCK, -HCP

- Data Direct Networks
  - 0750-01X, -014, -015, -016, -026, -027, 028
  - 0750-HCL, -HC4, -HCH, -HCJ, -HC5, -HCH, HCK
- IBM System x GPFS Storage Server
  - 0796-01X, 02X, -015, -016
  - 0796-HCB, -HBC, -HC5, -HC6

Note: Any chassis above 54.89 kg (121 lb) requires a lift tool.

For high-weight switches, plan to provide a lift for installation, removal, and replacement services. Lift specifications should meet the following:

- Height:
  - Stowed: 5 ft, 7.5 in.
  - Maximum forks down: 8 ft, 3 in.
  - Maximum forks up: 10 ft, .5 in.
  - Minimum forks down: 3.5 in.
- Load capacity:
  - Up to 400 lb

Note: Due to the weights of these devices, parts may be delayed in shipment.

Compatibility

All components of the Lenovo Intelligent Cluster are compatible when purchased as a supported Lenovo Intelligent Cluster solution.

Limitations

Lenovo Intelligent Cluster

- Lenovo Intelligent Cluster options are supported only when deployed in a Lenovo Intelligent Cluster solution. They will not be supported when installed outside a 1410 Rack.
- Use of the 1410-4RX or 1410-2RX Linux Cluster Rack outside of the Lenovo Intelligent Cluster offering is prohibited.
- When the heat exchange door is part of the Lenovo Intelligent Cluster Solution, Lenovo will attach the door to the rack. You are responsible for filling the heat exchange door with fluid and hooking up all plumbing connections. You are also responsible for draining the heat exchange door and disconnecting all plumbing connections prior to a Lenovo servicer's arrival on-site for replacement of the door assembly. After the servicer has replaced the heat exchange door assembly on the rack, it is your responsibility to refill the heat exchange door and reconnect all plumbing connections. All preventative maintenance on the rack is the sole responsibility of the client.
- Due to the weight of some switch chassis, the client may have to provide lifts for installation and repair if switches are installed in the upper portion of the rack.
- The LG-Ericsson ES-5048XG Switch (PSE) (4668-020 and 4668-HC9) is only supported in the 1410 enterprise racks because of length of the switch.
- The 0563-034 HVEC, 0563-HCU XCC FC A308 (Brocade MLXe 8) and 0563-035 HVEC, 0563-HCV XCC FC A309 (Brocade MLXE 16) will not be supported in configurations in conjunction with the Lenovo Acoustic Door Kit for Enterprise Rack option (part number 40K9627, feature code 4852), the Rear Door Heat eXchanger Option (part number 32R0712, feature code 4392), and the Dynamic Rack and Rear Door Heat eXchanger V2 1756-42X HVEC, 1756-HC1 XCC (feature code A2FP). This is due to air pressurization that occurs in the rack rear as a result of the added impedance of acoustic and cooling doors. This pressurization could result in hot air recirculation though the rack cold aisle opening created by the switch port location on the rack front cold aisle side.

iDataPlex

  - System x iDataPlex options are supported only when ordered and deployed in an iDataPlex solution. They will not be supported when ordered without a corresponding order for an iDataPlex Rack configuration.
  - The 1410 Rack Management Appliance is supported only when deployed in an iDataPlex configuration and with iDataPlex-supported BOM content.
  - Rear Door Heat eXchanger:
    -- The Rear Door Heat eXchanger is shipped separately from the iDataPlex rack for delivery and installation to the rack by a Lenovo authorized supplier.
    -- When the Rear Door Heat eXchanger is part of the iDataPlex solution, a Lenovo authorized service pamphlet shipped with Rear Door Heat eXchanger for warranty service information.) The client is responsible for filling the heat exchange door with fluid and hooking up all plumbing connections. The client is also responsible for draining the heat exchange door and disconnecting all plumbing connections prior to a Lenovo authorized supplier's arrival on site for replacement of the door assembly. After the servicer has replaced the heat exchange door assembly on the rack, it is the client's responsibility to refill the heat exchange door and reconnect all plumbing connections. All preventative maintenance on the rack is the sole responsibility of the client.
    -- Use of the iDataPlex Rack outside of the iDataPlex offering is not supported.
  - The Cisco 4948E Switch (oPSE) (4670-050 and 4670-HD1) is supported only in iDataPlex due to airflow.
- Components not specifically released and announced for the Intelligent Cluster may not receive full support.

Note: Regarding the use of SSDs, solid-state memory cells have an intrinsic, finite number of write cycles each cell can incur. As a result, each solid-state device has a maximum amount of write cycles to which it can be subjected, documented as total bytes written (TBD). Lenovo is not responsible for replacement of hardware that has reached the maximum guaranteed number of write cycles. This limit may be revealed as the device failing to respond to system-generated commands or becoming incapable of being written to. Additional information is available at

http://www-03.ibm.com/systems/x/options/storage/solidstate/index.html

Planning information

Customer responsibilities

Installation of hardware components is provided by Lenovo on the 1410 and 7825 machine types. Installation of hardware options within specific server nodes is a customer responsibility if not purchased as part of a manufacturing install service. Clients are responsible for preparing their site for installation.

Lenovo offers warranty support or service for the Lenovo and non-Lenovo products and options announced as part of the offering. To obtain solution-level support, contact Lenovo using the solution rack machine type and serial. Lenovo machine types supported as part of the Lenovo Intelligent Cluster solution carry their own warranty terms for on-site and CRU.

You must obtain the prerequisite version of the Linux operating system and device drivers as specified by Lenovo. You can install the required Linux operating system, device drivers, GPFS, and CSM software, use optional Linux cluster installation services to have Lenovo install it, or have a qualified Business Partner perform the service.

You are expected to review the *Installation Planning Guide* before the delivery of your Lenovo Intelligent Cluster. The customer's responsibilities must be verified as complete before scheduling an Lenovo installer to come on-site.

Visit

http://publib.boulder.ibm.com/cluster/

Important

The Intelligent Cluster is a highly customized solution that tests a best recipe of supported hardware and software components and code levels. In order to maintain full support of your Intelligent Cluster, it is important that the solution hardware and software levels remain at the best recipe level. Unless specifically directed to do so by the Lenovo Support team, do not apply any firmware or BIOS upgrades to your system or modify the software operating system. In addition, do not add content to your cluster that is not part of the tested recipe and without contacting your sales team for an expert review of the content changes you would like to make.

You can review the supported code levels and hardware components for the Intelligent Cluster by visiting the support web page and choosing Intelligent Cluster.

For information about the supported versions, visit

http://www-947.ibm.com/support/entry/portal/overview

Select downloads, and select the release of best recipe that is associated to the ship date of your Intelligent Cluster.

Cable orders

All cables are supplied with the Intelligent Cluster. Depending on the applications, the cables may be fully installed, partially installed (plugged at one end and packaged for shipping), or included as part of a shipment group.

Installability

Setup and installation of the Intelligent Cluster hardware are provided by Lenovo on the 1410 machine type.

When the heat exchange door is part of the Intelligent Cluster Solution, Lenovo will only attach the door to the rack.

Packaging

Lenovo Intelligent Cluster shipping contents:

- CD/Pubs Pack
  - Intelligent Cluster information
  - International License Agreement for Non-Warranted Programs
  - Statement of Limited Warranty
  - Warranty Information Sheet for Lenovo Intelligent Cluster
  - International Program License Agreement
- Poly bag - generic
- Installation Information Flyer
- Safety manual

Security, auditability, and control

This offering uses the security and auditability features from standard Lenovo offerings and supported Linux distributions.

The customer is responsible for evaluation, selection, and implementation of security features, administrative procedures, and appropriate controls in application systems and communications facilities.

Terms and conditions

To obtain copies of the Lenovo Statement of Limited Warranty, contact your reseller or Lenovo.

Warranty period

- Machine type 0724: Three years
- Optional features: One year

Note: For configurations that support the RAID Battery, the RAID battery will be warranted for one year effective on its date of installation. All other product warranty terms for the machine remain unchanged.

A Lenovo part or feature installed during the initial installation of a Lenovo machine is subject to a full warranty effective on the date of installation of the machine. A Lenovo part or feature which replaces a previously installed part or feature assumes the remainder of the warranty period for the replaced part or feature. A Lenovo part or feature added to a machine without replacing a previously installed part or feature is subject to a full warranty effective on its date of installation. Unless specified otherwise, the warranty period, type of warranty service, and service level of a part or feature is the same as the machine it is installed.

The following have been designated as consumables, supply items, or structural parts and therefore not covered by this warranty:

- Rack front door
- Rack filler plate
- DDN battery
- Mellanox blanks

Warranty service

If required, Lenovo provides repair or exchange service, depending on the type of warranty service specified below for the machine. Lenovo will attempt to resolve your problem over the telephone or electronically by access to a Lenovo website. Certain machines contain remote support capabilities for direct problem reporting, remote problem determination, and resolution with Lenovo. You must follow the problem determination and resolution procedures that Lenovo specifies. Following problem determination, if Lenovo determines On-site Service is required, scheduling of service will depend upon the time of your call, machine technology and redundancy, and availability of parts. Service levels are response-time objectives and are not guaranteed. The specified level of warranty service may not be available in all worldwide locations. Additional charges may apply outside Lenovo's normal service area. Contact your local Lenovo representative or your reseller for country-specific and location-specific information.

The type of service is Customer Replaceable Unit (for example, keyboard, mouse, speaker, memory, or hard disk drive) Service and On-site Service.

Customer Replaceable Unit (CRU) Service

Lenovo provides a replacement CRU to you for you to install. CRU information and replacement instructions are shipped with your machine and are available from Lenovo at any time on your request. A CRU is designated as being either a Tier 1 (mandatory) or a Tier 2 (optional) CRU. Installation of Tier 1 CRUs, as specified in this announcement, is your responsibility. If Lenovo installs a Tier 1 CRU at your request, you will be charged for the installation. You may install a Tier 2 CRU yourself or request Lenovo to install it, at no additional charge, under the type of warranty service designated for your machine.

Based upon availability, a CRU will be shipped for next-business-day (NBD) delivery. Lenovo specifies in the materials shipped with a replacement CRU whether a defective CRU must be returned to Lenovo. When return is required, return instructions and a container are shipped with the replacement CRU, and you may be charged for the replacement CRU if Lenovo does not receive the defective CRU within 15 days of your receipt of the replacement.

The following parts or features have been designated as Tier 1 CRUs:

- CMOS batteries
- Hard disk drives
- Hot-swap fan
- Hot-swap AC power supply
- Memory DIMM
- Optical drive
- PCI adapter
- Power cord
- Service label
- System label
- Hyper visor USB key
- PCI riser
- RAID card without battery
- Tape drive
- Ethernet daughter card

On-site Service

At Lenovo's discretion you will receive CRU service; or Lenovo or your reseller will repair the failing machine at your location and verify its operation. If required, On-site Repair is provided, 9 hours per day, Monday through Friday excluding holidays, NBD response. You must provide a suitable working area to allow disassembly and reassembly of the Lenovo machine. The area must be clean, well lit, and suitable for the purpose. On-site Service is not available in all countries, and some countries have kilometer or mileage limitations from a Lenovo service center. In those locations where On-site Service is not available, the normal in-country service delivery is used.

International Warranty Service (IWS)

IWS is available in selected countries or regions.

The warranty service type and the service level provided in the servicing country may be different from that provided in the country in which the machine was purchased.

Under IWS, warranty service will be provided with the prevailing warranty service type and service level available for the IWS-eligible machine type in the servicing country, and the warranty period observed will be that of the country in which the machine was purchased.

To determine the eligibility of your machine and to view a list of countries where service is available, visit

http://www-947.ibm.com/support/entry/portal/docdisplay?lndocid=GCOR-3FBJK2

Licensing

Programs included with this product are licensed under the terms and conditions of the License Agreements that are shipped with the system.

Hourly service rate classification

One

Field-installable features

Yes

Model conversions

No

Machine installation

Customer setup. Customers are responsible for installation according to the instructions Lenovo provides with the machine.

Graduated program license charges apply

No

Licensed Internal Code and Licensed Machine Code

This product does not contain Licensed Internal Code or Licensed Machine Code.

Machine Code License Acceptance Requirement

Acceptance-By-Use Machine: Yes, acceptance of the Machine Code license terms is conveyed through the user's initial use of the machine.

Educational allowance

None

Prices

Lenovo Services prices

For additional information and pricing on all Japanese Lenovo Services, visit

https://www-304.ibm.com/sales/gss/download/spst/servicepac/extProductSelectorWWW.do

AP distribution

Country/Region	Announce	Announce Date
AP IOT		
ASEAN*	Yes	March 3, 2015
India/South Asia**	Yes	March 3, 2015
Australia	Yes	March 3, 2015
People's Republic of China	Yes	March 3, 2015
Hong Kong S.A.R of the PRC	Yes	March 3, 2015
Macao S.A.R of the PRC	Yes	March 3, 2015
Taiwan	Yes	March 3, 2015
Korea	Yes	March 3, 2015
New Zealand	Yes	March 3, 2015
Japan IOT		
Japan	Yes	March 3, 2015

* Brunei Darussalam, Indonesia, Cambodia, Lao People's Democratic Republic, Malaysia, Philippines, Singapore, Thailand, and Vietnam

** Bangladesh, Bhutan, India, Sri Lanka, Maldives, Nepal, and Afghanistan

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