

IBM Flex System x440 Compute Node

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At a glance



The IBM Flex System™ x440 Compute Node is an Intel-processor-based server optimized for high-end virtualization, mainstream database deployments, and memory-intensive high-performance environments.

For ordering, contact your IBM® representative, an IBM Business Partner, or IBM Americas Call Centers at 800-IBM-CALL (Reference: YE001).

Overview

The IBM Flex System x440 Compute Node is an Intel-processor-based server optimized for high-end virtualization, mainstream database deployments, and memory-intensive high-performance environments.

Versatile

- Designed to run a variety of workloads, including high-end virtualization and mainstream databases
- A great choice of processors, memory, internal storage, and I/O options, allowing for flexible configurations
- Supported in the IBM Flex System Enterprise Chassis

Easy to use

- Two hot-swapped storage bays that support SAS/SATA drives, enabling drives to be removed easily for replacement or upgrade
- An optional embedded hypervisor helps enable "instant virtualization"
- Light Path diagnostics and Predictive Failure Analysis to help enable quick serviceability and maintenance
- The Flex System Management with a preconfigured and preinstalled interface to provide near-real-time management of the system

Performance optimized

- Next-generation Intel Xeon™ E5-4600 family processors, up to four processors, 130 W each
- Memory capacity with 48 DDR3 DIMM slots supporting up to 1,536 GB using 32 GB LRDIMMs
- Support for running 2DPC at 1600 MHz
- High-speed I/O that supports up to a total of sixteen physical 10 Gb ports or up to 64 ports of Virtual Fabric by using four 4-port 10 GbE mezzanine cards

Power and cooling

- Low-power processors and low-power memory DIMMs
- Energy-efficient 1.35 V DIMM support
- Active Energy Manager to help monitor and cap power consumption
- Advanced management that supports limiting power consumption and real-time power and thermal management
- Innovative and robust design to help keep the compute node performing under demanding conditions

Key prerequisites

- IBM Flex System Enterprise Chassis
- IBM network switch
- Appropriate PDUs and main power distribution
- VGA monitor, USB keyboard, and USB mouse for setup

Planned availability date

December 3, 2012

Description

IBM Flex System compute nodes

Compute nodes typically contain the number and type of microprocessors, memory modules, and hard disk drives that are needed to support a specific workload environment. These nodes use integrated network ports or optional network adapters to connect to external devices through the switches or modules that are installed in the chassis.

Note: The network adapters and ports in the nodes must be compatible with the network switches or modules in the chassis.

These compute nodes come with Intel Xeon microprocessors and provide the function, reliability, and performance in a small form factor design. They support a variety of Microsoft™ Windows™, Linux™, and VMware operating systems and are ideally suited for high-performance and virtualized environments such as memory-intensive computing, collaboration, general and mission-critical processing, and enterprise application workloads. All models come with an integrated management module (IMM2) that connects to the Chassis Management Module to provide the integrated systems-management functions for the node.

Flex System x440 Compute Node

The IBM Flex System x440 Compute Node is a high-density server optimized for high-end virtualization, mainstream database deployments, and memory-intensive high-performance environments.

The Flex System x440 Compute Node provides support for optional devices, such as the following devices:

- Up to four multicore microprocessors
- Up to 48 low profile dual inline memory modules (DIMMs)
- Up to two hot-swap storage drives
- Up to four I/O expansion adapters (model dependent)
- Up to two internal bootable USB flash keys

The Flex System x440 Compute Node is supported in the IBM Flex System Enterprise Chassis only.

The IBM Flex System x440 Compute Node supports memory mirroring. Chipkill is supported in any mode when x4-based DIMM memory is used. Chipkill memory correction for up to four bits per DIMM helps to keep your server up and running.

Additional features

- The IBM Flex System x440 Compute Node system board contains 48 DIMM connectors.
 - Each DIMM connector supports 4 GB, 8 GB, 16 GB, or 32 GB low-profile (LP) double data rate (DDR3) DRAM.
 - Chipkill is supported in x4 DIMM memory configurations only.
- Support is provided for up to two hot-swap, Small Form Factor (SFF) Serial Attached SCSI (SAS), Serial ATA (SATA), or solid-state (SSD) storage drives.
- Dual 10-Gigabit Ethernet connections are provided on select models.

IBM Flex System x440 Compute Node servers are designed for high throughput from processor to memory, and to bus I/O.

These features, combined with SMP capability and blade-thin density, make it an excellent choice for space-constrained and power-constrained environments used for:

- Database
- Virtualization
- General enterprise applications such as ERP and SCM
- Simulations

High-availability and serviceability features

- Hot-swap capability: Hot-swap compute nodes enable easy access to each node server.
- Management module
 - The management module interfaces with each node server for single systems management control.
- Dynamic System Analysis (DSA)
 - IBM Dynamic System Analysis (DSA) collects and analyzes system information to aid in diagnosing compute node problems. DSA collects the following information about the compute node:
 - Drive health information
 - Event logs for ServeRAID controllers and service processors
 - Hardware inventory, including PCI and USB information
 - Installed applications and hot fixes
 - Kernel modules
 - Light path diagnostics status

- Network interfaces and settings
- Performance data and details about processes that are running
- RAID and controller configuration
- Integrated management module 2 status and configuration
- System configuration
- Vital product data and firmware information

DSA creates a DSA log, which is a chronologically ordered merge of the system-event log (as the IPMI event log), the IMM event log (as the ASM event log), and the operating-system event logs. You can send the DSA log as a file to a support representative or view the information as a text file or HTML file.

- Flexible network support

The compute node provides flexible network capabilities:

- The integrated Emulex BE3 dual-port Gigabit Ethernet (select models) controller supports connections to a 1 Gbps or 10 Gbps network through an Ethernet-compatible switch module in the chassis. The controller also supports Wake on LAN technology.
- The compute node has connectors on the system board for optional expansion adapters for adding network communication capabilities to the compute node. Depending on the model, you can install up to four I/O expansion adapters for network support. This provides the flexibility to install expansion adapters that support a variety of network communication technologies.

- Hard disk drive support

The compute node supports up to two hot-swap hard disk drives. You can implement RAID 0 or RAID 1 for the drives.

- IBM ServerGuide Setup and Installation CD

The ServerGuide Setup and Installation CD, which you can download from the web, provides programs to help you set up the compute node and install a Windows operating system. The ServerGuide program detects installed optional hardware devices and provides the correct configuration programs and device drivers.

- Integrated management module 2 (IMM2)

The integrated management module 2 (IMM2) combines systems-management function, video controller, the remote presence, and blue-screen capture features in a single chip. The IMM2 provides advanced systems-management control, monitoring, and alerting function. If an environmental condition exceeds a threshold or if a system component fails, LED lights are illuminated on the IMM2 to help you diagnose the problem. The IMM2 then records the error in the IMM event log and alerts you to the problem.

Optionally, the IMM2 also provides a virtual presence capability for remote systems management capabilities. The IMM2 provides remote systems management through industry-standard interfaces:

- Common Information Model (CIM)
- Intelligent Platform Management Interface (IPMI) version 2.0
- Simple Network Management Protocol (SNMP) version 3.0
- Web browser

- Large system-memory capacity

The compute node supports up to 1,536 GB of system memory. The IBM Flex System x440 Compute Node provides support for up to 48 industry-standard registered or LRDIMM ECC DDR3 on low-profile (LP) DIMMs on the system board.

- Light path diagnostics

Light path diagnostics provides light-emitting diodes (LEDs) to help diagnose problems.

- Microprocessor technology
The compute node supports up to four multicore Intel Xeon microprocessors.
- Peripheral Component Interconnect Express® (PCIe)
PCIe is a computer expansion bus that is used for chip-to-chip interconnect and expansion adapter interconnect. You can add optional I/O and storage devices.
- Power throttling
By enforcing a configurable power policy known as power-domain oversubscription, the IBM Flex System chassis will allow for a larger overall chassis power budget depending on the number of power supplies installed. When a fault occurs in one or more power supplies, the power supplies can run oversubscribed for a short period of time. During this time period, the compute nodes will throttle to safe power level in order to allow all components in the chassis to stay operational and survive the power supply failure. This policy is enforced by the Chassis Management Module in cooperation with every installed compute node in the IBM Flex System chassis. The policy is in effect when initial power is applied to the IBM Flex System chassis or when an administrator changes the policy.

The following settings for this policy are available:

- Basic power management
- Power module redundancy (N+N or N+1)
- Power module redundancy with compute node throttling allowed (N+N or N+1)

An administrator can configure the policy and monitor the overall chassis power environment by using the Chassis Management Module user interface.

- Systems-management support
The compute node supports the IBM Flex System Chassis Management Module (CMM) and IBM Flex System Manager™ management software.
 - CMM is a hot-swap module that provides system-management functions for all components in an IBM Flex System chassis. It controls a serial port for remote connection and a 10/100 Mbps Ethernet remote-management connection.
 - IBM Flex System Manager management software is a platform-management foundation that streamlines the way you manage physical and virtual systems in a heterogeneous environment. By using industry standards, IBM Flex System Manager management software supports multiple operating systems and virtualization technologies.

Flex System networking portfolio

Networking in datacenters today is undergoing a transition from a discrete traditional model to a more flexible, optimized model or the "smarter" model. Clients are looking to support more workloads with decreasing or flat IT budget. The network architecture on the Flex System platform has been designed to address the key challenges clients are facing today in their datacenters. The key attributes of the network architecture on this platform are:

- Integrated
 - Efficient integrated management as part of the management appliance
 - Move from physical network management to logical network management in a virtualized environment
- Automated
 - Seamless provisioning, management, and deployment of both physical and virtual network parameters using tools like Virtual Fabric Manager, IBM SoftSwitch (5000v), and VMready®
- Optimized
 - Creation of a flat logical network so there are fewer elements to manage

- Reduced cost and complexity by leveraging IBM Virtual Fabric and I/O convergence
- Reduced risk and cost by leveraging scalable switches that can provide both port and bandwidth flexibility

One of the key attributes of the products on this platform is scalability. When modules are marked "Scalable," this means that clients can buy the base product with certain number of ports and when they need to scale up for more ports, they can just buy the license to enable the extra ports without having to provision any new hardware.

The Flex System networking portfolio includes:

- IBM Flex System EN2092 1 Gb Ethernet Scalable Switch

This 1 Gb scalable switch is for clients looking to use the value of Flex System without moving to a 10 Gb environment. Key features of this switch module are:

- The switch supports up to two logical partitions per physical switch.
- It is a 52-port switch with 28 internal 1 Gb ports, 20 external 1 Gb ports, and 4 external 10 Gb ports.
- The base switch provides 14 internal 1 Gb ports and 10 external 1 Gb RJ45 ports.
- Upgrade 1 offers 14 additional internal 1 Gb ports and 10 additional external 1 Gb RJ45 ports.
- Upgrade 2 enables the four 10 Gb uplink ports.
- Upgrade 1 can be applied to the base switch or to Upgrade 2.
- 10 Gb SFP+ ports can function at 1 Gb or 10 Gb.
- The switch provides support for full L2/L3 Ethernet functionality.

The IBM Flex System EN2092 1 Gb Ethernet Scalable Switch offers 14 internal 1 Gb ports to each compute node and 10 external 1 Gb ports as uplinks. The external ports are RJ45.

- IBM Flex System EN2092 1 Gb Ethernet Scalable Switch (Upgrade 1)

Clients who require either more than two 1 Gb ports per server or more bandwidth can enable additional ports by using this switch upgrade. This option enables another 14 internal 1 Gb ports to each compute node and 10 additional external 1 Gb uplinks.

- IBM Flex System EN2092 1 Gb Ethernet Scalable Switch (10 Gb Uplinks) (Upgrade 2)

This option enables the four 10 Gb uplinks on this switch module for clients who require higher performance and bandwidth to connect to 10 Gb Top-of-Rack (ToR) switch modules. Clients need to purchase at least the base switch before they can enable these uplinks. These uplinks can be enabled on either partition of the switch.

- IBM Flex System Fabric EN4093 10 Gb Scalable Switch

This 10 Gb scalable switch is designed to offer uncompromised scalability, throughput, and performance. This switch can help clients migrate to 10 Gb infrastructure and offers virtualization features such as Virtual Fabric and VMready . Clients should consider this switch if they:

- Are building a 10 Gb Ethernet infrastructure or migrating from 1 Gb to 10 Gb (mixed environment)
- Are deploying virtualization
- Want investment protection to upgrade to more ports and bandwidth (40 Gb)

Some of the key features of this switch are:

- This is a triple-density switch with the ability to scale based on your needs.

- It offers a total 64 ports with 42 internal 10 Gb ports and 22 external 10 Gb ports.
- The base switch provides 14 internal 10 Gb ports and 10 external SFP+ 10 Gb ports.
- Upgrade 1 provides 14 additional internal 10 Gb ports and enables two 40 Gb QSFP ports that can be used as four 10 Gb ports.
- Upgrade 2 offers 14 additional internal 10 Gb ports and enables 4 external SFP+ 10 Gb ports.
- Upgrade 1 is required to apply Upgrade 2.
- 10 Gb SFP+ ports can function at 1 Gb or 10 Gb.
- 40 Gb QSFP ports can function at 10 Gb or 40 Gb.
- The switch provides full Layer 2/3 Ethernet function.
- The switch offers Virtual Fabric support and management.

This base switch model will enable 14 internal 10 Gb ports, one to each compute node, and 10 external 10 Gb ports to connect to a ToR switch module. All external 10 Gb ports are SFP+ based connections.

- IBM Flex System Fabric EN4093 10 Gb Scalable Switch (Upgrade 1)

This switch upgrade can be applied on the base switch when you require support for four ports of 10 Gb on the server or if you just want more uplink bandwidth on the base switch. The upgrade will enable 14 additional internal 10 Gb ports, one to each compute node, and two 40 Gb uplinks. These 40 Gb uplinks are QSFP connectors but can be converted to four 10 Gb uplinks using fan out cable. This upgrade can be applied if you already have the base switch model.
- IBM Flex System Fabric EN4093 10 Gb Scalable Switch (Upgrade 2)

This switch upgrade can be applied on top of Upgrade 1 when you want to support six ports of 10 Gb on the server or if you just want more uplink bandwidth on the base switch. The upgrade will enable 14 additional internal 10 Gb ports, one to each compute node, and four 10 Gb uplinks. These uplinks are SFP+ ports.
- IBM Flex System EN4091 10 Gb Ethernet Pass-thru

This module offers easy connectivity of the Flex System Chassis to an external network infrastructure. This is an unmanaged device enabling direct connectivity of a compute node in the chassis to an external Top-of-Rack switch. This module can function at both 1 Gb and 10 Gb speeds. It has 14 internal links and 14 external SFP+ uplinks.
- IBM Flex System EN2024 4-port 1 Gb Ethernet Adapter

This four-port 1 Gb adapter can provide 1 Gb connectivity to clients. When it is combined with the IBM Flex System EN2092 1 Gb Ethernet Scalable Switch, clients can leverage an end-to-end 1 Gb solution on Flex System Chassis. This adapter is based on Broadcom 5718 ASIC and supports a PCIe Gen2 x4 interface with MSI/MSI-X. It also supports I/O virtualization features such as VMware NetQueue and Microsoft VMQ technologies.
- IBM Flex System CN4054 10 Gb Virtual Fabric Adapter and IBM Flex System CN4054 Virtual Fabric Adapter (software upgrade)

This is a four-port 10 Gb adapter that can scale up to 16 virtual ports and support multiple protocols such as Ethernet, iSCSI, and FCoE. This adapter uses the third generation of Emulex ASIC (BE3) that supports hardware offload and acceleration for network and storage protocols. By using a common infrastructure for Ethernet and storage networks, datacenters can reduce capital expenses (CAPEX) and operating expenses (OPEX). Key features of this adapter are:

 - Each 10 Gb physical port can support up to four virtual ports (vNIC).
 - Each vNIC appears as an individual adapter to the operating system.
 - Each vNIC allocates bandwidth at increments of 100 Mb.

- Clients can run advanced protocols such as HW iSCSI or FCoE on one of the vNICs per physical port by using the software upgrade key.
- The adapter can connect at 1 Gb or 10 Gb speed.

This adapter will support the following modes of operations:

- Physical Mode (pNIC): In this mode the adapter will present four ports of 10 Gb and clients can upgrade to run either FCoE or HW iSCSI to connect to a storage target.
- IBM Virtual Fabric Mode: In this mode each of the physical 10 Gb ports can present up to four virtual ports to the operating system. Therefore on this card, users can get up to 16 virtual ports. Clients can set the bandwidth of each of these virtual ports at increments of 100 Mb. Additionally they can apply the software upgrade to run storage protocols (HW iSCSI or FCoE) on four of the 16 virtual ports. This mode works with the IBM 10 Gb Virtual Fabric Switch to provide end-to-end I/O virtualization. This adapter ships by default in this mode.
- Switch Independent Mode: This functions like the IBM Virtual Fabric Mode except no setting or changes are required on the switch side. The adapter presents four virtual ports per physical port, but on the switch side it is still a single 10 Gb port. This mode will enable clients to leverage the IBM Virtual Fabric capability with the 10 Gb Pass-thru module also.

Key benefits of this adapter are:

- Ability to maximize I/O consolidation with high-performance 10 Gb ports
- One adapter to run multiple protocols
- Simplified setup and management options like CLI, Switch Interface, or Virtual Fabric Manager
- IBM Flex System EN4132 2-port 10 Gb Ethernet Adapter

This two-port 10 Gb adapter is based on Mellanox Connect X3 ASIC. This is a PCIe Gen 3 adapter that supports next-generation technology such as RDMA and RoCE. Other key features of this adapter are:

- Application acceleration
- Low latency for specialized apps

This adapter will work with the 10 Gb Flex System Fabric Switch and 10 Gb Pass-thru modules.

Fibre Channel Switch and Adapters

- IBM Flex System FC3171 8 Gb SAN Switch and IBM Flex System FC3171 8 Gb SAN Pass-thru

These SAN modules enable 8 Gb connectivity to storage from the Flex System Chassis. These SAN modules offer enhanced Fibre Channel functions such as Port Aggregation, Auto-StreamGuard, Enhanced N_Port ID Virtualization (NPIV), and Automatic Failover.

Both of these modules run at high-performance 8 Gb speed. Two part numbers are offered to meet clients' requirements whether they need full switching function in the chassis or just a simple pass-thru solution.

- IBM Flex System FC5022 24-port 16 Gb ESB SAN Scalable Switch, IBM Flex System FC5022 16Gb SAN Scalable Switch, and IBM Flex System FC5022 2-port 16 Gb FC Adapter

These SAN switch modules and HBA deliver an embedded option for IBM Flex System users deploying storage area networks in their enterprise. They offer end-to-end 16 Gb and 8 Gb connectivity. These scalable switches enable Dynamic Ports on Demand (DPOD) and grow with the needs of the clients. The N-Port Virtualization mode streamlines the infrastructure by reducing the number of domains to manage while enabling the ability to add or move servers without impact to the SAN. Management is simplified through the use of an integrated

management appliance, or clients using end-to-end Brocade SAN can leverage the Brocade management tools.

Key features of this switch:

- Superior scalability to allow greater intrachassis connectivity
- Extension, encryption, and compression capable
- Diagnostic Port (D-Port) for superior validation and serviceability of network
- Total of 48 ports wired with 28 ports internal and 20 external
- Based on Brocade's seventh-generation Fibre Channel Switch ASIC

Two versions of this switch are available:

- IBM Flex System FC5022 16 Gb SAN Scalable Switch
This switch comes with 12 Dynamic Ports on Demand (DPOD) licenses that can be applied to either internal or external links on this switch. Clients who do not fully populate the chassis can leverage this switch without having to pay for ports they are not using.
- IBM Flex System FC5022 24-port 16 Gb Enterprise SAN Scalable Switch
This switch comes with 24 DPOD licenses that can be applied to either internal or external links on this switch. This switch will also include these enhanced software licenses installed:
 - ISL Trunking (up to 128 Gb ISL Trucks)
 - Adaptive Networking
 - Advanced Performance Monitoring
 - Fabric Watch
 - Extended Fabrics
 - Server Application Optimization

To complement the 16 Gb switches, a two-port 16 Gb adapter based on Brocade architecture is being offered to provide end-to-end 16 Gb connectivity to a SAN. This adapter can autonegotiate and work at 8 Gb speed also. It offers enhanced features like storage Target Rate Limiting (TRL), VM aware Quality of Service (QoS) and 1M+ IOPS performance.

Clients can manage these devices by using the integrated Flex System Manager, or for advanced monitoring, they can use the Brocade Network Advisor.

In summary, these SAN switches and adapter offer these key values:

- First 16 Gbps embedded switch with up to 640 Gb bandwidth
- Investment protection; growth in ports and bandwidth
- Superior scalability to allow greater intrachassis connectivity
- ISL Trunks up to 128 Gb for superior performance, resiliency, and management
- Extension, encryption, and compression capable
- Diagnostic Port (D-Port) for superior serviceability
- VM aware Quality of Service from adapter through entire network
- IBM Flex System FC3172 2-port 8 Gb FC Adapter
The QLogic 8 Gb Fibre Channel adapter enables high-speed access for Flex System compute nodes to connect to a Fibre Channel storage area network (SAN). This adapter is based on the proven Qlogic 2532 8 Gb ASIC design and works with any of the 8 Gb or 16 Gb Flex System Fibre Channel switch modules. When compared to the previous-generation 4 Gb adapters, the new-generation 8 Gb adapters double the throughput speeds for Fibre Channel

traffic. As a result, you can manage increased amounts of data and possibly benefit from a reduced hardware expense.

- IBM Flex System FC3052 2-port 8 Gb FC Adapter

The Emulex 2-port 8 Gb Fibre Channel adapter enables high-speed access for Flex System compute nodes to an external storage area network (SAN). This adapter is based on the proven Emulex Fibre Channel stack and works with any of the 8 Gb or 16 Gb Flex System Fibre Channel switch modules. When compared to the previous-generation 4 Gb adapters, the new-generation 8 Gb adapters double the throughput speeds for Fibre Channel traffic. As a result, you can manage increased amounts of data and possibly benefit from a reduced hardware expense.

InfiniBand switch and adapters

- IBM Flex System IB6131 InfiniBand Switch, IBM Flex System IB6132 2-port QDR InfiniBand Adapter, and IBM Flex System IB6132 2-port FDR InfiniBand Adapter

InfiniBand is a high-speed server-interconnect technology that is ideally suited as the interconnect technology for access layer and storage components specifically for application and back-end IPC applications, for connectivity between application and back-end layers, and from back-end to storage layers. Through use of host channel adapters (HCAs) and switches, InfiniBand technology is used to connect servers with remote storage and networking devices, and other servers. It can also be used inside servers for interprocessor communication (IPC) in parallel clusters.

The IBM Flex System IB6131 InfiniBand Switch is an upgradeable device that can scale with your needs. The base switch enables 14 internal QDR links to each server and 18 QSFP uplink ports for interswitch links or to connect to external servers. Clients can upgrade to FDR speed (56 Gb) through the use of the Feature On Demand (FOD) process.

The InfiniBand QDR and FDR switches based on Mellanox technology are unmanaged switches. A subnet manager is required to establish an InfiniBand fabric. This module supports switch-embedded subnet managers and host-based subnet managers.

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

IBM Flex System suits multiple delivery models, from highly customizable hardware platforms to a fully integrated and optimized system.

- IBM Flex System hardware 'building blocks' made up of individual components that can be mixed and matched, and are fully customizable with optional management.
- IBM Flex System solutions made up of a chassis with an integrated management appliance, IBM networking, and storage standard.
- IBM Flex System optimized offerings made up of preconfigured, highly customized systems - focused on selected workloads or single-purpose applications such as PureFlex™ or Cloudburst.

Product number

The following are newly announced features on the specific models of the xSeries® 7917 machine type.

Description	MT	Model	Feature
7917-45X	7917	45X	
DRAWER FACTORY INTEGRATED IN RACK #1	7917	45X	4651
DRAWER FACTORY INTEGRATED IN RACK #2	7917	45X	4652
DRAWER FACTORY INTEGRATED IN RACK #3	7917	45X	4653
DRAWER FACTORY INTEGRATED IN RACK #4	7917	45X	4654
DRAWER FACTORY INTEGRATED IN RACK #5	7917	45X	4655
DRAWER FACTORY INTEGRATED IN RACK #6	7917	45X	4656
DRAWER FACTORY INTEGRATED IN RACK #7	7917	45X	4657
DRAWER FACTORY INTEGRATED IN RACK #8	7917	45X	4658
DRAWER FACTORY INTEGRATED IN RACK #9	7917	45X	4659
DRAWER FACTORY INTEGRATED IN RACK #10	7917	45X	4660
DRAWER FACTORY INTEGRATED IN RACK #11	7917	45X	4661
DRAWER FACTORY INTEGRATED IN RACK #12	7917	45X	4662
DRAWER FACTORY INTEGRATED IN RACK #13	7917	45X	4663
DRAWER FACTORY INTEGRATED IN RACK #14	7917	45X	4664
DRAWER FACTORY INTEGRATED IN RACK #15	7917	45X	4665
DRAWER FACTORY INTEGRATED IN RACK #16	7917	45X	4666
BLADE FACTORY INTEGRATED IN CENTER #1	7917	45X	4681
BLADE FACTORY INTEGRATED IN CENTER #2	7917	45X	4682
BLADE FACTORY INTEGRATED IN CENTER #3	7917	45X	4683
BLADE FACTORY INTEGRATED IN CENTER #4	7917	45X	4684
BLADE FACTORY INTEGRATED IN CENTER #5	7917	45X	4685
BLADE FACTORY INTEGRATED IN CENTER #6	7917	45X	4686
BLADE FACTORY INTEGRATED IN CENTER #7	7917	45X	4687
BLADE FACTORY INTEGRATED IN CENTER #8	7917	45X	4688
BLADE FACTORY INTEGRATED IN CENTER #9	7917	45X	4689
Month Indicator	7917	45X	9461
Day Indicator	7917	45X	9462
Hour Indicator	7917	45X	9463
Minute Indicator	7917	45X	9464
Quantity Indicator	7917	45X	9465
Countable Member Indicator	7917	45X	9466
BULK MES ORDER INDICATOR - SDI/OEM	7917	45X	A3CE
BULK MES ORDER INDICATOR - NON SDI/OEM	7917	45X	A3CF
ASSEMBLED IN USA INDICATOR	7917	45X	A3CG
CSC ORDER ROUTING INDICATOR - ROCHESTER	7917	45X	A3CH
Drawer not factory integrated in rack	7917	45X	A3CJ
Blade not factory integrated in chassis	7917	45X	A3CK
SYSTEM PLANT ORDER ROUTING INDICATOR	7917	45X	A3CL
Integrate Blade Server in Chassis	7917	45X	A3EB
Windows Svr 2008 R2 Datacenter (4CPU,5UserCAL),ML (not preinstalled)	7917	45X	A3EC
Windows Server Standard 2012 (2CPU)-English (not preinstalled)	7917	45X	A3L7
RFID Tag, AG/AP: 902-928Mhz	7917	45X	A2EV
Windows Server Standard 2012 2CPU/2VM Additional License-Multilang	7917	45X	A3ME
Windows Server Datacenter 2012 2CPU Additional License-Multilang	7917	45X	A3MF
Windows Storage Srv 2012 Std 2CPU/2VM Additional License-Multilang	7917	45X	A3MG
BTO in pre-approved countries Indicator	7917	45X	EFD9
Windows Svr 2008 R2 Standard (1-4 CPU, 5 CAL), ML (not preinstalled)	7917	45X	EMS1
Windows Svr 2008 R2 Enterprise (1-8CPU,10CAL), ML (not preinstalled)	7917	45X	EMS4
Windows Svr 2008 R2 Enterprise (1-8CPU,25CAL), ML (not preinstalled)	7917	45X	EMS7

The following are features already announced for the xSeries 7917 machine type.

Description	MT	Model	Feature
Integrated SATA Mirroring - 2 identical HDDs required	7917	45X	0030
Integrated SATA Striping - 2 identical HDDs required	7917	45X	0031
Enable selection of Solid State Drives for			

Secondary Array	7917	45X	2498
Enable selection of Solid State Drives for Primary Array	7917	45X	2499
IBM 300GB 10K 6Gbps SAS 2.5" SFF Slim-HS SED	7917	45X	5413
IBM 200GB SATA 1.8" MLC SSD	7917	45X	5420
IBM 50GB SATA 1.8" MLC SSD	7917	45X	5428
Select Storage devices - no IBM-configured RAID required	7917	45X	5977
Select Storage devices - IBM-configured RAID	7917	45X	5978
2.5" Gen2 HS HDD Filler	7917	45X	6421
Primary Array 2 HDDs	7917	45X	7008
Primary Array 3 HDDs	7917	45X	7009
Primary Array 4 HDDs	7917	45X	7010
Primary Array 5 HDDs	7917	45X	7011
Primary Array 6 HDDs	7917	45X	7012
Primary Array 7 HDDs	7917	45X	7013
Primary Array 8 HDDs	7917	45X	7014
Secondary Array 2 HDDs	7917	45X	7015
Secondary Array 3 HDDs	7917	45X	7016
Secondary Array 4 HDDs	7917	45X	7017
Secondary Array 5 HDDs	7917	45X	7057
Secondary Array 6 HDDs	7917	45X	7058
Integrated Solid State Mirroring	7917	45X	7859
Integrated Solid State Striping	7917	45X	7860
8GB (1x8GB, 2Rx4, 1.35V) PC3L-10600 CL9 ECC DDR3 1333MHz LP RDIMM	7917	45X	8923
4GB (1x4GB, 1Rx4, 1.35V) PC3L-10600 CL9 ECC DDR3 1333MHz LP RDIMM	7917	45X	8941
4GB (1x4GB, 2Rx8, 1.35V) PC3L-10600 CL9 ECC DDR3 1333MHz LP RDIMM	7917	45X	8942
IBM Flex System EN2024 4-port 1Gb Ethernet Adapter	7917	45X	A10Y
IBM 1TB 7.2K 6Gbps NL SATA 2.5" SFF HS HDD	7917	45X	A1AV
IBM Flex System FC3172 2-port 8Gb FC Adapter	7917	45X	A1BM
IBM Flex System FC5022 2-port 16Gb FC Adapter	7917	45X	A1BP
IBM 250GB 7.2K 6Gbps NL SATA 2.5" SFF HS HDD	7917	45X	A1NX
IBM 500GB 7.2K 6Gbps NL SATA 2.5" SFF HS HDD	7917	45X	A1NZ
IBM 1TB 7.2K 6Gbps NL SAS 2.5" SFF HS HDD	7917	45X	A1P3
16GB (1x16GB, 2Rx4, 1.35V) PC3L-10600 CL9 ECC DDR3 1333MHz LP RDIMM	7917	45X	A1QT
IBM Flex System EN4132 2-port 10Gb Ethernet Adapter	7917	45X	A1QY
IBM Flex System IB6132 2-port FDR Infiniband Adapter	7917	45X	A1QZ
IBM Flex System CN4054 Virtual Fabric Adapter (SW Upgrade)	7917	45X	A1R0
IBM Flex System CN4054 10Gb Virtual Fabric Adapter	7917	45X	A1R1
IBM Flex System x240 Compute Node Air Baffle	7917	45X	A248
IBM Flex System Compute Node Fabric Connector	7917	45X	A26R
IBM 900GB 10K 6Gbps SAS 2.5" SFF HS HDD	7917	45X	A282
IBM 300GB 15K 6Gbps SAS 2.5" SFF HS HDD	7917	45X	A283
4GB (1x4GB, 1Rx4, 1.5V) PC3-12800 CL11 ECC DDR3 1600MHz LP RDIMM	7917	45X	A28Z
16GB (1x16GB, 4Rx4, 1.35V) PC3L-10600 CL9 ECC DDR3 1333MHz LP LRDIMM	7917	45X	A290
32GB (1x32GB, 4Rx4, 1.35V) PC3L-10600 CL9 ECC DDR3 1333MHz LP LRDIMM	7917	45X	A291
8GB (1x8GB, 2Rx4, 1.5V) PC3-12800 CL11 ECC DDR3 1600MHz LP RDIMM	7917	45X	A292
IBM Flex System x440 Compute Node with embedded 10Gb Virtual Fabric	7917	45X	A2BC
IBM Flex System x440 Compute Node	7917	45X	A2BD
IBM Flex System x440 Compute Node Label	7917	45X	A2BE
IBM Flex System x440 Compute Node Cover	7917	45X	A2BF
IBM Flex System x440 Compute Node Front Bezel	7917	45X	A2BG
System Documentation and Software-US English	7917	45X	A2BJ
SAS HDD 1 x 2.5" Backplane	7917	45X	A2BY
Intel Xeon Processor E5-4603 4C 2.0GHz 10M Cache 1066MHz 95W	7917	45X	A2C0
Addl Intel Xeon Processor E5-4603 4C 2.0GHz 10MB Cache 1066MHz 95W	7917	45X	A2C1
Addl Intel Xeon Processor E5-4603 4C 2.0GHz 10MB Cache 1066MHz 95W	7917	45X	A2C2

Intel Xeon Processor E5-4607 6C 2.2GHz 12M Cache 1066MHz 95W	7917	45X	A2C3
Addl Intel Xeon Processor E5-4607 6C 2.2GHz 12MB Cache 1066MHz 95W	7917	45X	A2C4
Addl Intel Xeon Processor E5-4607 6C 2.2GHz 12MB Cache 1066MHz 95W	7917	45X	A2C5
Intel Xeon Processor E5-4610 6C 2.4GHz 15M Cache 1333MHz 95W	7917	45X	A2C6
Addl Intel Xeon Processor E5-4610 6C 2.4GHz 15MB Cache 1333MHz 95W	7917	45X	A2C7
Addl Intel Xeon Processor E5-4610 6C 2.4GHz 15MB Cache 1333MHz 95W	7917	45X	A2C8
Intel Xeon Processor E5-4617 6C 2.9GHz 15M Cache 1600MHz 130W	7917	45X	A2C9
Addl Intel Xeon Processor E5-4617 6C 2.9GHz 15MB Cache 1600MHz 130W	7917	45X	A2CA
Addl Intel Xeon Processor E5-4617 6C 2.9GHz 15MB Cache 1600MHz 130W	7917	45X	A2CB
Intel Xeon Processor E5-4640 8C 2.4GHz 20M Cache 1600MHz 95W	7917	45X	A2CC
Addl Intel Xeon Processor E5-4640 8C 2.4GHz 20MB Cache 1600MHz 95W	7917	45X	A2CD
Addl Intel Xeon Processor E5-4640 8C 2.4GHz 20MB Cache 1600MHz 95W	7917	45X	A2CE
Intel Xeon Processor E5-4620 8C 2.2GHz 16M Cache 1333MHz 95W	7917	45X	A2CF
Addl Intel Xeon Processor E5-4620 8C 2.2GHz 16MB Cache 1333MHz 95W	7917	45X	A2CG
Addl Intel Xeon Processor E5-4620 8C 2.2GHz 16MB Cache 1333MHz 95W	7917	45X	A2CH
Intel Xeon Processor E5-4650 8C 2.7GHz 20M Cache 1600MHz 130W	7917	45X	A2CJ
Addl Intel Xeon Processor E5-4650 8C 2.7GHz 20MB Cache 1600MHz 130W	7917	45X	A2CK
Addl Intel Xeon Processor E5-4650 8C 2.7GHz 20MB Cache 1600MHz 130W	7917	45X	A2CL
IBM Flex System Compute Node Full-wide WW packaging	7917	45X	A2CN
IBM 200GB SATA 2.5" MLC HS SSD	7917	45X	A2FN
IBM Blank USB Memory Key for VMware ESXi Downloads	7917	45X	A2G0
Primary Array - RAID 0	7917	45X	A2K6
Primary Array - RAID 1	7917	45X	A2K7
Primary Array - RAID 5	7917	45X	A2K9
Primary Array - RAID 6	7917	45X	A2KA
Primary Array - RAID 10	7917	45X	A2KB
Secondary Array - RAID 0	7917	45X	A2KF
Secondary Array - RAID 1	7917	45X	A2KG
Secondary Array - RAID 5	7917	45X	A2KJ
Secondary Array - RAID 6	7917	45X	A2KK
Secondary Array - RAID 10	7917	45X	A2KL
IBM Flex System FC3052 2-port 8Gb FC Adapter	7917	45X	A2N5
IBM Flex System x440 Compute Node Center Air Baffle	7917	45X	A2QQ
Intel Xeon Processor E5-4650L 8C 2.6GHz 20M Cache 1600MHz 115W	7917	45X	A2QU
Addl Intel Xeon Processor E5-4650L 8C 2.6GHz 20MB Cache 1600MHz 115W	7917	45X	A2QV
Addl Intel Xeon Processor E5-4650L 8C 2.6GHz 20MB Cache 1600MHz 115W	7917	45X	A2QW
IBM virtual Fabric Advanced Software Upgrade (LOM)	7917	45X	A2TD
IBM 256GB SATA 2.5" MLC HS Enterprise Value SSD	7917	45X	A2U3
IBM 128GB SATA 2.5" MLC HS Enterprise Value SSD 16GB (1x16GB, 2Rx4, 1.5V) PC3-12800 CL11 ECC	7917	45X	A2U4
DDR3 1600MHz LP RDIMM	7917	45X	A2U5
IBM USB Memory Key for VMware ESXi 5.0	7917	45X	A2VC
IBM 146GB 15K 6Gbps SAS 2.5" SFF G2HS HDD	7917	45X	A2XB
IBM 300GB 10K 6Gbps SAS 2.5" SFF G2HS HDD	7917	45X	A2XC
IBM 600GB 10K 6Gbps SAS 2.5" SFF G2HS HDD	7917	45X	A2XD
IBM 500GB 7.2K 6Gbps NL SAS 2.5" SFF G2HS HDD	7917	45X	A2XE
Server RAID M5115 SAS/SATA Controller for IBM Flex System	7917	45X	A2XW
Server RAID M5100 Series RAID 6 Upgrade for IBM			

Flex System	7917	45X	A2Y1
Server RAID M5100 Series Performance Upgrade for IBM Flex System	7917	45X	A2Y2
IBM Flex System x440 Compute Node CPU Filler	7917	45X	A2ZM
Server RAID M5100 Series SSD Caching Enabler for IBM Flex System	7917	45X	A36G
IBM USB Memory Key for VMware ESXi 5.0 Update1	7917	45X	A383
Server RAID M5100 Series Enablement Kit for IBM Flex System x440	7917	45X	A3DS
Server RAID M5100 Series IBM Flex System Flash Kit for x440	7917	45X	A3DT
Server RAID M5100 Series SSD Expansion Kit for IBM Flex System x440	7917	45X	A3DU
IBM Flex System 1.8" SSD Filler	7917	45X	A3EP
Server RAID M5100 Series Left Side Air Baffle for IBM Flex System x440	7917	45X	A3F6
IBM 100GB SATA 2.5" MLC HS Enterprise SSD	7917	45X	A3HR
Express Foundation Indicator	7917	45X	EFD1
Standard Foundation Indicator	7917	45X	EFD2
Enterprise Foundation Indicator	7917	45X	EFD3
PureFlex System Expansion	7917	45X	EFD4
Custom configuration	7917	45X	EFD5
Express Foundation Expansion Indicator	7917	45X	EFD6
Standard Foundation Expansion Indicator	7917	45X	EFD7
Enterprise Foundation Expansion Indicator	7917	45X	EFD8
Indicator for Smart Cloud Entry on x86 compute node	7917	45X	ESCE

Business Partner information

If you are a Direct Reseller - System Reseller acquiring products from IBM , you may link directly to Business Partner information for this announcement. A PartnerWorld® ID and password are required (use IBM ID).

<https://www.ibm.com/partnerworld/mem/sla.jsp?num=112-220>

Publications

The *Installation and Service Guide* , for IBM Flex System x440 Compute Node solutions, in US English versions, are available from

<https://www-304.ibm.com/systems/support/>

Under "Product Support", select " System x® ", and under "Choose your page" select "Documentation."

IBM Systems Information Centers provide you with a single site where you can access product documentation for IBM systems hardware, operating systems, and server software. Through a consistent framework, you can efficiently find information and personalize your access. The IBM Systems information Centers are at

<http://publib14.boulder.ibm.com/infocenter/systems>

Services

Global Technology Services

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

These services help you learn about, plan, install, manage, or optimize your IT infrastructure to be an on-demand business. They can help you integrate your high-speed networks, storage systems, application servers, wireless protocols, and an

array of platforms, middleware, and communications software for IBM and many non-IBM offerings. IBM is your one-stop shop for IT support needs.

For details on available services, contact your IBM representative or visit

<http://www.ibm.com/services/>

For details on available IBM Business Continuity and Recovery Services, contact your IBM 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/index.html>

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

System x and BladeCenter support services

Recommended core technical support

When you buy IBM System x technology, include the support services you need -- to help keep both your hardware and software working for you, day after day, at peak performance. It is your first step toward helping to protect your investment and sustain high levels of system availability. We offer service-level and response-time options to fit your business needs. And we will help you get started with a core support package that includes:

- **Continuous system monitoring**

Electronic monitoring that helps speed up problem-solving with automated, early detection of potential problems and system errors.

- **Hardware maintenance**

World-class remote and on-site hardware problem determination and repair services.

- **Software technical support**

Access to help line calls for fast, accurate answers to your questions during installation and throughout ongoing operations.

For more information, visit

<http://www.ibm.com/servers/eserver/xseries/services.html>

Technical information

Specified operating environment

Physical specifications

IBM Flex System x440 Compute Node

7917-45X

Processor	Intel™ Xeon
Number standard	1
Maximum	4
L3 cache (full speed)	20 MB
Memory (LP ECC DDR3)	8 GB (1.5v)
DIMMs (Standard)	1 x 8 GB
DIMM sockets	48
Capacity	1,536 GB ¹
Mezzanine Card	Optional
Standard	0
Maximum	2
Video	SVGA
Memory	16 MB
Disk controller	SAS
Channels	4
Connector internal	2
Connector external	0
RAID	Standard integrated 0, 1
Internal capacity	2 TB ²
Total HDD or SSD bays	Up to 2
Management processor	Standard
Ethernet controller	2 x Dual 10Gb
Front access connectors	
KVM connector	1 ³
USB connector	1

¹ Total system memory capacity is based on using 32 GB memory DIMMs.

² Capacities are based on installation of two 1 TB drives.

³ Use of the IBM Flex System Console Breakout Cable provided with each chassis and sold separately allows connection of standard KVM options.

For latest information on supported HDD options, visit

<http://www.ibm.com/servers/eserver/serverproven/compat/us/>

IBM Flex System x440 Compute Node specifications

Video subsystem

- 16 MB DDR3
- Integrated on the IMM2

Supported IBM Flex System x440 Compute Node video resolutions

Resolution	Maximum Refresh Rate Supported	Bpp
640 x 400	60, 72, 75, 85	8, 16, 24
800 x 600	60, 72, 75, 85	8, 16, 24
1024 x 768	60, 72, 75, 85	8, 16, 24
1280 x 1024	60, 75	8, 16, 24
1440 x 900	60, 60 RB	8, 16, 24
1600 x 1200	60, 75	8, 16, 24
1680 x 1050	60, 60 RB	8, 16, 24

Notes :

- 24 Bpp (16.7 million colors) aligned on a 32-bit boundary for performance
- Each resolution supports both CRT and flat panel monitors. For CRT monitors, each resolution complies with CRT ISO 9241.3.
 - 1440 x 900 and 1680 x 1050 are typically wide screen flat panel (non-CRT) settings so they are only available at 60 Hz.
 - 1440 x 900 and 1680 x 1050 are available at 60 Hz with support for 60 Hz Reduced Blanking Mode.
 - For the resolutions supported by different operating systems, refer the operating system documentation.

Dimensions - IBM Flex System x440 Compute Node

- Height: 55.5 mm (2.19 in)
- Depth: 492.7 mm (19.4 in)
- Width: 453.3 mm (17.4 in)
- Maximum weight: 12.25 kg (27 lb) (depending on the configuration when options are added)

Electrical

IBM Flex System x440 Compute Node: 12.2 (nominal) V dc

Note: All weights and measurements are approximate.

Standards**Equipment approvals and safety**

- FCC - Verified to comply with Part 15 of the FCC Rules Class A
- Canada ICES-004, issue 3 Class A
- UL/IEC 60950-1
- CSA C22.2 No. 60950-1
- NOM-019
- Argentina IEC 60950-1

Operating environment

The IBM Flex System x440 Compute Node complies with ASHRAE Class A3 specifications.

- Power on:
 - Temperature: 5°C to 40°C (41°F to 104°F)
 - Humidity, noncondensing: -12°C dew point (10.4°F) and 8% to 85% relative humidity
 - Maximum dew point: 24°C (75°F)
 - Maximum altitude: 3,048 m (10,000 ft)
 - Maximum rate of temperature change: 5°C/hr (41°F/hr)
- Power off:
 - Temperature: 5°C to 45°C (41°F to 113°F)
 - Relative humidity: 8% to 85%
 - Maximum dew point: 27°C (80.6°F)
- Storage (nonoperating):
 - Temperature: 1°C to 60°C (33.8°F to 140°F)
 - Altitude: 3,050 m (10,006 ft)
 - Relative humidity: 5% to 80%

- Maximum dew point: 29°C (84.2°F)
- Shipment (nonoperating):
 - Temperature: -40°C to 60°C (-40°F to 140°F)
 - Altitude: 10,700 m (35,105 ft)
 - Relative humidity: 5% to 100%
 - Maximum dew point: 29°C (84.2°F)
 - Particulate contamination

Hardware requirements

For service, the IBM Flex System x440 Compute Node requires a compatible:

- Monitor
- Combination USB keyboard and pointing device such as IBM part number 40K5372
- USB CD-RW/DVD drive such as the IBM and Lenovo part number 73P4515 or 73P4516

Software requirements

The following network operating systems are supported in the IBM Flex System x440 Compute Node.

- Microsoft :
 - Microsoft Windows Server 2008 R2 with Service Pack 1
 - Microsoft Windows Server 2008, Datacenter x64 Edition with Service Pack 2
 - Microsoft Windows Server 2008, Enterprise x64 Edition with RA Service Pack 2
 - Microsoft Windows Server 2008, Standard x64 Edition with RA Service Pack 2
 - Microsoft Windows Server 2008, Web x64 Edition with RA Service Pack 2
- Linux :
 - SUSE Linux Enterprise Server 10 for AMD64/EM64T, Service Pack 4
 - SUSE Linux Enterprise Server 11 for AMD64/EM64T, Service Pack 2
 - SUSE Linux Enterprise Server 11 with Xen for AMD64/EM64T, Service Pack 2
 - Red Hat Enterprise Linux 5 Server x64 Edition, U8
 - Red Hat Enterprise Linux 5 Server with Xen x64 Edition, U8
 - Red Hat Enterprise Linux 6 Server x64 Edition, U3
- VMware:
 - VMware ESX 4.1, U2
 - VMware ESXi 4.1, U2
 - VMware vSphere 5, U1

Note: For additional support, certification, and version information on network operating systems, visit

<http://www-03.ibm.com/systems/info/x86servers/serverproven/compat/us>

Compatibility

The IBM Flex System x440 Compute Node contains licensed system programs that include set configuration, set features, and test programs. IBM system BIOS is loaded from a "flash" EEPROM into system memory. This BIOS provides instructions and interfaces designed to support the standard features of the x440 Compute Node and to maintain compatibility with many current software programs.

Contact your IBM representative or IBM Business Partner, or refer to the *IBM Sales Manual* for information on the compatibility of hardware and software for System x

servers. The *Sales Manual* is updated periodically as new features and options are announced that support these servers.

Limitations

- The Flex System x440 Compute Nodes contain 48 DIMM sockets. A maximum of 1,536 TB of system memory is supported by using a 32 GB DIMM of ECC DDR3 memory in each of the DIMM sockets. A minimum of one memory feature must be installed. All memory installed must be of the same type (RDIMM, LRDIMM, or UDIMM).
- Processor modules must be of the same type, power level, and clock speed on each Flex System x440 Compute Node. Mixing processor modules of different speeds, power levels, or cache sizes or upgrading the base processors is not supported. Mixing processor speeds and memory speeds will result in the system running at the lower of rated speeds.
- The Flex System x440 Compute Node is supported only in the IBM Flex System Enterprise Chassis.
- Four mezzanine expansion cards may be installed on the Flex System x440 Compute Node.
- Mezzanine expansion cards installed in the Flex System x440 Compute Node require a switch module in the Flex System Enterprise Chassis of the same connectivity type.
- Regarding the use of solid-state disk drives, solid-state memory cells have an intrinsic, finite number of write cycles that 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 (TBW). IBM 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

The IBM Flex System x440 Compute Node server is designated as customer setup. Customer setup instructions are shipped with each system.

Supported memory options

Option Number	Description
90Y3105	32GB (4Gb, 4Rx4, 1.35V) PC3L-10600 DDR3-1333 LP LR-DIMM
49Y1567	16GB (2Gb, 2Rx4, 1.35V) (LR from 4Rx4) PC3L-10600 DDR3-1333 LP LR-DIMM
00D4968	16GB (4Gb, 2Rx4, 1.5V) PC3_12800 DDR3-1600 LP RDIMM
49Y1563	16GB (4Gb, 2Rx4, 1.35V) PC3-10600 DDR3-1333 LP RDIMM
49Y1559	4GB (2Gb, 1Rx4, 1.5V) PC3-12800 ECC LP RDIMM
49Y1406	4GB (2Gb, 1Rx4, 1.35V) PC3L-10600R ECC LP RDIMM
49Y1407	4GB (2Gb, 2Rx8, 1.35V) PC3L-10600R ECC LP RDIMM
90Y3109	8GB (2Gb, 2Rx4, 1.5V) PC3-12800 DDR3-1600 LP RDIMM
49Y1397	8GB 2Rx4 2Gb PC3L-10600R LP RDIMM 1.35V Capable

Cable orders

All cables are supplied with the IBM Flex System x440 Compute Node. 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.

Packaging - IBM Flex System x440 Compute Node shipping contents

Ship group

The system carton contains the system unit and a ship-group kit containing the following documents and CDs:

- Important Notices booklet
- IBM Warranty Information booklet
- Product Documentation CD that includes the following documents:
 - Installation and Service Guide
 - IBM Safety Information
 - Product machine code license and other licenses and notices
- Environmental Notice and User Guide Documentation CD

The *Installation and Service Guide* on the Product Documentation CD contains the installation, use, and troubleshooting information necessary to use and service the product.

Supplies

None

Security, auditability, and control

Three of the most important features in compute node design are reliability, availability, and serviceability (RAS). These RAS features help to ensure the integrity of the data that is stored in the compute node, the availability of the compute node when you need it, and the ease with which you can diagnose and correct problems.

The compute node has the following RAS features:

- Advanced Configuration and Power Interface (ACPI)
- Automatic server restart (ASR)
- Built-in diagnostics using DSA Preboot, which is stored NAND Flash memory
- Built-in monitoring for temperature, voltage, and hard disk drives
- Customer support center 24 hours per day, 7 days a week
- Customer upgrade of flash ROM-resident code and diagnostics
- Customer-upgradeable Unified Extensible Firmware Interface (UEFI) code and diagnostics
- ECC protected DDR3 memory
- ECC protection on the L2 cache
- Error codes and messages
- Integrated management module II (IMM2) that communicates with the Chassis Management Module to enable remote systems management
- Light path diagnostics
- Memory parity testing
- Microprocessor built-in self-test (BIST) during power-on self-test (PST)
- Microprocessor serial number access
- PCI Express 2.0 and PCI Express 3.0
- PCI PMI 2.2
- POST
- Power policy 24-hour support center
- Processor presence detection
- ROM-resident diagnostics

- System-error logging
- Vital product data (VPD) on memory
- Wake on LAN capability
- Wake on PCI (PME) capability
- Wake on USB 2.0 capability
- Processor failover upon failure of primary (boot) processor (requires two processors to support)

This offering uses the security and auditability features from standard IBM 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.

IBM Electronic Services

IBM has transformed its delivery of hardware and software support services to help you achieve higher system availability. Electronic Services is a Web-enabled solution that offers an exclusive, no-additional-charge enhancement to the service and support available for IBM servers. These services are designed to provide the opportunity for greater system availability with faster problem resolution and preemptive monitoring. Electronic Services comprises two separate, but complementary, elements: Electronic Services news page and Electronic Services Agent.

The Electronic Services news page is a single Internet entry point that replaces the multiple entry points traditionally used to access IBM Internet services and support. The news page enables you to gain easier access to IBM resources for assistance in resolving technical problems.

The Electronic Service Agent™ is no-additional-charge software that resides on your server. It monitors events and transmits system inventory information to IBM on a periodic, client-defined timetable. The Electronic Service Agent automatically reports hardware problems to IBM. Early knowledge about potential problems enables IBM to deliver proactive service that may result in higher system availability and performance. In addition, information collected through the Service Agent is made available to IBM service support representatives when they help answer your questions or diagnose problems. Installation and use of IBM Electronic Service Agent for problem reporting enables IBM to provide better support and service for your IBM server.

To learn how Electronic Services can work for you, visit

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

Terms and conditions

Volume orders: Contact your IBM representative.

IBM Global Financing

Yes

Warranty period

Three years.

An IBM part or feature installed during the initial installation of an IBM machine is subject to a full warranty effective on the date of installation of the machine. An IBM part or feature that replaces a previously installed part or feature assumes the

remainder of the warranty period for the replaced part or feature. An IBM 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 are the same as those for the machine in which it is installed.

Warranty service

If required, IBM provides repair or exchange service depending on the types of warranty service specified for the machine. IBM will attempt to resolve your problem over the telephone, or electronically via an IBM website. Certain machines contain remote support capabilities for direct problem reporting, remote problem determination, and resolution with IBM. You must follow the problem determination and resolution procedures that IBM specifies. Following problem determination, if IBM 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. If applicable to your product, parts considered Customer Replaceable Units (CRUs) will be provided as part of the machine's standard warranty service.

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 IBM's normal service area. Contact your local IBM representative or your reseller for country-specific and location-specific information.

CRU Service

IBM provides replacement CRUs to you for you to install. CRU information and replacement instructions are shipped with your machine and are available from IBM upon your request. CRUs are designated as being either a Tier 1 (mandatory) or a Tier 2 (optional) CRU.

Tier 1 (mandatory) CRU

Installation of Tier 1 CRUs, as specified in this announcement, is your responsibility. If IBM installs a Tier 1 CRU at your request, you will be charged for the installation.

Tier 2 (optional) CRU

You may install a Tier 2 CRU yourself or request IBM to install it, at no additional charge.

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

The following parts have been designated as Tier 1 CRUs:

- Cables
- System service label
- HDDs
- HDD backplane
- Memory DIMMs
- 3x8 double ended periscope receptacle
- Indicator panel
- 3.0 volt battery
- RFID label tag assembly
- 2 GB USB memory flash key
- Mezzanine adapters and cards

- KVM dongle cable

CRU and On-site Service

At IBM's discretion, you will receive specified CRU service, or IBM will repair the failing machine at your location and verify its operation. You must provide a suitable working area to allow disassembly and reassembly of the IBM machine. The area must be clean, well lit, and suitable for the purpose.

Service level is:

- 9 hours per day, Monday through Friday, excluding holidays, next business day response. Calls must be received by 5:00 pm local time in order to qualify for next business day response.
- 9 hours per day, Monday through Friday, excluding holidays, 4 hour average, same business day response. Same business day service level includes the installation of Tier 1 CRUs at no additional charge.
- 24 hours per day, 7 days a week, 4 hour average, same day response. Same day service level includes the installation of Tier 1 CRUs at no additional charge.

CRU and Courier or Depot Service

At IBM's discretion, you will receive specified CRU service, or you will disconnect the failing machine for collection arranged by IBM . IBM will provide you with a shipping container for you to return your machine to a designated service center. A courier will pick up your machine and deliver it to the designated service center. Following its repair or exchange, IBM will arrange the return delivery of the machine to your location. You are responsible for its installation and verification.

CRU and Customer Carry-In or Mail-In Service

At IBM's discretion, you will receive specified CRU service, or you will deliver or mail, as IBM specifies (prepaid unless IBM specifies otherwise), the failing machine suitably packaged to a location IBM designates. After IBM has repaired or exchanged the machine, IBM will make it available for your collection or, for mail-in service, IBM will return it to you at IBM's expense, unless IBM specifies otherwise. You are responsible for the subsequent installation and verification of the machine.

CRU and Machine Exchange Service

At IBM's discretion, you will receive specified CRU service, or IBM will initiate shipment of a replacement machine to your location. You are responsible for its installation and verification of operation. You must pack the failed machine into the shipping container that contained the replacement machine and return the failed machine to IBM . Transportation charges, both ways, are paid by IBM . You may be charged for the replacement machine if IBM does not receive the failed machine within 15 days of your receipt of the replacement.

Non-IBM parts service

Warranty service

IBM is now shipping machines with selected non-IBM parts that contain an IBM field replaceable unit (FRU) part number label. These parts are to be serviced during the IBM machine warranty period. IBM is covering the service on these selected non-IBM parts as an accommodation to their customers, and normal warranty service procedures for the IBM machine apply.

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?Indocid=GCOR-3FBJK2>

Warranty service upgrades

During the warranty period, warranty service upgrades provide an enhanced level of On-site Service for an additional charge. Service levels are response-time objectives and are not guaranteed. Refer to the **Warranty services** section for additional details.

IBM will attempt to resolve your problem over the telephone or electronically by access to an IBM website. Certain machines contain remote support capabilities for direct problem reporting, remote problem determination, and resolution with IBM . You must follow the problem determination and resolution procedures that IBM specifies. Following problem determination, if IBM 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.

Maintenance service options

CRU and On-site Service

At IBM's discretion you will receive CRU service or IBM will repair the failing machine at your location and verify its operation. You must provide a suitable working area to allow disassembly and reassembly of the IBM machine. The area must be clean, well lit, and suitable for the purpose. The following on-site response-time objectives are available as warranty service upgrades for your machine. Available offerings are:

- 9 hours per day, Monday through Friday, excluding holidays, 4 hour average, same business day response
- 24 hours per day, 7 days a week, 4 hour average response, same day
- 24 hours per day, 7 days a week, 2 hour average response, same day

Customer Replaceable Units (CRUs) may be provided as part of the machine's standard warranty CRU Service except that you may install a CRU yourself or request IBM installation, at no additional charge, under the CRU and On-site Service level specified above. For additional information on the CRU Service, see the warranty information.

Maintenance services

If required, IBM provides repair or exchange service depending on the types of maintenance service specified for the machine. IBM will attempt to resolve your problem over the telephone or electronically, via an IBM website. Certain machines contain remote support capabilities for direct problem reporting, remote problem determination, and resolution with IBM . You must follow the problem determination and resolution procedures that IBM specifies. Following problem determination, if IBM 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 maintenance service may not be available in all worldwide locations. Additional charges may apply outside IBM's normal service area. Contact your local IBM representative or your reseller for country-specific and location-specific information. The following service selections are available as maintenance options for your machine type.

On-site Service

IBM will repair the failing machine at your location and verify its operation. You must provide a suitable working area to allow disassembly and reassembly of the IBM machine. The area must be clean, well lit, and suitable for the purpose.

Service levels are:

- 9 hours per day, Monday through Friday, excluding holidays, next business day response
- 9 hours per day, Monday through Friday, excluding holidays, 4 hour average response, same business day
- 24 hours per day, 7 days a week, 4 hour average response, same day
- 24 hours per day, 7 days a week, 2 hour average response, same day

Customer Replaceable Unit (CRU) Service

If your problem can be resolved with a CRU (for example, keyboard, mouse, speaker, memory, or hard disk drive), and depending upon the maintenance service offerings in your geography, IBM will ship the replacement CRU to you for you to install. CRU information and replacement instructions are shipped with your machine and are available from IBM upon your request.

Based upon availability, CRUs will be shipped for next-business-day delivery. IBM specifies, in the materials shipped with a replacement CRU, whether a defective CRU must be returned to IBM. When return is required, 1) return instructions and a container are shipped with the replacement CRU, and 2) you may be charged for the replacement CRU if IBM does not receive the defective CRU within 15 days of your receipt of the replacement.

CRUs may be provided as part of the machine's standard maintenance service except that you may install a CRU yourself or request IBM installation, at no additional charge, under any of the On-site Service levels specified above.

CRU and Courier or Depot Service

At IBM's discretion you will receive CRU service or you must disconnect the failing machine for collection arranged by IBM. IBM will provide you with a shipping container for you to return your machine to a designated service center. A courier will pick up your machine and deliver it to the designated service center. Following its repair or exchange, IBM will arrange the return delivery of the machine to your location. You are responsible for its installation and verification.

CRU and Customer Carry-In or Mail-In Service

At IBM's discretion you will receive CRU service or you will deliver or mail, as IBM specifies (prepaid, unless IBM specifies otherwise) the failing machine suitably packaged to a location IBM designates. After IBM has repaired or exchanged the machine, IBM will make it available for your collection or, for mail-in service, IBM will return it to you at IBM's expense, unless IBM specifies otherwise. You are responsible for the subsequent installation and verification of the machine.

CRU and Machine Exchange Service

At IBM's discretion you will receive CRU service or IBM will initiate shipment of a replacement machine to your location. You are responsible for its installation and verification of operation. You must pack the failed machine into the shipping container that contained the replacement machine and return the failed machine to IBM. Transportation charges, both ways, are paid by IBM. You may be charged for the replacement machine if IBM does not receive the failed machine within 15 days of your receipt of the replacement.

Non-IBM parts service

Under certain conditions, IBM provides services for selected non-IBM parts at no additional charge for machines that are covered under warranty service upgrades or maintenance services.

This service includes hardware problem determination (PD) on the non-IBM parts (for example, adapter cards, PCMCIA cards, disk drives, memory) installed within IBM machines and provides the labor to replace the failing parts at no additional charge.

If IBM has a Technical Service Agreement with the manufacturer of the failing part, or if the failing part is an accommodations part (a part with an IBM FRU label), IBM may also source and replace the failing part at no additional charge. For all other non-IBM parts, customers are responsible for sourcing the parts. Installation labor is provided at no additional charge, if the machine is covered under a warranty service upgrade or a maintenance service.

Usage plan machine

No

IBM hourly service rate classification

One

When a type of service involves the exchange of a machine part, the replacement may not be new, but will be in good working order.

Field-installable features

Yes

Model conversions

No

Machine installation

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

Graduated program license charges apply

No

Licensed Machine Code

IBM Machine Code is licensed for use by a customer on the IBM machine for which it was provided by IBM under the terms and conditions of the IBM License Agreement for Machine Code, to enable the machine to function in accordance with its specifications, and only for the capacity authorized by IBM and acquired by the customer. You can obtain the agreement by contacting your IBM representative or visiting

http://www-304.ibm.com/servers/support/machine_warranties/machine_code.html

IBM may release changes to the Machine Code. IBM plans to make the Machine Code changes available for download from the IBM System x technical support website

<http://www-304.ibm.com/systems/support/>

If the machine does not function as warranted and your problem can be resolved through your application of downloadable Machine Code, you are responsible for downloading and installing these designated Machine Code changes as IBM specifies. If you would prefer, you may request IBM to install downloadable Machine Code changes; however, you may be charged for that service.

Access to IBM Flex System fix downloads will be granted upon entitlement validation. The terms and conditions for fixes will be covered under the License Agreement for Machine Code, International Program License Agreement, International License Agreement for Non-Warranted Programs and/or other terms provided with the fix, as applicable.

Educational allowance

A reduced charge is available to qualified education customers. The educational allowance may not be added to any other discount or allowance.

The educational allowance is 13% for the products in this announcement.

Additional information - System x , BladeCenter , and Flex System Support Services

Recommended Core Technical Support

When you sell IBM Flex System technology, include the support services your clients need to help keep both their hardware and software working day after day, at peak performance. It is their first step toward helping to protect their investment and sustain high levels of system availability. We offer service-level and response-time options to fit your customer's business. We have created a tiered structure of offerings that will help your customer get started with a core support package of options. The tiered support structure of offerings for IBM systems builds upon the base hardware warranty service through enhanced service levels to the minimum recommended level of Essential Support elements covering 24x7 Hardware and Software Support which should include the following:

Continuous System Monitoring

Electronic monitoring through IBM Electronic Service Agent that helps speed up problem-solving with automated, early detection of potential problems and system errors. IBM Electronic Service Agent provides proactive reporting of hardware events and enhances the ability to avoid problems with its call home abilities.

Hardware Maintenance

We recommend as part of an Essential Support element to every IBM system, IBM's world-class remote and on-site hardware problem determination and repair services enhanced with the call home abilities of IBM Electronic Service Agent . IBM Technical Support Services provide a tiered range of Warranty Service Upgrade and Maintenance offerings over and above base warranty to ensure high levels of availability and consistency of service. Our Essential Support tier including Warranty Service Upgrade is the recommended entry level for all our clients.

Software Technical Support

We recommend as part of an Essential Support element with every IBM system, Software Support Services from IBM Technical Support Services providing access to help line calls for fast, accurate answers to your clients' questions during installation and throughout ongoing operations. Support packages are available on IBM operating systems and third-party operating systems, as well as for IBM and third-party virtualization products. IBM Technical Support Services provided a tiered range of Software Support offerings to ensure high levels of availability and consistency of service. Our Essential Support tier is the recommended entry level for all our clients.

Base / Basic and Essential Support options are available across all geographies with High Availability and Premium services having availability tailored to geographic market needs.

For more information, visit

<http://www-935.ibm.com/services/us/en/it-services/tech-support-and-maintenance-services.html>

Prices

For current prices, contact IBM at 888-Shop-IBM (746-7426) or visit

<http://www-03.ibm.com/systems/x/>

To locate the web price, search on the feature number in the Search field.

The following are newly announced features on the specific models of the xSeries 7917 machine type:

Description	Model Number	Feature Number	Initial/MES/Both/Support	CSU
IBM Flex System x440 Compute Node	45X			N/A
Integrated SATA Mirroring - 2 identical HDDs required	45X	0030	Initial	
Integrated SATA Striping - 2 identical HDDs required	45X	0031	Initial	
Enable selection of Solid State Drives for Secondary Array	45X	2498	Initial	
Enable selection of Solid State Drives for Primary Array	45X	2499	Initial	
DRAWER FACTORY INTEGRATED IN RACK #1	45X	4651	Initial	
DRAWER FACTORY INTEGRATED IN RACK #2	45X	4652	Initial	
DRAWER FACTORY INTEGRATED IN RACK #3	45X	4653	Initial	
DRAWER FACTORY INTEGRATED IN RACK #4	45X	4654	Initial	
DRAWER FACTORY INTEGRATED IN RACK #5	45X	4655	Initial	
DRAWER FACTORY INTEGRATED IN RACK #6	45X	4656	Initial	
DRAWER FACTORY INTEGRATED IN RACK #7	45X	4657	Initial	
DRAWER FACTORY INTEGRATED IN RACK #8	45X	4658	Initial	
DRAWER FACTORY INTEGRATED IN RACK #9	45X	4659	Initial	
DRAWER FACTORY INTEGRATED IN RACK #10	45X	4660	Initial	
DRAWER FACTORY INTEGRATED IN RACK #11	45X	4661	Initial	
DRAWER FACTORY INTEGRATED IN RACK #12	45X	4662	Initial	
DRAWER FACTORY INTEGRATED IN RACK #13	45X	4663	Initial	
DRAWER FACTORY INTEGRATED IN RACK #14	45X	4664	Initial	
DRAWER FACTORY INTEGRATED IN RACK #15	45X	4665	Initial	
DRAWER FACTORY INTEGRATED IN RACK #16	45X	4666	Initial	
BLADE FACTORY INTEGRATED IN CENTER #1	45X	4681	Initial	

	45X	A2C8	Both
Intel Xeon Processor E5-4617	6C	2.9GHz 15M Cache	1600MHz 130W
	45X	A2C9	Initial
Addl Intel Xeon Processor E5-4617	6C	2.9GHz 15MB Cache	1600MHz 130W
	45X	A2CA	Both
Addl Intel Xeon Processor E5-4617	6C	2.9GHz 15MB Cache	1600MHz 130W
	45X	A2CB	Both
Intel Xeon Processor E5-4640	8C	2.4GHz 20M Cache	1600MHz 95W
	45X	A2CC	Initial
Addl Intel Xeon Processor E5-4640	8C	2.4GHz 20MB Cache	1600MHz 95W
	45X	A2CD	Both
Addl Intel Xeon Processor E5-4640	8C	2.4GHz 20MB Cache	1600MHz 95W
	45X	A2CE	Both
Intel Xeon Processor E5-4620	8C	2.2GHz 16M Cache	1333MHz 95W
	45X	A2CF	Initial
Addl Intel Xeon Processor E5-4620	8C	2.2GHz 16MB Cache	1333MHz 95W
	45X	A2CG	Both
Addl Intel Xeon Processor E5-4620	8C	2.2GHz 16MB Cache	1333MHz 95W
	45X	A2CH	Both
Intel Xeon Processor E5-4650	8C	2.7GHz 20M Cache	1600MHz 130W
	45X	A2CJ	Initial
Addl Intel Xeon Processor E5-4650	8C	2.7GHz 20MB Cache	1600MHz 130W
	45X	A2CK	Both
Addl Intel Xeon Processor E5-4650	8C	2.7GHz 20MB Cache	1600MHz 130W
	45X	A2CL	Both
IBM Flex System Compute Node Full-wide WW packaging			
	45X	A2CN	Initial
IBM 200GB SATA 2.5" MLC HS SSD			
	45X	A2FN	Both
IBM Blank USB Memory Key for VMware ESXi Downloads			
	45X	A2G0	Both
Primary Array - RAID 0			
	45X	A2K6	Initial
Primary Array - RAID 1			
	45X	A2K7	Initial
Primary Array - RAID 5			
	45X	A2K9	Initial
Primary Array - RAID 6			
	45X	A2KA	Initial
Primary Array - RAID 10			
	45X	A2KB	Initial
Secondary Array - RAID 0			
	45X	A2KF	Initial
Secondary Array - RAID 1			
	45X	A2KG	Initial
Secondary Array - RAID 5			
	45X	A2KJ	Initial
Secondary Array - RAID 6			
	45X	A2KK	Initial
Secondary Array - RAID 10			
	45X	A2KL	Initial
IBM Flex System FC3052 2-port 8Gb FC Adapter			
	45X	A2N5	Both
IBM Flex System x440 Compute Node Center Air Baffle			
	45X	A2QQ	Initial
Intel Xeon Processor E5-4650L	8C	2.6GHz 20M Cache	1600MHz 115W
	45X	A2QU	Initial
Addl Intel Xeon Processor E5-4650L	8C	2.6GHz 20MB Cache	1600MHz 115W
	45X	A2QV	Both
Addl Intel Xeon Processor E5-4650L	8C	2.6GHz 20MB Cache	1600MHz 115W
	45X	A2QW	Both
IBM Virtual Fabric Advanced Software Upgrade (LOM)			
	45X	A2TD	Both
IBM 256GB SATA 2.5" MLC HS Enterprise Value SSD			
	45X	A2U3	Both
IBM 128GB SATA 2.5" MLC HS Enterprise Value SSD			
	45X	A2U4	Both
16GB (1x16GB, 2Rx4, 1.5V) PC3-12800 CL11 ECC DDR3 1600MHz LP RDIMM			
	45X	A2U5	Both
IBM USB Memory Key for VMware ESXi 5.0			
	45X	A2VC	Both
IBM 146GB 15K 6Gbps SAS 2.5" SFF G2HS HDD			
	45X	A2XB	Both
IBM 300GB 10K 6Gbps SAS 2.5" SFF G2HS HDD			

IBM 600GB 10K 6Gbps SAS 2.5" SFF G2HS HDD	45X A2XC	Both
IBM 500GB 7.2K 6Gbps NL SAS 2.5" SFF G2HS HDD	45X A2XD	Both
ServerRAID M5115 SAS/SATA Controller for IBM Flex System	45X A2XE	Both
ServerRAID M5100 Series RAID 6 Upgrade for IBM Flex System	45X A2XW	Both
ServerRAID M5100 Series Performance Upgrade for IBM Flex System	45X A2Y1	Both
IBM Flex System x440 Compute Node CPU Filler	45X A2Y2	Both
ServerRAID M5100 Series SSD Caching Enabler for IBM Flex System	45X A2ZM	Initial
IBM USB Memory Key for VMware ESXi 5.0 Update1	45X A36G	Both
BULK MES ORDER INDICATOR - SDI/OEM	45X A383	Initial
BULK MES ORDER INDICATOR - NON SDI/OEM	45X A3CE	MES
ASSEMBLED IN USA INDICATOR	45X A3CF	MES
CSC ORDER ROUTING INDICATOR - ROCHESTER	45X A3CG	Initial
Drawer not factory integrated in rack	45X A3CH	Initial
Blade not factory integrated in chassis	45X A3CJ	Initial
SYSTEM PLANT ORDER ROUTING INDICATOR	45X A3CK	Initial
ServerRAID M5100 Series Enablement Kit for IBM Flex System x440	45X A3CL	Initial
ServerRAID M5100 Series IBM Flex System Flash Kit for x440	45X A3DS	Both
ServerRAID M5100 Series SSD Expansion Kit for IBM Flex System x440	45X A3DT	Both
Integrate Blade Server in Chassis	45X A3DU	Both
Windows Svr 2008 R2 Datacenter (4CPU,5UserCAL),ML (not preinstalled)	45X A3EB	Initial
IBM Flex System 1.8" SSD Filler	45X A3EC	Initial
ServerRAID M5100 Series Left Side Air Baffle for IBM Flex System x440	45X A3EP	Initial
IBM 100GB SATA 2.5" MLC HS Enterprise SSD	45X A3F6	Initial
Windows Server Standard 2012 (2CPU)-English (not preinstalled)	45X A3HR	Initial
Windows Server Datacenter 2012 (2CPU)-English (not preinstalled)	45X A3L7	Initial
Windows Storage Srv 2012 Std (2CPU)-English (not preinstalled)	45X A3LN	Initial
Windows Server Standard 2012 2CPU/2VM Additional License-Multilang	45X A3M3	Initial
Windows Server Datacenter 2012 2CPU Additional License-Multilang	45X A3ME	Initial
Windows Storage Srv 2012 Std 2CPU/2VM Additional License-Multilang	45X A3MF	Initial
Express Foundation Indicator	45X A3MG	Initial
Standard Foundation Indicator	45X EFD1	Initial
Enterprise Foundation Indicator	45X EFD2	Initial
PureFlex System Expansion	45X EFD3	Initial
Custom configuration	45X EFD4	Initial
Express Foundation Expansion Indicator	45X EFD5	Initial
Standard Foundation Expansion Indicator	45X EFD6	Initial
Enterprise Foundation Expansion Indicator	45X EFD7	Initial

	45X	EFD8	Initial
BTO in pre-approved countries	Indicator		
	45X	EFD9	Initial
Windows Svr 2008 R2 Standard	(1-4 CPU, 5 CAL), ML	(not preinstalled)	
	45X	EMS1	Initial
Windows Svr 2008 R2 Enterprise	(1-8CPU,10CAL), ML	(not preinstalled)	
	45X	EMS4	Initial
Windows Svr 2008 R2 Enterprise	(1-8CPU,25CAL), ML	(not preinstalled)	
	45X	EMS7	Initial
Indicator for Smart Cloud Entry	on x86 compute node		
	45X	ESCE	Initial

Maintenance charges

For additional information on maintenance and pricing, please contact your IBM Sales Representative or your IBM Business Partner, or call 1-800-IBM-CALL (1-800-426-2255).

For ServiceElect (ESA) maintenance service charges, contact IBM Global Services at 888-IBM-4343 (426-4343).

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