

IBM Flex System x220 Compute Node adds new Intel Xeon processors

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At a glance



The IBM Flex System™ x220 Compute Node is the next-generation cost-optimized compute node designed for less demanding workloads and low-density virtualization. The x220 is efficient and equipped with flexible configuration options and advanced management to run a broad range of workloads.

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 x220 is a versatile, easy-to-use compute node optimized for price/performance, power, and cooling. The x220, based on the Intel Xeon™ processor E5-2400 product family, delivers flexibility and capability, designed for infrastructure workloads and entry virtualization. The processors support automated power management with onboard sensors to give you more control over power and thermal levels across the system. These capabilities, combined with memory capacity up to 192 GB, are designed to help you get the most out of your systems.

Versatile

- A feature-rich design enables the IBM Flex System x220 Compute Node to run a broad range of workloads, including infrastructure, virtualization, and enterprise applications.
- A great choice of processors, memory, internal storage, and I/O options allows flexible configurations.
- The x220 Compute Node is supported in the IBM Flex System Enterprise Chassis.

Easy to use

- Two hot-swapped storage bays support SATA/SSD 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 help enable quick serviceability and maintenance.
- The Flex System Management appliance provides real-time management of the system day one through a preconfigured and preinstalled interface once setup is complete.

Optimized performance

- Next-generation Intel Xeon E5-2400 family processors, up to 95W.
- Memory capacity with 12 DDR3 DIMM slots supporting up to 192 GB (with 16 GB RDIMMs).
- Support for running 2DPC at 1600 MHz.
- High-speed I/O that supports up to a total of eight physical 10 Gb ports or up to 32 ports of virtual fabric.

Power and cooling

- Low-power processor, solid-state drives, and low-power memory DIMMs.
- Energy-efficient 1.35V DIMM support with xSmartEnergy Control helps monitor and cap power consumption.
- Advance management supports limiting power consumption, and real-time power and thermal management.
- Innovative and robust design helps keep the compute node performing under demanding conditions.

Key prerequisites

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

Planned availability date

August 24, 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 of the X-Architecture® systems 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 II (IMM2) that connects to the Chassis Management Module to provide the integrated systems-management functions for the node.

Flex System x220 Compute Node

The IBM Flex System x220 is versatile, easy-to-use compute node optimized for price/performance, power, and cooling. The x220, based on the Intel Xeon processor E5-2400 product family, is cost-optimized and designed for infrastructure workloads and entry virtualization.

The Flex System x220 Compute Node provides support for optional devices, such as:

- Up to two multicore microprocessors
- Up to 12 dual inline LP memory modules (DIMMs)
- Up to two hot-swap storage drives
- Up to two I/O expansion adapters
- Up to two internal bootable USB flash keys

The Flex System x220 Compute Node is supported in the IBM Flex System Enterprise Chassis only.

The IBM Flex System x220 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.

Standard IBM Flex System x220 Compute Node configuration

Model information

Model	Processor name	Cores	CPU speed	CPU GT/s	CPU power	Memory/ type	HDD interface
7906-F2x	Xeon E5-2418L	4	2.0 GHz	7.2	50w	1x4 GB 1333 MHz	H/S SFF
	Cache:	10 MB					

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Additional features

- The IBM Flex System x220 Compute Node system board contains 12 DIMM connectors.
 - Each DIMM connector supports 2 GB, 4 GB, 8 GB, or 16 GB low-profile (LP) double-date 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 ATA (SATA) drives.
- Dual 1 Gigabit Ethernet connections are provided on selected models.

IBM Flex System x220 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 are designed to enable easy access to each node server.
- Management module: The management module interfaces with each node server for single systems management control.
- IBM Dynamic System Analysis (DSA): 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 II (IMM2) 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 Broadcom BCM5718 dual-port Gigabit Ethernet controller (selected models) supports connections to a 1 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 two 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.
- IBM X-Architecture : IBM X-Architecture systems combine proven, innovative IBM designs to make your x86-processor-based compute node powerful, scalable, and reliable.
- Integrated Management Module II (IMM2): 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, the light-emitting diodes (LEDs) on the IMM2 are illuminated to help you diagnose the problem; the error is recorded in the IMM event log, and alerts you to the problem.

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 192 GB of system memory. The memory controller provides support for up to 12 industry-standard registered 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 two 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 can 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 a 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 (CMM) 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 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 using 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 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 offers uncompromised scalability, throughput, and performance. This switch can help clients migrate to 10 Gb infrastructure and offers virtualization features like 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 four 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 can 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 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 1Gb 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 use 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 like 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 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 use 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 like 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, and offer enhanced Fibre Channel functions like 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 for 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 16 Gb 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 using 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 intra-chassis 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 also includes these enhanced software licenses preinstalled:
 - 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, we will offer a two-port 16 Gb adapter based on Brocade architecture to offer end-to-end 16 Gb connectivity to a SAN. This adapter can also autonegotiate and work at 8 Gb speed. It offers enhanced features such as storage Target Rate Limiting (TRL), VM aware QoS and 1M+ IOPS performance.

Clients can manage these devices 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 previous 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 previous 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 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 the use of host channel adapters (HCAs) and switches, InfiniBand technology enables the connection to servers with remote storage and networking devices, and other servers. It can also be used inside servers for inter-processor communication (IPC) in parallel clusters.

IBM Flex System IB6131 InfiniBand Switch is an upgradeable device that can scale with your needs. Base switch enables 14 internal QDR links to each server and 18 QSFP uplink ports for inter-switch links or to connect to external servers. Clients can upgrade to FDR speed (56 Gb) using 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' are made up of individual components that can be mixed and matched, and are fully customizable with optional management
- IBM Flex System solutions consist of a chassis with an integrated management appliance, IBM networking, and storage standard

- IBM Flex System optimized offerings are preconfigured, highly customized systems focused on selected workloads or single-purpose such as PureFlex™ or Cloudburst

Product number

The following are features already announced for the 3331, 7906, 8737 machine types:

Description	MT	Model	Feature
640GB High IOPS MLC Duo Adapter for IBM System x®	7906	AC1 MC1	5985
2U Bracket for High IOPS SSD PCIe Adapters	7906	AC1 MC1	7466
1.28TB HIGH IOPS MLC DUO ADAPTER FOR IBM SYSTEM X	7906	AC1 MC1	A1NB
16GB (1x16GB, 2Rx4, 1.35V) PC3L-10600 CL9 ECC DDR3 1333MHZ LP RDIMM	7906	AC1 MC1	A1QT
4GB (1x4GB, 2Rx8, 1.5V) PC3-12800 CL11 ECC DDR3 1600MHZ LP RDIMM	7906	AC1 MC1	A24L
4GB (1x4GB, 1Rx4, 1.5V) PC3-12800 CL11 ECC DDR3 1600MHZ LP RDIMM	7906	AC1 MC1	A28Z
IBM 256GB SATA 2.5" MLC HS Enterprise Value SSD	7906	AC1 MC1	A2U3
IBM 128GB SATA 2.5" MLC HS Enterprise Value SSD	7906	AC1 MC1	A2U4
16GB (1x16GB, 2Rx4, 1.5V) PC3-12800 CL11 ECC DDR3 1600MHZ LP RDIMM	7906	AC1 MC1	A2U5
IBM USB Memory Key for VMware ESXi 5.0 Update1	7906	AC1 MC1	A383
Intel Xeon Processor E5-1410 4C 2.8GHz 10MB Cache 1333MHZ 80W	7906	AC1 MC1	A3C4
Intel Xeon Processor E5-2448L 8C 1.8GHz 20MB Cache 1600MHZ 70W	7906	AC1 MC1	A3C5
Intel Xeon Processor E5-2428L 6C 1.8GHz 15MB Cache 1333MHZ 60W	7906	AC1 MC1	A3C6
Intel Xeon Processor E5-2418L 4C 2.0GHz 10MB Cache 1333MHZ 50W	7906	AC1 MC1	A3C7
Addl Intel Xeon Processor E5-2448L 8C 1.8GHz 20MB Cache 1600MHZ 70W	3331	HC1	A3C8
Addl Intel Xeon Processor E5-2448L 8C 1.8GHz 20MB Cache 1600MHZ 70W	7906	AC1 MC1	
Addl Intel Xeon Processor E5-2428L 6C 1.8GHz 15MB Cache 1333MHZ 60W	3331	HC1	A3C9
Addl Intel Xeon Processor E5-2428L 6C 1.8GHz 15MB Cache 1333MHZ 60W	7906	AC1 MC1	
Addl Intel Xeon Processor E5-2418L 4C 2.0GHz 10MB Cache 1333MHZ 50W	3331	HC1	A3CA
Addl Intel Xeon Processor E5-2418L 4C 2.0GHz 10MB Cache 1333MHZ 50W	7906	AC1 MC1	
IBM 1.2TB High IOPS MLC Mono Adapter	7906	AC1 MC1	A3DY
IBM 2.4TB High IOPS MLC Duo Adapter	7906	AC1 MC1	A3DZ
IBM Flex System 1.8" SSD Filler	7906	AC1 MC1	A3EP
IBM USB Memory Key for VMware ESXi 5.0 Update1	8737	AC1	A383

Single Entity Offerings (SEO)

Description	SEO number
IBM Flex System x220 Compute Node	7906F2U

Option SEOs

The following are new unique option part numbers for IBM Flex System x220 Compute Node.

SEO

Number	Description
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00D9526	Intel Xeon Processor E5-2448L 8C 1.8GHz 20MB Cache 1600MHz 70W
00D9527	Intel Xeon Processor E5-2428L 6C 1.8GHz 15MB Cache 1333MHz 60W
00D9528	Intel Xeon Processor E5-2418L 4C 2.0GHz 10MB Cache 1333MHz 50W

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=112-133>

Publications

The *Installation and Service Guide* , for IBM Flex System x220 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 Center 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 , BladeCenter , and Flex System Support Services

Recommended Core Technical Support

IBM Flex System technology offers 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 these IBM systems 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 provide 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>

Technical information

Specified operating environment

Physical specifications

IBM Flex System x220 Compute Node

7906-F2x

Processor	Intel Xeon E5-2418L 4 core 50w
Internal speed	2.0 GHz
Maximum memory speed	1333 MHz
CPU interconnect speed	7.2 GT/s
Number standard	1
Maximum	2
L3 cache (full speed)	10 MB
Memory (LP ECC DDR3)	4 GB
DIMMs (Standard)	1 x 4 GB
DIMM sockets	12
Capacity	192 GB ¹
Mezzanine Card	Optional
Standard	0
Maximum	1
Video	SVGA
Memory	16 MB
Disk controller	SATA
Channels	2
Connector internal	2
Connector external	0
RAID	Standard
Internal capacity	2 TB ²
Total HDD or SSD bays	Up to 2
Management processor	Standard
Ethernet controller	Dual 1 Gb (standard)
Front access connectors	
KVM connector	1 ³
USB connector	1

¹Total system memory capacity is based on using 16 GB memory DIMMs.

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

³Use 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 x220 Compute Node specifications

Video subsystem

- 16 MB DDR3
- Integrated on the IMM2

Supported IBM Flex System x220 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 x220 Compute Node

- Height: 55.5 mm (2.19 in)
- Depth: 492.24 mm (19.38 in)
- Width: 217.35 mm (8.56 in)
- Maximum weight: 6.4 kg (14.11 lb) (depending on the configuration when options are added)

Electrical

IBM Flex System x220 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

Operating environment

The IBM Flex System x220 compute node complies with ASHRAE Class A3 specifications.

- Power on:
 - Temperature: 5°C to 40°C (41°F - 104°F)
 - Humidity, noncondensing: -12°C dew point (10.4°F) and 8% - 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 per hour (41°F per hour)
- Power off:
 - Temperature: 5°C to 45°C (41°F - 113°F)
 - Relative humidity: 8% - 85%
 - Maximum dew point: 27°C (80.6°F)
- Storage (nonoperating):
 - Temperature: 1°C to 60°C (33.8°F - 140°F)

- Altitude: 3,050 m (10,006 ft)
- Relative humidity: 5% - 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% - 100%
 - Maximum dew point: 29°C (84.2°F)
 - Particulate contamination

Hardware requirements

For service, the IBM Flex System x220 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 have been tested for compatibility with the IBM Flex System x220 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, U2 and 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 x220 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 x220 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 x220 Compute Nodes contain 12 DIMM sockets. A maximum of 192 GB of system memory is supported by using a 16 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, LR DIMM, or UDIMM).
- Processor modules must be of the same type, power level, and clock speed on each Flex System x220 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 x220 Compute Node is supported only in the IBM Flex System Enterprise Chassis.
- One mezzanine expansion card may be installed on the Flex System x220 Compute Node and is supported if the additional microprocessor is installed.
- The Flex System x220 Compute Node cannot support x16 Mezzanine cards in full bandwidth. The maximum bandwidth for ASIC 1 of Mezz card is PCI Express 3.0 x8, and PCI Express 3.0 x4 for Mezz card ASIC 2.
- The Flex System x220 Compute Node contains built-in Software RAID controller - ServerRAID C105. It supports SATA interface drives only, and either RAID 0 or RAID 1 must be created. SSD drives are not supported by C105. There is no native driver support for Linux distributions, and C105 is not supported on RHEL6 U3, XEN, or VMware. A hardware RAID upgrade option is available by purchasing the ServerRAID H1135 card to support all operating systems and SSD drives.
- Mezzanine expansion cards installed in the Flex System x220 Compute Node require a switch module in the Flex System Enterprise Chassis of the same connectivity type.
- Regarding the used 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 TBW (Total Bytes Written). 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 become 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 x220 Compute Node server is designated as customer setup. Customer setup instructions are shipped with each system.

Supported memory options

Option Number	Description
49Y1403	2GB (1x2GB, 1Rx8, 1.35V) PC3L-10600 CL9 ECC DDR3 1333MHZ LP UDIMM
49Y1404	4GB (1x4GB, 2Rx8, 1.35V) PC3L-10600 CL9 ECC DDR3 1333MHZ LP UDIMM
49Y1406	4GB (1x4GB, 1Rx4, 1.35V) PC3L-10600 CL9 ECC DDR3 1333MHZ LP RDIMM
49Y1407	4GB (1x4GB, 2Rx8, 1.35V) PC3L-10600 CL9 ECC DDR3 1333MHZ LP RDIMM
49Y1397	8GB (1x8GB, 2Rx4, 1.35V) PC3L-10600 CL9 ECC DDR3 1333MHZ LP RDIMM
49Y1400	16GB (1x16GB, 4Rx4, 1.35V) PC3L-8500 CL7 ECC DDR3 1066MHZ LP RDIMM
90Y3109	8GB (1x8GB, 2Rx4, 1.5V) PC3-12800 CL11 ECC DDR3 1600MHZ LP RDIMM
49Y1559	4GB (1x4GB, 1Rx4, 1.5V) PC3-12800 CL11 ECC DDR3 1600MHZ LP RDIMM

90Y3178 4GB (1x4GB, 2Rx8, 1.5V) PC3-12800 CL11 ECC DDR3 1600MHZ LP RDIMM
49Y1563 16GB (1x16GB, 2Rx4, 1.35V) PC3L-10600 CL9 ECC DDR3 1333MHZ LP
RDIMM
00D4968 16GB (1x16GB, 2Rx4, 1.5V) PC3-12800 CL11 ECC DDR3 1600MHZ LP
RDIMM

Cable orders

All cables are supplied with the IBM Flex System x220 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

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 and voltage
- 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 (POST)
- 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

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.

Terms and conditions

IBM Global Financing

Yes.

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

In the United States, call 800-IBM-SERV (426-7378), or write to:

Warranty Information
P.O. Box 12195
Research Triangle Park, NC 27709
Attn: Dept JDJA/B203

Warranty period

- Three years
- Optional features - One year

Note: For configurations that support the RAID Battery, the RAID battery will be warranted for 1 year effective on its "Date of Installation." All other product warranty terms for the machine remain unchanged.

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 which 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 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:

- Baffles and fillers

- Miscellaneous parts kit
- Top cover assembly
- Handle, cam assembly left
- HDD cage
- Rear bulkhead

Warranty service

If required, IBM provides repair or exchange service, depending on the type of warranty service specified below for the machine. 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. 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- 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

IBM provides a replacement CRU to you for you to install. CRU information and replacement instructions are shipped with your machine and are available from IBM 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 IBM 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 IBM 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. 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, and 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 or features have been designated as Tier 1 CRUs:

- Cables
- System service label
- Front bezel with power button
- HDDs
- HDD backplane
- Memory DIMMs
- 3x8 double ended periscope receptacle
- Indicator panel
- 3.0 volt battery
- RAID battery (one year warranty)
- RFID label tag assembly
- 2 GB USB memory flash key
- Mezzanine adapters and cards
- PEN

- KVM dongle cable

On-site Service

At IBM's discretion you will receive CRU service or IBM 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 IBM 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 an IBM service center. In those locations where On-site Service is not available, the normal in-country service delivery is used.

Call IBM at 1-800-IBM-SERV (426-7378) to assist with problem isolation for hardware to determine if warranty service is required. Telephone support may be subject to additional charges, even during the limited warranty period.

Calls must be received by 5:00 p.m. local time in order to qualify for NBD service.

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?lnocid=GCOR-3FBJK2>

For more information on IWS, refer to Services Announcement [601-034](#), dated September 25, 2001 .

Licensing

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

Maintenance services

ServicePac , ServiceSuite , ServiceElect, and ServiceElite

ServicePac® , ServiceSuite® , ServiceElect, and ServiceElite provide hardware warranty service upgrades, maintenance, and selected support services in one agreement.

Warranty service upgrade

During the warranty period, a warranty service upgrade provides an enhanced level of On-site Service for an additional charge. A warranty service upgrade must be purchased during the warranty period and is for a fixed term (duration). It is not refundable or transferable and may not be prorated. If required, IBM will provide the warranty service upgrade enhanced level of On-site Service acquired by the customer. Service levels are response-time objectives and are not guaranteed.

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.

CRUs will be provided as part of the machine's standard warranty CRU Service except that you may install a Tier 2 CRU yourself or request IBM installation, at no additional charge, under one of the On-site Service levels specified below.

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.

Maintenance service

If required, IBM provides repair or exchange service, depending on the type of maintenance service specified below for the machine. 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. Service levels are response-time objectives and are not guaranteed.

CRU Service

If your problem can be resolved with a CRU (for example, keyboard, mouse, speaker, memory, or hard disk drive), IBM will ship the CRU to you for you to install. CRU information and replacement instructions are shipped with your machine and are available from IBM at any time on your request.

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, and 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.

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.

Maintenance service (ICA)

Maintenance services are available for ICA legacy contracts.

Alternative service (warranty service upgrades)

During the warranty period, a warranty service upgrade provides an enhanced level of On-site Service for an additional charge. A warranty service upgrade must be purchased during the warranty period and is for a fixed term (duration). It is not refundable or transferable and may not be prorated. If required, IBM will provide the warranty service upgrade enhanced level of On-site Service acquired by the customer. Service levels are response-time objectives and are not guaranteed.

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.

A CRU will be provided as part of the machine's standard warranty CRU Service except that you may install a Tier 1 CRU yourself or request IBM to install it, at no additional charge, under the type of warranty service designated for your machine.

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.

Maintenance service

If required, IBM provides repair or exchange service, depending on the type of maintenance service specified below for the machine. 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. Service levels are response-time objectives and are not guaranteed.

CRU Service

If your problem can be resolved with a CRU (for example, keyboard, mouse, speaker, memory, or hard disk drive), IBM will ship the CRU to you for you to install. CRU information and replacement instructions are shipped with your machine and are available from IBM at any time on your request.

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, and 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.

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.

Non-IBM parts support

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 its customers, and normal warranty service procedures for the IBM machine apply.

Warranty service upgrades and maintenance services

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

IBM Service provides hardware problem determination on non-IBM parts (for example, adapter cards, PCMCIA cards, disk drives, or memory) installed within IBM machines covered under warranty service upgrades or maintenance services 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.

IBM 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 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

None

Prices

For current prices, contact IBM at 888-Shop-IBM (746-7426) or visit <http://www-03.ibm.com/systems/x/>

The following are features already announced for the 3331 machine type:

Description	Model Number	Feature Number	Initial/MES/Both/Support
Addl Intel Xeon Processor E5-2448L 8C 1.8GHz 20MB Cache 1600MHz 70W	HC1	A3C8	MES
Addl Intel Xeon Processor E5-2428L 6C 1.8GHz 15MB Cache 1333MHz 60W	HC1	A3C9	MES
Addl Intel Xeon Processor E5-2418L 4C 2.0GHz 10MB Cache 1333MHz 50W	HC1	A3CA	MES

The following are features already announced for the 7906 machine type:

Description	Model Number	Feature Number	Initial/MES/Both/Support
640GB High IOPS MLC Duo Adapter for IBM System x	AC1 MC1	5985	Initial Initial
2U Bracket for High IOPS SSD PCIe Adapters	AC1 MC1	7466	Initial Initial
1.28TB HIGH IOPS MLC DUO ADAPTER FOR IBM SYSTEM X	AC1 MC1	A1NB	Initial Initial
16GB (1x16GB, 2Rx4, 1.35V) PC3L-10600 CL9 ECC DDR3 1333MHz LP RDIMM	AC1 MC1	A1QT	Initial Initial
4GB (1x4GB, 2Rx8, 1.5V) PC3-12800 CL11 ECC DDR3 1600MHz LP RDIMM	AC1 MC1	A24L	Initial Initial
4GB (1x4GB, 1Rx4, 1.5V) PC3-12800 CL11 ECC DDR3 1600MHz LP RDIMM	AC1 MC1	A28Z	Initial Initial
IBM 256GB SATA 2.5" MLC HS Enterprise Value SSD	AC1 MC1	A2U3	Initial Initial
IBM 128GB SATA 2.5" MLC HS Enterprise Value SSD	AC1 MC1	A2U4	Initial Initial
16GB (1x16GB, 2Rx4, 1.5V) PC3-12800 CL11 ECC DDR3 1600MHz LP RDIMM	AC1 MC1	A2U5	Initial Initial
IBM USB Memory Key for VMware ESXi 5.0 Update1	AC1 MC1	A383	Initial Initial
Intel Xeon Processor E5-1410 4C 2.8GHz 10MB Cache 1333MHz 80W	AC1 MC1	A3C4	Initial Initial
Intel Xeon Processor E5-2448L 8C 1.8GHz 20MB Cache			

1600MHz 70w	AC1 MC1	A3C5	Initial Initial
Intel Xeon Processor E5-2428L 1333MHz 60w	6C 1.8GHz 15MB Cache		
	AC1 MC1	A3C6	Initial Initial
Intel Xeon Processor E5-2418L 1333MHz 50w	4C 2.0GHz 10MB Cache		
	AC1 MC1	A3C7	Initial Initial
Addl Intel Xeon Processor E5-2448L Cache 1600MHz 70w	8C 1.8GHz 20MB		
	AC1 MC1	A3C8	Initial Initial
Addl Intel Xeon Processor E5-2428L Cache 1333MHz 60w	6C 1.8GHz 15MB		
	AC1 MC1	A3C9	Initial Initial
Addl Intel Xeon Processor E5-2418L Cache 1333MHz 50w	4C 2.0GHz 10MB		
	AC1 MC1	A3CA	Initial Initial
IBM 1.2TB High IOPS MLC Mono Adapter	AC1 MC1	A3DY	Initial Initial
IBM 2.4TB High IOPS MLC Duo Adapter	AC1 MC1	A3DZ	Initial Initial
IBM Flex System 1.8" SSD Filler	AC1 MC1	A3EP	Initial Initial

The following are features already announced for the 8737 machine type:

Description	Model Number	Feature Number	Initial/ MES/ Both/ Support
IBM USB Memory Key for VMware	ESXi AC1 MC1	5.0 Update1 A383	Initial Initial

IBM Flex System x220 Compute Node

Description	SEO Number	Initial/ MES/ Both/ Support	CSU
E5-2418L, 2.0 GHz 4C, 50w, 4GB	7906F2x	Both	Yes

SEO Options

Description	SEO Number	Initial/ MES/ Both/ Support	CSU
Intel Xeon E5-2448L 8C 1.8GHz 20MB 70W	00D9526	Both	Yes
Intel Xeon E5-2428L 6C 1.8GHz 15MB 60W	00D9527	Both	Yes
Intel Xeon E5-2418L 4C 2.0GHz 10MB 50W	00D9528	Both	Yes

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

ServicePac for Warranty and Maintenance

ServicePac offerings are valid for models announced in the United States.

ServicePac for warranty and Maintenance

		SEO	MTM
7906	3 Year Onsite Repair 9x5 4 Hour Response	46Y0475	675682Q
7906	3 Year Onsite Repair 24x7 4 Hour Response	46Y0476	675682R
7906	3 Year Onsite Repair 24x7 2 Hour Response	46Y0477	675682S
7906	4 Year Onsite Repair 9x5 Next Business Day	46Y0478	675682T
7906	4 Year Onsite Repair 9x5 4 Hour Response	46Y0479	675682U
7906	4 Year Onsite Repair 24x7 4 Hour Response	46Y0480	675682V
7906	4 Year Onsite Repair 24x7 2 Hour Response	46Y0481	675682W
7906	5 Year Onsite Repair 9x5 Next Business Day	46Y0482	675682X
7906	5 Year Onsite Repair 9x5 4 Hour Response	46Y0483	675682Y
7906	5 Year Onsite Repair 24x7 4 Hour Response	46Y0484	675682Z
7906	5 Year Onsite Repair 24x7 2 Hour Response	46Y0485	6756830
7906	3 Year Onsite Repair 24x7 4 Hour Response with HDDR	46Y0486	6756831
7906	4 Year Onsite Repair 24x7 4 Hour Response with HDDR	46Y0487	6756832
7906	4 Year Onsite Repair 9x5 Next Business Day Response with HDDR	46Y0488	6756833
7906	5 Year Onsite Repair 24x7 4 Hour Response with HDDR	46Y0489	6756834
7906	5 Year Onsite Repair 9x5 Next Business Day Response with HDDR	46Y0490	6756835

ServicePac for Maintenance Agreement

		SEO	MTM
7906	1 Year Onsite Repair 9x5 Next Business Day	46Y0532	6756F0U
7906	1 Year Onsite Repair 9x5 4 Hour Response	46Y0533	6756F0V
7906	1 Year Onsite Repair 24x7 4 Hour Response	46Y0534	6756F0W
7906	1 Year Onsite Repair 24x7 2 Hour Response	46Y0535	6756F0X
7906	2 Year Onsite Repair 9x5 Next Business Day	46Y0536	6756F0Y
7906	2 Year Onsite Repair 9x5 4 Hour Response	46Y0537	6756F0Z
7906	2 Year Onsite Repair 24x7 4 Hour Response	46Y0538	6756F1A
7906	2 Year Onsite Repair 24x7 2 Hour Response	46Y0539	6756F1B
7906	1 Year Onsite Repair 24x7 4 Hour Response with HDDR	46Y0540	6756F1C
7906	2 Year Onsite Repair 24x7 4 Hour Response with HDDR	46Y0541	6756F1D
7906	1 Year Onsite Repair 9x5 Next Business Day Response with HDDR	46Y0542	6756F1F
7906	2 Year Onsite Repair 9x5 Next Business Day with HDDR	46Y0543	6756F1G

ServicePac for Essential Support:
Warranty and Maintenance Option plus Remote Technical Response

		SEO	MTM
7906	3 Year Essential Support 24x7 4 Hour Response	46Y0544	N/A

SERVICEPAC FOR Essential Support:
Maintenance plus Remote Technical Support

		SEO	MTM
7906	1 Year Essential Support 24x7 4 Hour Response	46Y0545	N/A
7906	1 Year Essential Support 9x5 Next Business Day Response	46Y0546	N/A

Visit the following web link for ServicePac information

http://www-935.ibm.com/services/us/its/html/servicepac_americas.html

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