



IBM PowerHA SystemMirror Standard Edition V7 and enhancements to PowerHA SystemMirror Enterprise Edition V6

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At a glance

PowerHA™ SystemMirror for AIX® Standard Edition is the IBM® Power Systems™ data center solution that helps protect critical business applications from outages, planned or unplanned.

PowerHA SystemMirror for AIX Enterprise Edition includes the Standard Edition plus advanced capabilities such as failover to backup resources at remote locations. Enterprise Edition:

- Supports Metro Mirror / Global Mirror in a DS8700 configuration
- Supports Global Mirror/Metro in an SVC configuration
- Supports Hitachi Truecopy
- Supports High Availability and Disaster Recovery with EMC SRDF (Symmetrix Remote Data Facility) deployments
- Supports GLVM sync and async mode

Either edition, when deployed in dynamic logical partitioning (DLPAR) environments, enables managed utilization of resources on a secondary node in the PowerHA SystemMirror cluster for IBM POWER5™ and later processors.

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

Overview

IBM PowerRHA SystemMirror Standard Edition V 7.1

PowerHA SystemMirror for AIX V7.1 is the next generation of clustering solutions for high availability. Based on Cluster Aware AIX, the new PowerHA SystemMirror Standard Edition offering represents a major shift in the architectural notions of building and managing clusters for high availability. Cluster Aware AIX shifts key aspects of clustering technology into the AIX kernel, enabling simpler, more robust cluster formation and management. Featuring near real-time inter-node messaging and synchronization, cluster-wide health management, and multichannel redundancy for communications, PowerHA SystemMirror 7.1 will make data center operations for high availability simpler and more robust.

In addition to integration with Cluster Aware AIX, PowerHA SystemMirror 7.1 Standard Edition features include:

- Centralized cluster repository for cluster-wide name space management and inter-node synchronization.
- PowerHA SystemMirror kernel-based low-latency event communication.
- Smart Assist technology, enabling out-of-the-box high availability (HA) support for popular applications, and a new intuitive user interface. The Smart Assist HA agents enable easy deployment and management for SAP, Enterprise Content Manager, Oracle, DB2®, WebSphere®, Tivoli® Storage Manager (TSM) and FileNet® software.
- Simplified PowerHA SystemMirror SMIT menus for cluster configuration and administration.
- The IBM Systems Director based PowerHA SystemMirror management interface provides for an easy-to-use graphical interface to deploy and manage the PowerHA SystemMirror clusters. A set of wizards guides customers through creation of cluster and resource groups. A sophisticated management interface allows the customer to manage various clusters in their environment. Using this interface, administrators can generate reports, examine topology, and be notified of status changes to resources and clusters.
- PowerHA SystemMirror 7 Standard Edition includes this IBM Systems Director plugin at no charge, which can be installed and used by the customer to deploy and manage PowerHA SystemMirror clusters. The plugin consists of the IBM Systems Director server component and also the agent that gets deployed on individual nodes in the PowerHA SystemMirror clusters. IBM Systems Director Server component of PowerHA plugin can also be downloaded and installed by the customer.

PowerHA SystemMirror for AIX 7.1 highlights include:

- PowerHA SystemMirror for AIX Standard Edition is the Power Systems data center solution that helps protect critical business applications from outages, planned or unplanned.
- PowerHA SystemMirror is designed to provide high availability of data by protecting against storage errors through mirroring.
- PowerHA SystemMirror clusters up to 32 nodes and provides for a rich set of resource group formation and policies to manage the resource groups across the cluster.
- PowerHA SystemMirror provides for centralized administration of the cluster with key management capabilities in storage, network, and security areas. The IBM Systems Director based graphical interface provides for a sophisticated dashboard for managing all the clusters in the enterprise environment from a single interface.
- PowerHA SystemMirror provides for a cluster-wide data synchronization capability through the File collections facility.
- PowerHA SystemMirror provides for daily verification of the operating environment between the active and standby nodes to ensure proper failovers. The verification framework allows for customization.
- PowerHA SystemMirror deployed in DLPAR environments enables managed utilization of resources on a secondary node in the PowerHA SystemMirror cluster for POWER5 and later processors.

The PowerHA SystemMirror 6.1 Enterprise Edition update (Service Pack 3) enables the following features:

- High Availability and Disaster Recovery (HA/DR) with Hitachi TrueCopy based replication: PowerHA SystemMirror exploits the replication capabilities of Hitachi storage subsystems to provide for a two-site HA/DR solution. Both synchronous and asynchronous mirroring capabilities of Hitachi Truecopy replication are exploited.
- High Availability and Disaster Recovery with IBM DS8700 Global Mirror replication: Support for the DS8K family of storage subsystem has been extended with support for asynchronous mirroring (Global Mirror) across long distances on the DS8700.

Key prerequisites

Refer to the [Hardware requirements](#) section and [Software requirements](#) section.

Planned availability date

September 10, 2010

Description

PowerHA 7.1 SystemMirror: Next-generation high availability

PowerHA SystemMirror has provided for high availability and disaster recovery solutions to customers for nearly two decades. PowerHA SystemMirror can support up to 32 AIX nodes in a cluster and optimally manage the resources and resource groups in the cluster. Originally known as HACMP™, the product has provided for integrated and extensive support for various AIX features, including the storage management across the cluster.

PowerHA SystemMirror 7.1 released in 2010 provides the next-generation HA solution based on clustering. It builds an HA solution integrated with the robust Cluster Aware AIX (CAA) operating system capabilities. Very high levels of integration between the HA solution and the operating system allow for a simplified and reliable product.

Internal architecture of the product has been revamped to simplify the product. Many of the clustering primitives have been embedded into the AIX kernel to make the solution more robust. Design focus for PowerHA SystemMirror 7.1 release has been around the following areas:

- Simplification: Simplification of topology management and cutting down support for obsolete technologies. Out of the box HA agents (Smart Assists) for common middleware products.
- Usability: Better user interfaces enhance the end-user experiences. Full fledged, easy-to-use graphical management interface. Also simplified SMIT interfaces for easier navigation and management of the PowerHA SystemMirror product.
- Enhanced HA Management: Reliable health management via kernel embedded topology management. Advanced event management framework and fine granular event generation and consumption for better HA decision making.

Using the above themes as the basis, various layers of the HA stack have been updated to provide for an even more reliable and user friendly product. The following sections describe the highlights of the various enhancements done in PowerHA SystemMirror 7.1 release.

Some of the components in PowerHA SystemMirror 7.1 HA solution are highlighted below:

- IBM Director Management Interfaces
- Resource Management
- Middleware HA
- Central Configuration
- Event Management
- Fencing

Topology management

Topology management in PowerHA SystemMirror 7 has been revamped to provide for a simpler as well as a reliable foundation for the cluster formation and HA management. Note that topology management being referred to here provides for the very foundation of the cluster: Heart beat and reliable messaging related cluster communication infrastructure. Additionally, topology management aids in event generation and cluster-wide configuration management.

Some of the subcomponents of Topology Management layer are listed below

- Cluster communication: Communication between the nodes in the cluster in regards to cluster formation, continuous health monitoring as well as the inter-node messaging and synchronization.
- Clustering infrastructure support: Tools and aids needed to help form and manage the cluster.

Cluster communication

Nodes in a cluster keep track of the health of each other by sending and receiving heartbeats regularly. Additionally, they need to communicate with each other one to one or one to many for many important tasks such as during cluster formation, changes to cluster configuration, collective decision making, and so on. These forms of communication need to be highly reliable and are the core foundation to any HA solution. The reliability of these communication mechanisms is directly related to solving issues in regards to cluster partitioning and false failure detections.

PowerHA SystemMirror 7 provides for an advanced method of communication between the nodes that are designed to provide protection against cluster partitioning. For most data center environments, PowerHA SystemMirror 7 will implement multiple communication paths between the hosts in the cluster.

Multi channel communications between hosts

PowerHA SystemMirror 7: Apart from exploiting the traditional network links for communication, POWER7 uniquely exploits the storage area network (SAN) links also for communication purposes. Using the SAN links in the data center allows for an alternative high-speed physical channel for communication apart from the network links deployed in the environment. For example, if the systems have two network adapters each for redundancy purposes and an host bus adapter (HBA) each for the SAN interconnects to disks, then the resulting communication possibilities are:

- Communication through network interfaces on Network adapter 1
- Communication through network interfaces on Network adapter 2
- Communication through SAN fabric of HBA 1

Additionally, as part of the topology management, heartbeat management has been re-architected to make it simpler to configure and a robust framework for health management. Also, the communication management now is from the AIX kernel as compared to the user space. PowerHA SystemMirror 7 and Cluster Aware AIX heart beating and messaging now is based on Multicast packets. A single packet transmitted by a node is received by the other nodes participating in the cluster to know that node A is healthy. Most of the cluster communication is done in the AIX kernel.

This has many advantages:

- Communication is more reliable because unlike user space-based monitoring, it is not prone to operating system scheduling issues.
- Communication done at kernel level also allows for sending out the messages from a node experiencing extreme duress.

- Setup of the communication links is done using the discovered adapters, thus reducing burden on the end user in regards to deployment.

AIX Cluster Awareness

Some of the AIX commands have been modified to be aware of the cluster deployed and take precautions to prevent administrators from accidentally changing the configuration of the cluster to be out of sync. Also configuration and device management components of AIX are aware of the clustering and shared disks and provide for ways to manage them better.

Storage framework: Fencing

A storage framework is embedded in the operating system to aid in storage device management. As part of the framework, fencing disks or disk groups are supported. Fencing shuts off write access to the shared disks from any entity on the node (irrespective of the privileges associated with the entity trying to access the disk). Fencing is exploited by PowerHA SystemMirror to implement strict controls in regards to shared disks and their access solely from one the nodes sharing the disk. Fencing assures that when the workload moves to another node for continuing operations, then access to the disks on the departing node are completely turned off for write operations.

Central configuration

PowerHA and AIX 7 use a centralized disk for managing the cluster-related configuration. This disk called *cluster repository* is used for cluster-wide name space management as well as for managing the cluster configuration. The disk is also used to manage inter-node synchronization. Managing the configuration centrally allows for better method of implementing cluster-related changes as well as helps in synchronization across the cluster.

Advanced event management

AIX operating system has been updated to generate fine granular events in relation to storage and networks. These events are being generated in the kernel and handed over to PowerHA SystemMirror through programmatic interfaces in real time. This framework also extends and exchanges events across the various nodes in the cluster at kernel level. This kernel level event exchanges allows for handling very dire conditions on any node. For example, loss of a operating system related critical storage will be detected and action taken as needed.

CLMGR: Single command for PowerHA SystemMirror management

A command-line user interface for PowerHA SystemMirror 7 has been introduced. Command "clmgr" allows an administrator to use a uniform interface to deploy as well as do the day-to-day cluster management. This utility provides SystemMirror with a supported, highly usable, easily scriptable textual interface for the first time.

Resource management enhancements

PowerHA SystemMirror manages high availability of the stack through resource group definitions, wherein the various dependencies are captured. PowerHA SystemMirror has supported many resource group-related policy options. The PowerHA SystemMirror V7 release has new policy choices that provide flexibility in administering the resource groups across the various nodes in the cluster.

Resource group relationship enhancements

PowerHA SystemMirror supports several resources group dependencies, including location dependencies. Using these capabilities customers can define policies for their resource groups such that sequence of the software entities in the stack are

controlled appropriately and high availability of the application stack is assured. For example, an application server-related resource group needs to be started after its related database resource group is started and accordingly brought down first before the database can be shut down.

PowerHA SystemMirror 7 includes these enhancements:

- Start After dependency: A resource group can be started after its dependent resource group has been started.
- Stop After dependency: A resource group is stopped after the resource group that is dependent on it is stopped.

Adaptive RG decision framework

PowerHA SystemMirror supports different policies, which includes startup policies, failover policies, and fail back policies. These policies will decide the behavior of resources group during starting, failover, and fallback situations.

Startup policies

- Online on First Available node
- Online on Home node
- Online on All Available nodes

Dynamic node priority failover policies

Previous PowerHA SystemMirror has supported many policies in regards to failovers from one node to another.

- Failover to Next Highest priority Node
- Failover Using Distribution policy
- Bring Offline

To this set, a new dynamic decision making is being added in PowerHA SystemMirror 7. It is called *Failover Using Dynamic Node Priority*. In the Dynamic node Priority policy, there are few predefined criteria (that is free memory, CPU idle time, and disk busy) based on which the failover node will be decided.

The DNP feature is enhanced in PowerHA SystemMirror 7 to support the user-defined criteria, wherein the criteria can be supplied by the user (user-specified method can return the value of the node during failover) and based on the values the failover node will be chosen dynamically.

Failback policies

- Failback to High Priority Node
- Never Fall Back

Support for custom resources

PowerHA SystemMirror 7 introduces a powerful framework for customers to plug into the HA decision-making process of PowerHA SystemMirror. Customers can check the health of a custom resource and send the information to PowerHA to control the decision making in relation to RG movements. Custom resource can be plugged into the RG so its processing order can be controlled.

The framework captures the details of the resource by adding a custom resource type to the PowerHA SystemMirror configuration. As part of the configuration, users would also specify the order of processing in the Resource Group. Custom resource is treated very similar to the standard resource management.

Middleware/application HA management

PowerHA SystemMirror 7 provides extensive support to the administrator to deploy and manage their application/middleware products from HA perspective. Out-of-the-box, ready-to-use HA agents allow for configuring the HA policy and come with robust middleware health monitoring methods. They also provide for starting and stopping the various middleware entities in the application stack. PowerHA SystemMirror 7 will support HA agents for the most common middleware products, including SAP, Enterprise Content Manager, Oracle, DB2, WebSphere, and TSM.

PowerHA SystemMirror supports an HA agent framework called *Smart Assist framework*. This framework provides for capabilities to develop an HA agent that can integrate with the PowerHA SystemMirror product and can perform the following key functions:

- **Discovery:** Aids in discovering the deployment of the concerned middleware across the nodes in the cluster and helps in configuring the HA policy for the middleware entities deployed across the cluster. Discovery covers end-to-end resource dependencies. (For example, middleware might depend on a set of volume groups. Those are discovered and included in the resource group definitions.)
- **HA management:** Smart Assist includes scripts to start, stop, and monitor the middleware entities. These methods are refined to adapt to the middleware characteristics to provide robust health monitoring capabilities.
- **Environment Verification:** As part of the daily active-standby node checks, additional checks are done for the middleware concerned.

Two of the key middleware stack supported by PowerHA SystemMirror V7 are described in some detail in the following sections.

Smart Assist for SAP

PowerHA SystemMirror 7.1 delivers a Smart Assist for High Availability management of some SAP software. This module discovers the SAP deployment in the cluster and helps customer define high availability policies for this stack. The Smart Assist agent contains discovery modules, start, stop, and monitor methods in relation to various subsystems in the stack (shared file systems, databases, application servers, and so on). Clients can use the Smart Assist for SAP through the PowerHA SystemMirror management interfaces to define the resource groups for configuring and managing high availability of the SAP deployment in the PowerHA cluster.

PowerHA SystemMirror HA management support for SAP includes the following:

- Support for ABAP and J2EE environment
- Support with DB2, Oracle, or MAXDB databases
- Support for LiveCache (MAXDB) based fast failover

For additional information on the SAP software supported, see the PowerHA System Mirror product documentation.

Smart Assist for enterprise content management - FileNet environment

The FileNet product from IBM provides for content management capabilities. Some of the features of FileNet product are:

- Discovers content from different sources (mail, documents)
- Organizes unstructured data
- Facilitates regulatory compliance
- Automated Business Process Management
- Content Life Cycle Management

A typical FileNet deployment consists of various engines being deployed on multiple nodes separate from the database. The deployments include shared disks and related resources. This setup is typically deployed in a cluster and inter-relationship between the entities must be managed. PowerHA SystemMirror helps achieve that goal. With the FileNet environment deployed in the PowerHA cluster, customers will be able to use the PowerHA included FileNet Smart Assist module. An administrator will be able to use the PowerHA user interfaces to discover the FileNet deployment in the cluster, and review the Smart Assist discovered dependencies and relationship, customize, if necessary, and then deploy the HA policy for the environment. This results in the PowerHA SystemMirror supplied health monitors being deployed for the various FileNet components and dependencies. Additionally, PowerHA SystemMirror verifies the active and standby environments to ensure that the failover environment is in sync with the primary environment. Smart Assist based user interfaces are available through SMIT as well as the IBM Systems Director.

PowerHA SystemMirror management interface in IBM Systems Director

Highlights

Integration with IBM Systems Director provides PowerHA SystemMirror with a world-class graphical and textual user interface. This new interface provides a single, centralized point of management for all SystemMirror clusters within your business. IBM Systems Director is highly accessible and easy to use, and is a common, unified interface for many IBM server offerings.

Description

Integration with IBM Systems Director provides SystemMirror with a world-class graphical and textual user interface. This new interface provides a secure, single, centralized point of management for all SystemMirror clusters within your business. IBM Systems Director is highly accessible and easy to use, and is a common, unified interface for many IBM STG offerings. These combined characteristics result in reduced training costs and simplified cluster administration. The IBM Systems Director plug-in for PowerHA SystemMirror provides smart assistance in setting up new clusters and application management via wizards, which offer a step-by-step guided approach to accomplishing these tasks. The SystemMirror Director interface also provides live status updates, which graphically display the status of resource groups, nodes, and clusters. A page is provided that summarizes status so that you can see the health of your entire enterprise in a single glance. A management interface is also provided for day-to-day management operations. This interface helps reduce user mistakes by providing a logical layout, smart options, and error detection, which help prevent problems from occurring. A command-line interface is also provided as part of the Director plug-in for PowerHA SystemMirror, which for the first time provides a single, centralized point of scripting control over multiple clusters.

Software requirements:

To take advantage of the new SystemMirror user interface, an IBM Systems Director 6.2 server is required. Refer to the IBM Systems Director documentation for information about its hardware and software requirements. An IBM Systems Director 6.2 agent is also required on each node. This agent is provided automatically with AIX 6.1 TL06 and AIX 7.1, and only needs to be installed as part of the base AIX installation, and activated.

The "clmgr" command-line unification utility is included as part of the base SystemMirror product for all editions. The only requirement it imposes is that in order to achieve full functionality, the SystemMirror C-SPOC files set must be installed.

Limitations:

In the IBM PowerHA SystemMirror 7.1 release, the IBM Systems Director integration does not include support for the PowerHA SystemMirror Enterprise Edition features.

In the IBM PowerHA SystemMirror 7.1 release, the unified command-line interface utility, "clmgr", does not include support for the SystemMirror Enterprise technologies.

PowerHA SystemMirror V7.1 does not provide IPv6 support. Clients who require this support are advised to use PowerHA SystemMirror V6.1.

SMIT interface simplification

The PowerHA SystemMirror SMIT menus have been restructured to simplify configuration and administration by grouping menus by function. For example, all cluster configuration and management operations related to the cluster topology, nodes, networks, and network interfaces is found under the "Cluster Nodes and Networks" menu. All configuration and management operations concerning applications and resource groups can be found under the "Cluster Applications and Resources" menu. Custom cluster configuration options that are not typically required or used by most customers but which provide extended flexibility in configuration and management options, are found under the Custom Cluster Configuration menu. The PowerHA SystemMirror SMIT menus can be reached with the new SMIT fastpath "smit sysmirror", or with the existing fast path "smit hacmp".

Accessibility by people with disabilities

A U.S. 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

Section 508 of the U.S. Rehabilitation Act

IBM PowerHA SystemMirror Standard Edition V7 and Enterprise Edition V6, when used in accordance with IBM's associated documentation, satisfies the applicable requirements of Section 508 of the Rehabilitation Act, provided that any assistive technology used with the product properly interoperates with it. A U.S. Section 508 Voluntary Product Accessibility Template (VPAT) can be requested at

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

Statement of direction

IBM intends to enhance PowerHA SystemMirror Enterprise Edition to exploit AIX Cluster Aware technologies.

All statements regarding IBM's future direction and intent are subject to change or withdrawal without notice, and represents goals and objectives only. Information regarding potential future products is intended to outline our general product direction and it should not be relied on in making a purchase decision. The information mentioned regarding potential future products is not a commitment, promise, or legal obligation to deliver any material, code, or functionality. Information about potential future products may not be incorporated into any contract. The development, release, and timing of any future features or functionality described for our products remains at our sole discretion.

All statements regarding IBM's plans, directions, and intent are subject to change or withdrawal without notice.

Program number

Program number	VRM	Program name
5765-H39	7.1	IBM PowerHA SystemMirror Standard edition
5765-H24	6.1	IBM PowerHA SystemMirror Enterprise edition Service Pack 3

Note: 5765-H24 is already announced.

Product identification number

Program PID number	Maintenance 1-year PID number	Maintenance 3-year PID number
5765-H39	5660-H23	5662-H23
5765-H24	5660-H24	5662-H24

Offering Information

Product information is available via the Offering Information Web site

<http://www.ibm.com/common/ssi>

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=210-198>

Publications

The IBM Publications Center

<http://www.ibm.com/shop/publications/order>

The Publications Center is a worldwide central repository for IBM product publications and marketing material with a catalog of 70,000 items. Extensive search facilities are provided. Payment options for orders are via credit card (in the U.S.) or customer number for 50 countries. A large number of publications are available online in various file formats, and they can all be downloaded by all countries, free of charge.

Technical information

Specified operating environment

Hardware requirements

IBM systems that run IBM POWER5, POWER6™, or POWER7™ technology-based processors, including the IBM Power Systems, System p®, System i®, System p5®, eServer™ p5, and eServer pSeries® server product lines.

Software requirements

Systems operating on AIX 6.1 are supported only when used within the system operating environments described in the appropriate hardware announcements and when used within the specified operating environment. When systems operating on AIX 6.1 are used with other software or software in later announcements, other limitations may be included.

The program's specifications and specified operating environment information may be found in documentation accompanying the program, if available, such as a readme file, or other information published by IBM, such as an announcement letter. Documentation and other program content may be supplied only in the English language.

Limitations

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<http://www.ibm.com/software/sla/sladb.nsf>

Planning information

Packaging

Your Proof of Entitlement (PoE) for this program is a copy of a paid sales receipt, purchase order, invoice, or other sales record from IBM or its authorized reseller from whom you acquired the program, provided that it states the license charge unit (the characteristics of intended use of the program, number of processors, number of users) and quantity acquired.

Information about how you may obtain program services will be provided by the party (either IBM or its authorized reseller) from whom you acquired the program.

Security, auditability, and control

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

Global Technology Services

Contact your IBM representative for the list of selected services available in your country, either as standard or customized offerings for the efficient installation, implementation, or integration of this product.

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To learn more about IBM Software Services or to contact a Software Services sales specialist, visit

<http://www.ibm.com/software/sw-services/>

Ordering information

Charge metric

Program name	Part number or PID number	Charge metric
IBM PowerHA SystemMirror Standard edition	5765-H39	Per Processor on Small, Medium, or Large Server
IBM PowerHA SystemMirror Enterprise edition	5765-H24	Per Processor on Small, Medium, or Large Server

Processor

A processor (commonly called a *CPU* or *core*) is the unit of measure by which this program is licensed. It is a functional unit within a computing device that interprets and executes instructions. A processor consists of at least an instruction control unit and one or more arithmetic or logic unit. With multicore technology, each core is considered a processor. A Proof of Entitlement (PoE) must be obtained for the appropriate number of processors based on the level of all processor cores activated and available for use by the program on the server.

Orders may be placed beginning with configurator availability.

For new orders, select from the following table:

5765-H39 IBM PowerHA SystemMirror Standard Edition V7.1		OTC feature number
Description		
Per Processor - Small, including 1 Year SWMA		0001
Per Processor - Medium, including 1 Year SWMA		0002
Upgrade small to medium		0003
Per Processor - Large, including 1 Year SWMA		0004
Upgrade small to large		0005
Upgrade medium to large		0006

The Software Maintenance programs and feature numbers for PowerHA Standard and Enterprise Editions V6.1 have been previously announced and priced.

Program number		Program description
PowerHA SystemMirror Standard Edition		
5660-H23	1.1.0	SW Maintenance Regist/Renewal 1 Year
5661-H23	1.1.0	SW Maintenance After License 1 Year
5662-H23	1.1.0	SW Maintenance Registration 3 Year
5663-H23	1.1.0	SW Maintenance Renewal 3 Year
5664-H23	1.1.0	SW Maintenance After License 3 Year
PowerHA SystemMirror Enterprise Edition		
5660-H24	1.1.0	SW Maintenance Regist/Renewal 1 Year
5661-H24	1.1.0	SW Maintenance After License 1 Year
5662-H24	1.1.0	SW Maintenance Registration 3 Year
5663-H24	1.1.0	SW Maintenance Renewal 3 Year
5664-H24	1.1.0	SW Maintenance After License 3 Year

Orders may be placed beginning with configurator availability.

This software license includes Software Maintenance, previously referred to as Software Subscription and Technical Support.

Extending coverage for a total of three years from the date of acquisition may be elected. Order the program number, feature number, and quantity to extend coverage for your software licenses. If maintenance has expired, specify the after license feature number.

Expedite feature for licensed programs and SWMA programs:

Program number	Description	Feature number
5765-H39	PowerHA SystemMirror Standard Edition	3445

System Program Order (SPO): An order for SPO 5692-A5L or 5692-A6P is mandatory for shipments of program distribution. The individual licensed program orders are for registration and billing purposes only. No shipment occurs under these orders.

Specify feature number 3435.

Machine-readable materials are only available on CD-ROM. To receive shipment of machine-readable materials, the order needs to include SPO 5692-A5L or 5692-A6P. The individual licensed program order (for example, 5765-H39) must still be ordered but will be for registration and billing purposes only and will not result in shipment of materials.

Program number	Program/Function name	Feature number
5692-A6P	PowerHA SystemMirror Standard Edition v7	2267
5692-A5L	PowerHA SystemMirror Standard Edition v7	2267

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hours), as well as access to updates, releases, and versions of the program as long as support is in effect.

License Information form number

The program's License Information will be available for review on the IBM Software License Agreement Web site

<http://www.ibm.com/software/sla/sladb.nsf>

Limited warranty applies

Yes

Limited warranty

IBM warrants that when the program is used in the specified operating environment, it will conform to its specifications. The warranty applies only to the unmodified portion of the program. IBM does not warrant uninterrupted or error-free operation of the program or that IBM will correct all program defects. You are responsible for the results obtained from the use of the program.

IBM provides you with access to IBM databases containing information on known program defects, defect corrections, restrictions, and bypasses at no additional charge. For further information, consult the IBM Software Support Handbook found at

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

IBM will maintain this information for at least one year after the original licensee acquires the program (warranty period).

Money-back guarantee

If for any reason you are dissatisfied with the program and you are the original licensee, you may obtain a refund of the amount you paid for it, if within 30 days of your invoice date you return the program and its PoE to the party from whom you obtained it. If you downloaded the program, you may contact the party from whom you acquired it for instructions on how to obtain the refund.

For clarification, note that for programs acquired under any of IBM's On/Off Capacity on Demand (On/Off CoD) software offerings, this term does not apply since these offerings apply to programs already acquired and in use by you.

Authorization for use on home/portable computer

You may not copy and use this program on another computer without paying additional license fees.

Volume orders (IVO)

Yes. Contact your IBM representative.

Passport Advantage applies

No

Software Subscription and Support applies

Yes. All distributed software licenses include Software Subscription and Support (also referred to as Software Maintenance) for a period of 12 months from the date of acquisition, providing a streamlined way to acquire IBM software and assure technical support coverage for all licenses. Extending coverage for a total of three years from date of acquisition may be elected.

While your Software Subscription and Support is in effect, IBM provides you assistance for your routine, short duration installation and usage (how-to) questions, and code-related questions. IBM provides assistance via telephone and, if available, electronic access, only to your information systems (IS) technical support personnel during the normal business hours (published prime shift hours) of your IBM support center. (This assistance is not available to your end users.) IBM provides Severity 1 assistance 24 hours a day, every day of the year. For additional details, consult your IBM Software Support Handbook at

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

Software Subscription and Support does not include assistance for the design and development of applications, your use of programs in other than their specified operating environment, or failures caused by products for which IBM is not responsible under this agreement.

For more information about the Passport Advantage Agreement, visit the Passport Advantage Web site at

<http://www.ibm.com/software/passportadvantage>

IBM Operational Support Services -- SoftwareXcel

No

IBM Operational Support Services -- SupportLine

No

System i Software Maintenance applies

No

Variable charges apply

Yes

Educational allowance available

Yes. A 15% education allowance applies to qualified education institution customers.

IBM Electronic Services

Electronic Service Agent™ and the IBM Electronic Support Web portal are dedicated to providing fast, exceptional support to IBM Systems customers. The IBM Electronic Service Agent tool is a no-additional-charge tool that proactively monitors and reports hardware events, such as system errors, performance issues, and inventory. The Electronic Service Agent tool can help you stay focused on your company's strategic business initiatives, save time, and spend less effort managing day-to-day IT maintenance issues. Servers enabled with this tool can be monitored remotely around the clock by IBM Support all at no additional cost to you.

Now integrated into the base operating system of AIX 5.3, AIX 6.1, and AIX 7.1, Electronic Service Agent is designed to automatically and electronically report system failures and utilization issues to IBM, which can result in faster problem resolution and increased availability. System configuration and inventory information collected by the Electronic Service Agent tool also can be viewed on the secure Electronic Support Web portal, and used to improve problem determination and resolution by you and the IBM support team. To access the tool main menu, simply type "smitty esa_main", and select "Configure Electronic Service Agent." In addition, ESA now includes a powerful Web user interface, giving the administrator easy access to status, tool settings, problem information, and filters. For more

information and documentation on how to configure and use Electronic Service Agent, refer to

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

The IBM Electronic Support portal is a single Internet entry point that replaces the multiple entry points traditionally used to access IBM Internet services and support. This portal enables you to gain easier access to IBM resources for assistance in resolving technical problems. The My Systems and Premium Search functions make it even easier for Electronic Service Agent tool-enabled customers to track system inventory and find pertinent fixes.

Benefits

Increased uptime: The Electronic Service Agent tool is designed to enhance the Warranty or Maintenance Agreement by providing faster hardware error reporting and uploading system information to IBM Support. This can translate to less wasted time monitoring the "symptoms," diagnosing the error, and manually calling IBM Support to open a problem record. Its 24 x 7 monitoring and reporting mean no more dependence on human intervention or off-hours customer personnel when errors are encountered in the middle of the night.

Security: The Electronic Service Agent tool is designed to be secure in monitoring, reporting, and storing the data at IBM. The Electronic Service Agent tool securely transmits either via the Internet (HTTPS or VPN) or modem, and can be configured to communicate securely through gateways to provide customers a single point of exit from their site. Communication is one way. Activating Electronic Service Agent does not enable IBM to call into a customer's system. System inventory information is stored in a secure database, which is protected behind IBM firewalls. It is viewable only by the customer and IBM. The customer's business applications or business data is never transmitted to IBM.

More accurate reporting: Since system information and error logs are automatically uploaded to the IBM Support center in conjunction with the service request, customers are not required to find and send system information, decreasing the risk of misreported or misdiagnosed errors. Once inside IBM, problem error data is run through a data knowledge management system and knowledge articles are appended to the problem record.

Customized support: Using the IBM ID entered during activation, customers can view system and support information in the "My Systems" and "Premium Search" sections of the Electronic Support Web site at

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

My Systems provides valuable reports of installed hardware and software using information collected from the systems by Electronic Service Agent. Reports are available for any system associated with the customer's IBM ID. Premium Search combines the function of search and the value of Electronic Service Agent information, providing advanced search of the technical support knowledgebase. Using Premium Search and the Electronic Service Agent information that has been collected from your system, customers are able to see search results that apply specifically to their systems.

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

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

Prices

For additional information and current prices, contact your local IBM representative.

For new orders, select from the following table:

Description	OTC feature number
5765-H39 IBM PowerHA SystemMirror Standard Edition v7.1	
Per Processor - Small, including 1 Year SWMA	0001
Per Processor - Medium, including 1 Year SWMA	0002
Upgrade small to medium	0003
Per Processor - Large, including 1 Year SWMA	0004
Upgrade small to large	0005
Upgrade medium to large	0006

The Software Maintenance programs and feature numbers for PowerHA Standard and Enterprise Editions V6.1 have been previously announced and priced.

Program number	Program description
PowerHA SystemMirror Standard Edition	
5660-H23 1.1.0	SW Maintenance Regist/Renewal 1 Year
5661-H23 1.1.0	SW Maintenance After License 1 Year
5662-H23 1.1.0	SW Maintenance Registration 3 Year
5663-H23 1.1.0	SW Maintenance Renewal 3 Year
5664-H23 1.1.0	SW Maintenance After License 3 Year
PowerHA SystemMirror Enterprise Edition	
5660-H24 1.1.0	SW Maintenance Regist/Renewal 1 Year
5661-H24 1.1.0	SW Maintenance After License 1 Year
5662-H24 1.1.0	SW Maintenance Registration 3 Year
5663-H24 1.1.0	SW Maintenance Renewal 3 Year
5664-H24 1.1.0	SW Maintenance After License 3 Year

Orders may be placed beginning with configurator availability.

This software license includes Software Maintenance, previously referred to as Software Subscription and Technical Support.

Extending coverage for a total of three years from the date of acquisition may be elected. Order the program number, feature number, and quantity to extend coverage for your software licenses. If maintenance has expired, specify the after license feature number.

Expedite feature for licensed programs and SWMA programs:

Program number	Description	Feature number
5765-H39	PowerHA SystemMirror Standard Edition	3445

System program order (SPO):

An order for SPO 5692-A5L or 5692-A6P is mandatory for shipments of program distribution. The individual licensed program orders are for registration and billing purposes only. No shipment occurs under these orders.

Specify feature number 3435.

Machine-readable materials are only available on CD-ROM. To receive shipment of machine-readable materials, the order needs to include SPO 5692-A5L or 5692-A6P. The individual licensed program order (for example, 5765-H39) must still be ordered but will be for registration and billing purposes only and will not result in shipment of materials.

Program number	Program/Function name	Feature number
5692-A6P	PowerHA SystemMirror Standard Edition v7	2267
5692-A5L	PowerHA SystemMirror Standard Edition v7	2267

Variable charges: The applicable processor-based one-time charge will be based on the group of the designated machine on which the program is licensed for use. If the program is designated to a processor in a group for which no charge is listed, the charge of the next higher group listed applies. For movement to a machine in a higher group, an upgrade charge equal to the difference in the then-current charges between the two groups will apply. For movement to a machine in a lower group, there will be no adjustment or refund of charges paid.

Program number	Description	Feature number	List Price
5765H39	per proc core S w/ 1y SWMA	0001	\$ 2,500
5765H39	per proc core M w/ 1y SWMA	0002	3,500
5765H39	U/G from S to M system	0003	1,000
5765H39	per proc core L w/ 1y SWMA	0004	4,500
5765H39	U/G from S to L system	0005	2,000
5765H39	U/G from M to L system	0006	1,000

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