# IBM PowerHA SystemMirror Standard Edition V7 and Enterprise Edition V7 help protect critical business applications from outages

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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 back up resources at remote locations.

New with this release, Enterprise Edition supports:

- Metro Mirror/Global Mirror in DS8700 and DS8800 configurations
- HyperSwap® in a Metro Mirror with DS8800 configuration
- Global Mirror/Metro in an SVC or V7000 configuration
- Global Mirror/Metro Mirror in an XIV® configuration
- 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

PowerHA SystemMirror for AIX introduces its next technology level Version 7.1.2 and includes the following key features

- Version 7.1.2 is available in Standard Edition as well as Enterprise Edition. The Enterprise Edition provides for Disaster Recovery solutions with both host based mirroring and storage-based mirroring.
- IPv6 support is enabled with this version for the Version 7 product.
- HyperSwap capability is introduced. HyperSwap with DS8800 storage subsystem provides for continuous availability against storage failures.
- Support for multisites Disaster Recovery management.
- Enhancements to graphical management interface to deploy and manage single and multisite cluster solutions.

PowerHA SystemMirror for AIX , V7.1 is the next generation of clustering solutions for high availability and disaster recover. Based on Cluster Aware AIX (CAA), the PowerHA SystemMirror Standard Edition and the PowerHA SystemMirror Enterprise Edition offerings represent a major shift in the traditional architectural concepts of building and managing clusters for high availability and disaster recovery. 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 internode messaging and synchronization, cluster-wide health management, multichannel redundancy, and multicasting communications (with the Standard Edition), PowerHA SystemMirror V7.1 makes data center operations for high availability simpler and more robust.

The PowerHA SystemMirror V7.1 offering introduces new capabilities that include stretched clusters and linked clusters, both of which enable kernel-level communications between geographically dispersed nodes for more robust configurations. The linked cluster topology has an independent cluster repository at the primary and secondary sites, which enables clients to have two data centers linked by unicasting. A stretched cluster configuration has a single repository and supports multicasting and multichannel communications.

The Version 7 clustering technology enables PowerHA SystemMirror V7.1 Enterprise Edition to support HyperSwap with the IBM System Storage® DS8800 and Metro Mirror replication. HyperSwap technology enables PowerHA Enterprise Edition clients to deploy two sites and two DS8800 storage units between sites in a cross-coupled configuration that provides production continuity through a storage failure.

In addition to integration with Cluster Aware AIX , PowerHA SystemMirror V7.1 Standard Edition features include:

- Centralized cluster repository for cluster-wide name space management and internode 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 portfolio supports IBM DB2® , IBM WebSphere® , IBM MQSeries® , Oracle, SAP, SAP MaxDB, Enterprise Content Manager, TSM, Lotus® Domino® Server, IBM LDAP, IBM HTTP printers, and FileNet® . PowerHA SystemMirror also includes Smart Assists to deploy and manage the SAP liveCache Hot Standby Solution.
- IPv6 is supported for both internal and external cluster communications.
- 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 7.1 Standard Edition and Enterprise Edition include the 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. The IBM Systems Director Server component of the PowerHA plugin can also be downloaded and installed by the customer.

PowerHA SystemMirror for AIX 7.1 highlights include:

- PowerHA SystemMirror V7.1 Enterprise Edition.
- Support for HyperSwap with the DS8800.
- Linked cluster technology for multisite unicast communications with independent cluster repositories.
- Stretched cluster technology for multisite multicast communications with a shared cluster repository.

- PowerHA SystemMirror enables key storage, network, and security capabilities of the stretched cluster and linked cluster topologies to be centrally administered. 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.
- Multisite install wizard for simplified setup of the PowerHA multisite cluster.

The PowerHA SystemMirror 7.1 Enterprise Edition also supports:

- IBM Storage Systems DS8800, SVC, V7000, and XIV with either Metro Mirror or Global Mirror, enabling automatic failover between geographically dispersed data centers.

## Key prerequisites

Refer to the Hardware requirements and Software requirements sections.

## Planned availability date

November 9, 2012

## PowerHA 7.1 SystemMirror : Next-generation high availability

PowerHA SystemMirror clustering technology has provided high availability and disaster recovery solutions for nearly two decades. PowerHA SystemMirror can support up to 16 AIX nodes and optimally manage the resources and resource groups in the cluster. PowerHA SystemMirror provides integrated and extensive support for various AIX features, including the storage management across the cluster.

PowerHA SystemMirror V7.1, builds on the next-generation clustering solutions for HA and disaster recovery (DR) clustering technology, featuring Cluster Aware AIX (CAA) and now extended to the PowerHA Enterprise Edition, enabling clients to build various types of geographically dispersed cluster configurations designed to address site outages and disaster recovery scenarios.

The internal architecture of the product was revamped with the introduction of PowerHA SystemMirror V7.1 Standard Edition. These architectural enhancements have now been extended to the Enterprise Edition. The overall objective has been to simplify HA/DR operations while making it more robust. The new features for PowerHA SystemMirror V7.1 have focused on the following areas:

- Simplification

  - Simplification of cluster topology management for geographically dispersed locations, also referred to as *multisite locations*
- Usability

  - New single command line tool designed to enhance the user experience
  - Easy-to-use graphical management interface
  - Simplified SMIT interfaces for easier navigation and management of the PowerHA SystemMirror product
- Enhanced HA management

  - Reliable health management through kernel-embedded topology management
  - Advanced event management framework and fine granular event generation and consumption for better HA decision making
- Robust, flexible multisite configurations

  The CAA technology has been extended to the Enterprise Edition clustering, enabling such benefits as kernel-level messaging and providing customer options

for cluster topologies. Clients now have the choice of implementing multiple sites through either stretch cluster or linked clusters.

The following sections describe the highlights of the various enhancements in PowerHA SystemMirror V7.1.

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

- IBM Director Management interfaces
- Resource management
- Central configuration
- Event management
- Stretched clusters
- Linked clusters

## Topology management

Topology management in PowerHA SystemMirror V7 has been revamped to provide a simpler, reliable foundation for the cluster formation and HA management in the data center as well as between sites. Note that topology management provides the very foundation of the cluster: Heartbeat and reliable messaging-related cluster communication infrastructure. Additionally, topology management aids in event generation and cluster-wide configuration management.

- Stretched clusters provide the capability to implement a multisite configuration with a shared repository and multicast communications. The stretched cluster configuration includes support for the popular Cross-Site Mirroring configuration through the Standard Edition and LVM mirroring as well as GLVM or storage-based replication topologies through the Enterprise Edition for greater geographic dispersion since a stretch cluster configuration requires multicasting and a shared repository disk is more suitable to synchronous replication distances.
- Linked clusters provide two independent sites connected through unicast communications, each with independent yet "linked" cluster repositories. These configurations are based upon either GLVM or storage replication configurations for data resiliency and can be either synchronous or asynchronous.
- HyperSwap - PowerHA 7.1 enables HyperSwap technology in Power Systems . HyperSwap provides for continuous availability of applications by protecting them from storage outages. HyperSwap configurations provide for robust HADR deployment with the IBM DS8800 storage server. This configuration is designed to provide multisite continuous availability in the event of a storage server outage, whether planned or unplanned. Underlying storage replication is based on Metro Mirror replication and is therefore synchronous.
- Communication between the nodes in the cluster are for continuous health monitoring as well as the internode messaging and synchronization. In the stretched cluster configuration, this is done through multicast communications, and in the linked cluster configuration, this is done through unicast communications, which synchronizes the repository content between the primary and secondary sites as well as provides heartbeat between the sites. A client may also choose to implement a unicast configuration between sites where the communications network will not support multicasting.
- Clustering infrastructure support: Tools and aids needed to help form and manage the cluster include the multisite installation wizard.

## 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 because they 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 is designed to provide protection against cluster partitioning.

For many data center environments, PowerHA SystemMirror 7.1 Standard Edition will use multicasting to implement multiple communication paths between the hosts in the cluster. For Enterprise Edition clients implementing a multisite configuration on top of storage or GLVM replication, unicast will be the communication approach through a linked cluster configuration. Linked clusters topology's supported will initially deploy heartbeats through TCP/IP connections, although architecturally SAN-based communications are a possible option in a future release of the product.

## Multichannel communications between hosts

PowerHA SystemMirror V7.1 Standard Edition, apart from exploiting the traditional network links for communication, also uniquely exploits the SAN links for communication purposes. Using the SAN links in the data center allows for an alternative high-speed physical channel for communication. For example, if the systems have two network adapters each for redundancy purposes and a 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
- Communication through shared central repository hard disk

The PowerHA SystemMirror Enterprise Edition, though architected for future exploitation of the SAN fabric, will initially use the traditional network links to conduct multisite cluster communications. However, just as with the Standard Edition, the cluster communication and heartbeat are now conducted at the kernel level.

The heartbeat management has been architected to make it simpler to configure in a robust framework for health management. The communication management is conducted from the AIX kernel as compared to the user space. PowerHA SystemMirror V7 and Cluster Aware AIX heart beating and messaging now is based on multicast packets for stretch cluster topologies and unicast packets for linked cluster topologies. A single packet transmitted by a node is received by the other nodes (and site in the case of a multisite configuration) participating in the cluster to know that the sending node A is healthy. Most of the cluster communication is done in the AIX kernel. Site A will conduct its multicast event management as will site B. In the event of a site outage, the unicast heartbeat will indicate loss of a site.

This approach 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 the kernel level also allows for messages to be sent 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.
- Primary and secondary site clusters are independently managing local cluster health while at the same time communicating between the sites. A cluster event can occur at a site without impacting the linked cluster between sites.

# AIX cluster awareness

AIX configuration and device management components of AIX are aware of the clustering and shared disks in the data center or of the disks in the stretched cluster and provide for ways to manage them better. For clients configuring a geographically dispersed or multisite cluster, there will be two topologies to choose from: a stretch cluster or a linked cluster. A stretch cluster will have a single repository disk, while a linked cluster will have a repository on the primary site and the secondary site.

## HyperSwap

A PowerHA SystemMirror Enterprise Edition and DS8800 storage multisite configuration is enabled that cross connects two sites in a linked or stretched cluster topology that enables the applications to continue through either a planned or unplanned storage server outage. If one of the storage servers goes offline, the other storage server continues storage operations with minimal disruption to the application environment. The DS8800 storage devices are coupled through Metro Mirror replication, and the production nodes are configured through either a stretched cluster configuration with a single repository and a multicast network or through two independent repositories in a linked cluster configuration with a unicast communication network.

## Central configuration

PowerHA and AIX 7 use a centralized disk for managing the data center cluster-related configuration. This disk, called *cluster repository* , is used for cluster-wide name space management and for managing the cluster configuration. The disk is also used to manage internode synchronization. Managing the configuration centrally allows for a better method of implementing cluster-related changes as well as helps in synchronization across the cluster. The repository configuration can be configured through a stretch cluster (one repository) or through a linked cluster (two independent repositories linked through communications to maintain synchronization of primary and secondary sites).

## Advanced event management

The 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 the kernel level. This kernel-level event allows for handling very dire conditions on any node. For example, loss of 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 V7 has been introduced. The 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. New policy choices in Version 7 provide flexibility in administering the resource groups across the various nodes in the cluster.

## Resource group relationship management

PowerHA SystemMirror supports several resource 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.

The following enhancements are introduced in PowerHA SystemMirror V7.1:

- 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 Resource Group (RG) decision framework

PowerHA SystemMirror supports different policies, including startup policies, failover policies, and fail back policies. These policies will decide the behavior of resource groups 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

Previously, 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 policy called "Failover Using Dynamic Node Priority" is being added in PowerHA SystemMirror V7. In the Dynamic Node Priority policy, there are few predefined criteria, such as free memory, CPU idle time, and disk busy, on which the failover node will be decided. The DNP feature is enhanced in PowerHA SystemMirror V7 to support the user-defined criteria wherein the criteria can be supplied by the user (the 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 resources 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 V7 provides extensive support to administrators to deploy and manage their application/middleware products from an 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 stacks supported by PowerHA SystemMirror V7 are described in detail in the following sections.

## Smart Assist for SAP

PowerHA SystemMirror V7.1 delivers a Smart Assist for High Availability management of some SAP software. This module discovers the SAP deployment in the cluster and helps customers 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, refer to the PowerHA SystemMirror product documentation.

## Smart Assist for enterprise content management - FILENET environment

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

- 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 interrelationships 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 relationships, customize them, 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

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 through 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.

## 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

## Section 508 of the US Rehabilitation Act

IBM PowerHA SystemMirror Standard Edition V7 and Enterprise Edition V7, when used in accordance with IBM's associated documentation, satisfy the applicable requirements of Section 508 of the Rehabilitation Act, provided that any assistive technology used with the product properly interoperates with it. A US 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 update IBM PowerHA SystemMirror Enterprise Edition V7 to support

- Select EMC storage subsystems that provide Symmetrix Remote Data Facility (SRDF) replication services
- Select Hitachi storage subsystems that provide TrueCopy or Universal replication services
- Select HP storage subsystems that provide Continuous Access Software replication services

IBM intends to enhance IBM PowerHA SystemMirror Enterprise Edition to provide tiebreaker capabilities for multisite solutions.

IBM's statements regarding its plans, directions, and intent are subject to change or withdrawal without notice at IBM's sole discretion. Information regarding potential future products is intended to outline our general product direction and it should not be relied on in making a purchasing 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.

## Program number

```
Program                    Program
number        VRM          name

5765-H37      7.1          IBM PowerHA SystemMirror Enterprise edition
5765-H39      7.1          IBM PowerHA SystemMirror Standard edition
```

### Product identification number

```
                     Maintenance        Maintenance
Program PID number   1-year PID number  3-year PID number

 5765-H39            5660-H23,5661-H23  5662-H23,5663-H23,5664-H23
 5765-H37            5660-H24,5661-H24  5662-H24,5663-H24,5664-H24

Note: The 5765-H39 and all of the SWMA PIDs listed here are
      already announced.
```

## Offering Information

Product information is available via the Offering Information website

   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=212-365

## 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 US) 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

PowerHA SystemMirror V7.1 supports upgrades from prior versions of the product, including PowerHA V5.5 and SystemMirror V6.1.

There are two general methods for upgrading:

- A dynamic upgrade from a prior release involves installing SystemMirror V7.1 on each node in the cluster while cluster services are active on other nodes. The version compatibility function allows you to upgrade the cluster one node at a time, without taking the entire cluster offline. Configuration data is retained.
- A static upgrade involves installing SystemMirror V7.1 on all nodes in the cluster at the same time. This means that at some point, cluster services and applications must be brought down on all nodes. With proper planning, the downtime can be minimized. Configuration information must be saved in the form of a cluster snapshot, then applied to the nodes after the new release is installed.

**Notes :**

- Although different releases of SystemMirror can coexist in a cluster temporarily, the version compatibility function is intended as a migration aide when moving from prior releases and is not intended to provide long-term compatibility between versions of the product in a production cluster.
- There is no dynamic upgrade option for existing customers using SystemMirror 710. SystemMirror 710 customers must plan for a static upgrade and the associated outages.

Customers migrating from prior releases of PowerHA SystemMirror that had deployed site configurations will need to convert their site definitions to the new linked cluster or stretched cluster features.

### 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*

PowerHA SystemMirror V7 is supported on AIX V6.1 and AIX V7.1 Operating Systems.

The specific software requirements for PowerHA SystemMirror V7.1.2 are as follows

- Software levels required

- OS: AIX 6.1 Technology Level 8 with Service Pack 1 or AIX 7.1 Technology Level 2 with Service Pack 1
- PowerHA SystemMirror 7.1.2 with Service Pack 1
- Additional software requirement for Enterprise Edition and HyperSwap
  - PowerHA SystemMirror 7.1.2 Service Pack 1 with APAR IV27586

To take advantage of the new SystemMirror user interface, an IBM Systems Director V6.3 server is required. Refer to the IBM Systems Director documentation for information about its hardware and software requirements. An IBM Systems Director V6.3 agent is also required on each node. This agent is provided automatically with AIX 6.1 TL08 and AIX 7.1 TL02, 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 fileset must be installed.

Systems operating on AIX 6.1 or AIX 7.1 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 or AIX 7.1 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.

## 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 are 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".

For additional information, refer to the Terms and conditions section of this announcement, or to the License Information document that is available on the IBM Software License Agreement website

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.

## Software Services

IBM Software Services has the breadth, depth, and reach to manage your services needs. You can leverage the deep technical skills of our lab-based, software services team and the business consulting, project management, and infrastructure expertise of our IBM Global Services team. Also, we extend our IBM Software Services reach through IBM Business Partners to provide an extensive portfolio of capabilities. Together, we provide the global reach, intellectual capital, industry insight, and technology leadership to support a wide range of critical business needs.

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-H37 | 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-H37  IBM PowerHA SystemMirror Enterprise Edition V7.1.2
```

| Description | OTC feature number |
|---|---|
| Per Processor - Small, including 1 Year SWMA | 0001 |
| Per Processor - Medium, including 1 Year SWMA | 0002 |
| Upgrade small to medium | 0004 |
| Per Processor - Large, including 1 Year SWMA | 0005 |
| Upgrade small to large | 0007 |
| Upgrade medium to large | 0008 |

```
         Upgrade from IBM PowerHA SystemMirror Standard Edition
         to PowerHA SystemMirror Enterprise Edition 5765-H37

                                                    OTC
                                                    feature
         Description                                number

         Per Processor - Upgrade from Standard Small      0017
         Per Processor - Upgrade from Standard Medium,    0018
         Per Processor - Upgrade from Standard Large      0019
```

The Software Maintenance programs and feature numbers for PowerHA Enterprise
Editions V7.1 have been previously announced and priced.

```
         Program
         number     Program description

         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:

```
                                                    Feature
      Program number   Description                  number

      5765-H39         PowerHA SystemMirror Standard Edition    3445
```

**System Program Order (SPO):** An order for SPO 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-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.

```
                                                    Feature
      Program number   Program/Function name        number

      5692-A6P         PowerHA SystemMirror Enterprise Edition V7   2268
```

## Terms and conditions

The information provided in this announcement letter is for reference and convenience purposes only. The terms and conditions that govern any transaction with IBM are contained in the applicable contract documents such as the IBM International Program License Agreement, IBM International Passport Advantage® Agreement, and the IBM Agreement for Acquisition of Software Maintenance.

### Licensing

IBM International Program License Agreement including the License Information document and Proof of Entitlement (PoE) govern your use of the program. PoEs are required for all authorized use.

This software license includes Software Subscription and Support (also referred to as Software Maintenance).

### Agreement for Acquisition of Software Maintenance

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### License Information form number

LC23-5096-00

### 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.

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

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### 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.

### 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 website at

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

### IBM Operational Support Services -- SoftwareXcel

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.

## Statement of good security practices

IT system security involves protecting systems and information through prevention, detection, and response to improper access from within and outside your enterprise. Improper access can result in information being altered, destroyed, or misappropriated or can result in misuse of your systems to attack others. Without a comprehensive approach to security, no IT system or product should be considered completely secure and no single product or security measure can be completely effective in preventing improper access. IBM systems and products are designed to be part of a comprehensive security approach, which will necessarily involve additional operational procedures, and may require other systems, products, or services to be most effective. IBM does not warrant that systems and products are immune from the malicious or illegal conduct of any party.

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

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To learn how Electronic Services can work for you, visit

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

## Prices

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

Orders may be placed beginning with configurator availability.

For new orders, select from the following table:

```
5765-H37  IBM PowerHA SystemMirror Enterprise Edition V7.1.2

                                                 OTC
                                                 feature
          Description                            number   OTC

          Per Processor - Small, including 1 Year SWMA     0001
```

```
        Per Processor - Medium, including 1 Year SWMA      0002
        Upgrade small to medium                            0004
        Per Processor - Large, including 1 Year SWMA       0005
        Upgrade small to large                             0007
        Upgrade medium to large                            0008


         Upgrade from IBM PowerHA SystemMirror Standard edition
        to PowerHA SystemMirror Enterprise edition 5765-H37


                                                  OTC
                                                  feature
        Description                               number    OTC

        Per Processor - Upgrade from Standard Small       0017
        Per Processor - Upgrade from Standard Medium,     0018
        Per Processor - Upgrade from Standard Large       0019
```

The Software Maintenance programs and feature numbers for PowerHA Enterprise Editions V7.1 have been previously announced and priced.

```
        Program
        number      Program description                         OTC

        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:

```
                                                Feature
        Program number  Description             number    OTC

        5765-H39        PowerHA SystemMirror Standard Edition    3445
```

**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.

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   ENUS-212-365-LIST_PRICES_2012_10_03.PDF

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```

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