IBM TotalStorage Enterprise Storage Server delivers PPRC over Fibre Channel and enhancements to the Enterprise Storage Server Application Programming Interface

Overview
IBM continues to demonstrate leadership in business continuance, offering Peer-to-Peer Remote Copy (PPRC) over Fibre Channel links for the IBM TotalStorage® Enterprise Storage Server™ (ESS), and enhancements to the ESS Application Programming Interface (ESS API).

The use of Fibre Channel as the communications link between the ESS PPRC primary and PPRC secondary machines drive business efficiency by enabling the exploitation of existing Fibre Channel infrastructure and capacity.

Compared to PPRC over ESCON® links, PPRC over Fibre Channel allows a reduction in the PPRC link infrastructure by a 4 to 1 ratio, while delivering equivalent or better performance.

The ESS API is enhanced to support Copy Services configuration and use for PPRC and FlashCopy®. It supports these activities through the use of the interface as defined by the Storage Networking Industry Association (SNIA) Storage Management Initiative Specification (SMI-S). These enhancements demonstrate IBM’s continued support for Common Information Model (CIM) and Web Based Enterprise Management (WBEM) technologies as the common interface for the discovery and management of resources in a multi-vendor storage area network.

Arrays Across Loops (AAL) is a new configuration option whereby disk arrays are spread across both loops on the SSA device adapter pair. AAL configurations can support up to a 1.8 times improvement in sequential bandwidth performance on a single array.

Additionally, many ESS users can potentially benefit from the following support enhancements:

- Asynchronous Cascading PPRC enhancements, exploiting failover and failback modes
- rpm intermix support among same-capacity disks, including Spare Upgrades (#219x)
- Turbo II Processor option, offering new levels of throughput and performance for high-capacity configurations

Planned availability dates
November 21, 2003:
- ESS LIC Level 2.3.0 including support for:
  - PPRC over Fibre Channel
  - ESS API support for Copy Services
  - Asynchronous Cascading PPRC enhancements
  - AAL (#9903)
  - Turbo II Processor option (#3607)

February 20, 2004:
- rpm intermix support among same-capacity disks
- Spare Upgrades (#219x)

At a glance
New features and functions for the IBM TotalStorage ESS are designed to help improve business continuity and performance:

- PPRC over Fibre Channel, enabling the use of Fibre Channel Protocol (FCP) as a communications link between the ESS PPRC primary and secondary machines
- ESS Application Programming Interface (ESS API) support for Copy Services configuration and use
- Arrays Across Loops (AAL), offering improved single array sequential bandwidth performance
- Asynchronous Cascading PPRC enhancements, exploiting failover and failback modes
- rpm intermix support among same-capacity disks
- Turbo II Processor option

Key prerequisites
All features and functions in this announcement require ESS Licensed Internal Code (LIC) Level 2.3.0, or later, except the Turbo II Processor option, which requires ESS LIC Level 2.1.1, or later.

Refer to the Hardware and software requirements section for additional information.
PPRC over Fibre Channel links drives business efficiency

PPRC over Fibre Channel links can help drive business efficiency by enabling exploitation of existing Fibre Channel infrastructure and capacity. Peer-to-Peer Remote Copy (PPRC) is a hardware-based disaster recovery solution designed to provide real-time mirroring of logical volumes between two ESSs. PPRC Version 2 is designed to provide Fibre Channel as the communications link between the PPRC primary and PPRC secondary machines. Compared to PPRC over ESCON links, PPRC over Fibre Channel allows a reduction in PPRC link infrastructure by a 4 to 1 ratio, while delivering equivalent or better performance. PPRC communication to the secondary control unit, via Fibre Channel, provides for a much faster interface compared to ESCON, particularly at long distances.

As in the current PPRC implementation, there will continue to be a maximum of eight paths per LSS to LSS relationship, and up to four secondary relationships per primary LSS. Within a single machine, you can run PPRC over both Fibre Channel and ESCON links, although the link type cannot be mixed within the same LSS. The Fibre Channel ports used for PPRC can be configured as either a dedicated PPRC link or as a shared port between PPRC and FCP data traffic.

Operational control for PPRC over Fibre Channel is provided by the ESS Specialist, ESS API, and Copy Services CLI.

For z/OS, operational control for PPRC over Fibre Channel is provided by ANTRQST API and TSO commands. ICKDSF provides operational control for PPRC over Fibre Channel for z/OS, VM, VSE, and stand-alone environments.

PPRC over Fibre Channel is supported on the ESS Model 800, and is provided with PPRC Version 2. PPRC Version 2 is an optional feature for the ESS (#85xx).


IBM enhances ESS API with support for Copy Services

The ESS continues to provide functions intended to help reduce the total cost of ownership and enable business continuance automation by enhancing the ESS API with Copy Services configuration and use for FlashCopy and PPRC. The ESS API supports routine LUN management activities, such as LUN creation, mapping, and masking. It now supports two Copy Services functions — FlashCopy and PPRC. It supports these activities through the use of the interface as defined by the Storage Networking Industry Association (SNIA) Storage Management Initiative Specification (SMI-S).

The ESS API is implemented through the IBM TotalStorage Common Information Model Agent (CIM Agent) for the ESS, a middleware application designed to provide a CIM-compliant interface. The CIM-compliant interface allows Tivoli® and third-party software management tools to discover, monitor, and control the ESS. These enhancements demonstrate IBM’s continued support for CIM and Web Based Enterprise Management (WBEM) technologies as the common interface for the discovery and management of resources in a multi-vendor storage area network.

The ESS API and CIM Agent are provided with the ESS at no additional charge. The CIM Agent is available for the AIX®, Linux, and Windows™ 2000 operating system environments.


Arrays Across Loops (AAL) improves subsystem bandwidth

AAL is a new configuration option whereby disk arrays are spread across two loops on the SSA device adapter pair. AAL allows you to take full advantage of the ESS subsystem bandwidth because a RAID array is built across two SSA loops within a device adapter pair. Each SSA loop provides up to 160 MB per second non-arbitrated bandwidth for data transfer. Providing access to two loops almost doubles the bandwidth capacity available to a RAID rank. z/OS logical volumes or open systems LUNs are striped across the data volumes of their associated RAID rank. Implementing AAL allows effective bandwidth, thus creating availability to multiple processes accessing a busy volume or LUN with high demand. This can help improve performance and reduce elapsed times especially for sequential batch and file maintenance. Overall, an AAL configuration can provide up to a 1.8 times improvement in sequential bandwidth performance on a single array, compared to non-AAL configurations.

AAL is supported on the ESS Model 800, and is an optional feature to the ESS (#9903).

Preview

IBM TotalStorage Enterprise Storage Server Expert (ESS Expert) plans to provide performance and capacity reporting for the ESS Model 800 with the AAL feature in the first half of 2004.

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

Copy Services enhancements

Asynchronous Cascading PPRC enables the creation of three-site or two-site long-distance PPRC configurations by allowing a PPRC secondary volume to also serve as a PPRC primary volume in another PPRC relationship. Asynchronous Cascading PPRC has been enhanced to exploit failover and fallback modes in a three-site solution. This can help reduce the time required to synchronize PPRC volumes after switching between sites during planned or unplanned outages.

These PPRC enhancements are supported on ESS Models 800, F20, and F10, and are provided with PPRC Version 2. PPRC Version 2 is an optional feature to the ESS (#85xx for the Model 800, and #185x for the Models F20 and F10).

Operational control is provided by the ESS Specialist, ESS API, and Copy Services CLI. ICKDSF also provides operational control for z/OS, VM, and VSE environments.

The ESS Copy Service Server, which resides on an ESS cluster, manages Copy Services functions among the ESSs within its domain. This function is enhanced with support for the following:

- Copy Services Domain support for up to eight ESSs, allowing additional flexibility.
• Copy Services Web enhancements offering server status notification. An alert is generated from the Copy Services server to the ESS to notify you that the Copy Services server is down or not responding.

These Copy Services Server enhancements are supported on ESS Models 800, F20, and F10.

rpm intermix support among same-capacity disks

The ESS now offers rpm intermix support among same-capacity disks. This enhancement provides additional flexibility by supporting the intermix of 15,000 rpm Disk Eight-Pack features with lower rpm disk eight-pack features of the same capacity on ESS Models 800, F10, and F20.

Disk Eight-Pack features of the same capacity but different rpm can be intermixed not only within a single ESS, but also within a Serial Storage Architecture (SSA) loop. When intermix occurs within an SSA loop, IBM recommends the purchase of 15,000 rpm Spare Upgrades (#219x). Refer to the Customer responsibilities section for more information.

Today’s announcement fulfills the rpm intermix support within same disk capacity Statement of General Direction in Hardware Announcement 102-118, dated April 23, 2002, IBM TotalStorage Enterprise Storage Server Enhances Performance — 15,000 rpm Disk Drives and Delivers New Solutions for Long Distance Copy, Hardware Announcement 102-201, dated July 15, 2002, IBM TotalStorage Enterprise Storage Server Model 800, and Hardware Announcement 103-037, dated February 17, 2003, IBM TotalStorage Enterprise Storage Server Delivers Bluefin Support (SNIA SMIS) with the ESS API, and Enhances Linux Support and Interoperability.

Turbo II Processor option offers improved performance

The Turbo II Processor option (feature number 3607), a follow-on replacement to the Turbo Processor (feature number 3606), offers up to a 30% improvement for high-hit ratio and high operations per second workloads as compared to the Standard Processor in an ESS Model 800. Processor option feature conversions are available to enable existing Model 800 machines to exploit this new enhancement.

Reference information


Trademarks

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Windows is a trademark of Microsoft Corporation.
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**Publications**

The following publication has been updated to reflect this announcement:

<table>
<thead>
<tr>
<th>Title</th>
<th>Order number</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM TotalStorage® Enterprise Storage Server Introduction and Planning Guide</td>
<td>GC26-7444</td>
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</tbody>
</table>

The following publication, as well as other publications shipped with the ESS, will be updated with the planned availability of the features and functions in this announcement:

<table>
<thead>
<tr>
<th>Title</th>
<th>Order number</th>
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</thead>
<tbody>
<tr>
<td>IBM TotalStorage Enterprise Storage Server Application Programming Interface Reference</td>
<td>GC35-0489</td>
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</table>

ESS publications are available at:


Publications can be ordered from your IBM representative, by direct order, or through the Publication Notification System (PNS) Web site at:


The Publications Center is a worldwide central repository for IBM product publications and marketing material. This site offers customized search functions to locate publications. This site also offers access to the Publication Notification System (PNS), a site where you can subscribe to receive e-mail notifications regarding new or revised publications that are of interest to you.

The Publications Center can be accessed at:


**Technical information**

**Specified operating environment**

**Hardware and software requirements:** The ESS ships with IBM LIC that is licensed for use by a customer on a specific machine, designated by serial number, under the terms and conditions of the IBM Customer Agreement or the IBM Agreement for Licensed Internal Code.

All features and functions in this announcement are supported on ESS Model 800 and require ESS LIC Level 2.3.0, or later, except as noted below.

- The Turbo II Processor options requires ESS LIC Level 2.1.1, or later.

The following functions are supported on ESS Models F10 and F20 and require ESS LIC Level 2.3.0, or later, except as noted below:

- ESS API support for Copy Services (requires ESS LIC level 2.1.1, or later)
- Asynchronous Cascading PPRC enhancements
- rpm intermix support among same-capacity disks
- Spare Upgrades (Model F20 only)

Refer to the ESS Interoperability Matrix for a list of interoperable environments and configurations, including minimum operating system levels for the functions included in this announcement:


**PPRC over Fibre Channel**

PPRC over Fibre Channel requires PPRC Version 2 (#85xx) and is supported on the ESS Model 800 with Fibre Channel/FICON™ host adapters (#3024 and #3025).

PPRC Version 2 must be purchased for both the primary and secondary ESS. In three-machine Asynchronous Cascading PPRC configurations, PPRC Version 2 must also be purchased for the intermediate ESS.

PPRC over Fibre Channel requires the installation of at least one Fibre Channel/FICON host adapter on each ESS in the PPRC configuration. For highest availability, IBM recommends that more than one Fibre Channel/FICON host adapter per ESS be used for the PPRC connectivity.

PPRC over Fibre Channel is supported with the use of SAN fabric products, DWDMs, and channel extenders. A current list of supported environments, configurations, networks, and products is available at:


Vendors should be consulted regarding hardware and software prerequisites when using their products in an ESS PPRC configuration. IBM is not responsible for third-party products.

**ESS API support for Copy Services**

The ESS API commands can be issued only to a Model 800 with ESS LIC Level 2.3.0, or later. If that Model 800 is configured as a Copy Services server, the ESS API can also be used to configure and use Copy Services on ESS Models 800, F20, and F10 residing within the Copy Services domain. Machines within the Copy Services domain require ESS LIC Level 2.1.1, or later.

**AAL**

For machines with the AAL feature enabled (#9903), Disk Eight-Packs must always be ordered in a quantity of four features of the same type.

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*This announcement is provided for your information only. For additional information, contact your IBM representative, call 800-IBM-4YOU, or visit the IBM home page at: http://www.ibm.com.*
When AAL is used in configurations with the Expansion Enclosure, Disk Eight-Pack Mounting Kits (feature numbers 2102 and 9102) must be ordered in pairs within the Expansion Enclosure.

AAL is not supported on machines with the Standby Capacity On Demand program. The IBM TotalStorage Enterprise Storage Server™ Expert (ESS Expert) is not supported on the ESS Model 800 with the AAL feature. Refer to the Description section for more information.

Planning information

Customer responsibilities

Physical configuration planning: Your disk marketing specialist can help you plan and select the ESS physical configuration and features. Introductory information, including required and optional features, can be found in the IBM TotalStorage Enterprise Storage Server Introduction and Planning Guide (GC26-7444).

Capacity and performance planning assistance is also available. Through the use of Disk Magic, your disk marketing specialist can help you plan and anticipate performance characteristics for specific workloads by modelling proposed configurations.

Installation planning: Installation planning is a customer responsibility. Information about planning the installation of your ESS, including equipment, site, and power requirements, can be found in the IBM TotalStorage Enterprise Storage Server Introduction and Planning Guide (GC26-7444).

Logical configuration planning and application: Logical configuration planning is a customer responsibility. Logical configuration refers to the creation of RAID ranks, volumes, and/or LUNs, and the assignment of the configured capacity to servers.

During the ESS installation, your disk marketing specialist can help you plan your initial logical configuration, and IBM will apply the logical configuration to the machine.

Following the ESS installation, all modifications to the logical configuration are a customer responsibility and can be performed using the ESS Specialist, ESS CLI, or ESS API. IBM Global Services will also modify the logical configuration (fee-based services).

Refer to the following publications for additional information:

- IBM TotalStorage Enterprise Storage Server Configuration Planner for Open Systems Hosts (SC26-7477)
- IBM TotalStorage Enterprise Storage Server Configuration Planner for S/390® and IBM @server zSeries® Hosts (SC26-7476)
- IBM TotalStorage Enterprise Storage Server Web Interface User’s Guide (SC26-7448)

AAL: To understand the benefits of AAL, refer to the AAL White Paper.

For machines with the AAL feature enabled, the following rules apply:

- A given set of Disk Eight-Packs are installed in sequence of highest capacity, highest speed to the lowest capacity, lowest speed. As a result, 72.8 GB, 15,000 rpm drives are installed before 72.8 GB, 10,000 rpm drives, or 36.4 GB, 15,000 rpm drives. A set is defined as a group of Disk Eight-Pack features installed on a new machine during the initial order or a group of Disk Eight-Pack features ordered on a capacity upgrade.

- Disk Eight-Packs are installed in pairs on the Serial Storage Architecture (SSA) loops. The installation is rotated through the SSA loops in the following sequence:
  - 1A, 1B, 2A, 2B, 3A, 3B, 4A, 4B.

- Disk Eight-Packs are installed in the Disk Eight-Pack Mounting Kit as follows:
  - Disk Eight-Pack numbers 1 - 16 are installed (evenly distributed) in the first and second Disk Eight-Pack Mounting Kits.
  - Disk Eight-Pack numbers 17 - 32 are installed (evenly distributed) in the third and fourth Disk Eight-Pack Mounting Kits.
  - Disk Eight-Pack numbers 33 - 48 are installed (evenly distributed) in the fifth and sixth Disk Eight-Pack Mounting Kits.

- A unique spare pool is established for each drive capacity on an SSA loop.
  - A spare pool must contain at least two drives.
  - If an SSA loop contains both RAID 5 and RAID 10 arrays, the spare pool might have three drives. The number of drives depends upon the sequence in which the arrays are configured.
  - Spares are not shared between SSA loops.

AAL is a plant install only feature. Requests to convert existing machines to an AAL configuration or to remove an AAL configuration will be processed through a priced ITS services contract. The conversion process is disruptive and data will not be preserved.

PPRC planning and implementation:

The implementation and use of PPRC requires appropriate planning. Detailed information is available in ESS publications, as well as in the following IBM Redbooks™:

- IBM TotalStorage Enterprise Storage Server: Implementing Copy Services in an Open Environment (SG24-5757)
- IBM TotalStorage Enterprise Storage Server: Implementing ESS Copy Services with IBM @server zSeries (SG24-5680)

Planning and implementation services for ESS copy services are offered by IBM Global Services (IGS). For additional information, contact your IBM representative or visit: http://www.ibm.com/services

When using channel extender products with PPRC, the channel extender vendor will determine the maximum distance supported between the primary and secondary ESS. Vendors should be contacted for their distance capability, line quality requirements, and WAN attachment capabilities.

When using PPRC over Fibre Channel as a synchronous copy solution, prior approval must be received from IBM if the distance between the primary and secondary ESS will exceed 103 km. Approval can be requested by submitting a Request for Price Quotation (RPO). The RPO should include information on distance between sites, the channel extension technology, the type of telecom line, the amount of network bandwidth, the ESS capacity, and a general description of the workload.
rpm intermix among same-capacity disks: Disk Eight-Pack features of the same capacity but different rpm can be intermixed not only within an ESS, but also within an SSA loop. When 15,000 rpm Disk Eight-Packs will be installed onto an SSA loop with logically configured Disk Eight-Packs of the same capacity but lower rpm, IBM recommends the purchase of the appropriate 15,000 rpm Spare Upgrade (#219x) as a corequisite to the purchase of the 15,000 rpm Disk Eight-Packs.

The Spare Upgrade feature contains two 15,000 rpm disk drives of the selected capacity and will be used to replace the lower rpm drives assigned to the spare pool on that SSA loop. Upgrading the spares to 15,000 rpm is necessary to help maintain the performance benefits offered by the 15,000 rpm drives. Failure to upgrade the spares when an intermix situation is first created can leave the machine vulnerable to performance degradation in the event of a 15,000 rpm drive failure.

Only the Models F20 and 800 with an Expansion Enclosure (#2100 for the Model F20 and #2110 for the Model 800) are subject to intermix within an SSA loop. Even for those models with an Expansion Enclosure, intermix within an SSA loop may not always occur. Your disk marketing specialist can help you determine whether your configuration is subject to rpm intermix within an SSA loop and can help you plan accordingly.

Support for rpm intermix among same-capacity disks is available only as field install. New ESS machine orders continue to be subject to the following limitation.

For a given capacity, the 15,000 rpm Disk Eight-Pack features (#214x and #215x) cannot be intermixed with lower rpm Disk Eight-Pack features (#212x and #213x) of the same capacity.

- #2142 and #2152 (18.2 GB, 15,000 rpm) cannot be intermixed with #2122 or #2132.
- #2143 and #2153 (36.4 GB, 15,000 rpm) cannot be intermixed with #2123 or #2133.
- #2144 and #2154 (72.8 GB, 15,000 rpm) cannot be intermixed with #2124 or #2134.

Additional information on rpm intermix considerations can be found in the IBM TotalStorage Enterprise Storage Server Introduction and Planning Guide (GC26-7444).

Cable orders: No cables required.

Direct customer support: Direct customer support for the 2105 ESS is provided by IBM Operational Support Services — SupportLine. This fee service can enhance your productivity by providing voice and electronic access into the IBM support organization. IBM Operational Support Services — SupportLine will help answer questions pertaining to product and feature usage (“how to”), configuration, and product compatibility for eligible products. For a list of the products supported via Support Line, visit the following Web site:

http://www.ibm.com/services/sl/products/

For more information on services, call 800-IBM-4YOU (426-4968).

Security, auditability, and control

This product uses the security and auditability features of the host hardware, host software, and/or application software to which it is attached.

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

Terms and conditions

This product is available for purchase under the terms of the IBM Customer Agreement.

IBM hardware products are manufactured from new parts and used parts. In some cases, the hardware product may have been previously installed. Regardless, IBM’s warranty terms apply.

MES discount applicable: No

Field installable feature: Yes

Warranty period: Three years

Customer setup: No

Licensed Internal Code: Same license terms and conditions as designated machine.

Prices

<table>
<thead>
<tr>
<th>Description</th>
<th>Feature number</th>
<th>Purchase price</th>
<th>MMMC</th>
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<tbody>
<tr>
<td>Machine type 2105, Model 800</td>
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<tr>
<td>Spare Upgrades:</td>
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<tr>
<td>Spare Upgrade — 18.2 GB</td>
<td>2192</td>
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<td>Spare Upgrade — 36.4 GB</td>
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<tr>
<td>Spare Upgrade — 72.8 GB</td>
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<td>(15,000 rpm)</td>
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<tr>
<td>Turbo II Processor</td>
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<td>Arrays Across Loops</td>
<td>9903</td>
<td>NC</td>
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Feature Purchase

Description number price  MMMC

Machine type 2105, Model F20

Spare Upgrades:

Spare Upgrade — 18.2 GB (15,000 rpm)  2192  $ 9,500  $ 10
Spare Upgrade — 36.4 GB (15,000 rpm)  2193  13,000  10
Spare Upgrade — 72.8 GB (15,000 rpm)  2194  21,000  10

MMMC = Minimum Monthly Maintenance Charge
NC = No Charge

Machine type 2105, Model 800

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<td>3606 to 3607</td>
<td>Turbo to Turbo II Processor</td>
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</table>

Note: Parts removed or replaced become the property of IBM and must be returned.

Order now

To order, contact the Americas Call Centers, your local IBM representative, or your IBM Business Partner.

To identify your local IBM representative or IBM Business Partner, call 800-IBM-4YOU (426-4968).

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Mail: The Americas Call Centers Dept. YE001
P.O. Box 2690
Atlanta, GA 30301-2690

Reference: YE001

The Americas Call Centers, our national direct marketing organization, can add your name to the mailing list for catalogs of IBM products.

Note: Shipments will begin after the planned availability date.

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