IBM System Storage TS7740 Virtualization Engine now supports three cluster grids, Copy Export for standalone clusters, and other upgrades

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At a glance

IBM System Storage TS7740 Virtualization Engine machine code Release 1.3 includes support for:

- Three cluster grids
- One million logical volumes
- Copy Export for standalone clusters
- Optical fiber adapter connections for Grid Communications
- Ordering Performance Throughput in increments from 100 MB/sec, up to 600+ MB/sec
- Upgrading from two to four FICON adapters
- Upgrading from one to three Cache Drawers
- Ordering additional Performance Throughput and Cache Enablement increments
- Host Console Request
- Converting standalone clusters to participate in a grid

IBM System Storage TS7740 Virtualization Engine machine code Release 1.4 includes support for:

- Copy Export for grid clusters
- TS7700 configurations with a one TS7740 Cache Controller and no TS7740 Cache Drawers
- TS7700 configurations with a single 1 TB Cache Enablement increment

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800-IBM-CALL Reference: ME001

Overview

IBM System Storage™ TS7740 Virtualization Engine™ machine code Release 1.3 delivers support for three cluster grids, one million logical volumes, Host Console Request, Copy Export for standalone clusters, and converting standalone clusters to participate in a grid.

New features and upgrades available with Release 1.3, designed to provide customers with greater solution options, include:

- Availability of optical fiber adapter connections for Grid Communications
Communications

- Upgrading from two to four FICON™ adapters
- Upgrading from one TS7740 Cache Drawer to three TS7740 Cache Drawers
- Ordering Performance Throughput in 100 MB/sec increments from 100 MB/sec up to 600+ MB/sec
- Ordering additional Performance Throughput and Cache Enablement increments

Copy Export for grid clusters, additional upgrades to convert standalone clusters to participate in a grid, TS7740 configurations with a single drawer of disk cache, and support for a minimum of one terabyte Cache Enablement are delivered with TS7740 Virtualization Engine machine code Release 1.4.

The IBM TotalStorage® 3494 Model B10 and Model B20 Virtual Tape Systems (VTS) have also been enhanced to support data migrations from certain VTS configurations to TS7740 Virtualization Engine configurations.

Key prerequisites

A TS7740 Virtualization Engine Server can attach to FICON channels on selected IBM System z™ servers with the appropriate levels of System z software. From four to sixteen 3592 tape drives (TS1120 Model E05 or 3592 Model J1A Tape Drives) in a TS3500 Tape Library must be attached to the TS7700 Virtualization Engine, or from four to twelve 3592 tape drives in a 3494 Tape Library must be attached to the TS7700 Virtualization Engine. An IBM 3953 Library Manager is required with the TS3500 Tape Library. Additional features may be required on the TS7700 Virtualization Engine components or automation frames. Refer to the Technical information section for details.

Planned availability dates

- August 31, 2007: Release 1.3 functions and features
- November 23, 2007: Release 1.4 functions

Description

The TS7740 Virtualization Engine machine code Release 1.3 delivers support for these capabilities:

- Three cluster grids
- One million logical volumes
- Copy Export for standalone clusters
- Optical fiber adapter connections for Grid Communications
- Host Console Requests
- Ordering Performance Throughput in 100 MB/sec increments up to 600+ MB/sec
- Secure Data Erase
- Purge Path Extended

The following upgrade capabilities are supported:

- Upgrading from two to four FICON adapters
- Upgrading from one TS7740 Cache Drawer to three TS7740 Cache Drawers
- Ordering additional Performance Throughput increments and Cache Enablement increments
- Selected scenarios for converting standalone clusters to participate in a grid
- Selected scenarios for migrating data from a VTS to a TS7700
- Converting FICON adapters from:
– Longwave to shortwave
– Shortwave to longwave
– 4 km longwave to 10 km longwave

The 3494 Model B10 and Model B20 Virtual Tape Systems (VTS) have also been enhanced to support data migrations from certain VTS configurations to TS7740 Virtualization Engine configurations.

The TS7740 Virtualization Engine machine code Release 1.4 delivers support for:

- Copy Export for grid clusters
- Additional scenarios for converting standalone clusters to participate in a grid
- Additional scenarios for migrating data from a VTS to a TS7700
- TS7700 configurations with a single TS7740 Cache Unit
- TS7700 configurations with a single 1 TB Cache Enablement increment

**Three cluster grid:** The maximum number of clusters supported in a TS7700 grid has been expanded to three.

A typical configuration would include two local clusters in the same building or metro area (within 100 Km) with connectivity to the same hosts, to support high availability needs. This will provide up to 512 virtual tape devices to these local hosts and support immediate copies between the local clusters, assuming sufficient network bandwidth is available. The third cluster can be installed at a remote site and receive primarily deferred copies. Immediate copies to this cluster would be reserved for critical volumes only, to help reduce the demand for network bandwidth and delays to job execution. Virtual devices are normally left offline at the remote site except for disaster recovery or disaster testing.

Another potential three cluster configuration could include two clusters in independent data centers. The hosts at one center do not connect to the TS7700 over FICON at the other center, and those two TS7700s would not replicate data between themselves. A third cluster could be located remotely from the two centers (which may be remote from each other) and be the target of primarily deferred copies for disaster recovery purposes.

In a three cluster grid configuration, two clusters can be placed in Service Mode. Generally, only one cluster is placed in Service Mode at a time to limit exposure to a potential single point of failure with the remaining cluster. Only one cluster can be in Service Prep at a time.

If all clusters go down, all clusters must come backup together to bring the grid online without assistance. If only two of three clusters are available, an IBM Service representative will have the ability to force the clusters online. If two clusters have been forced online, the third cluster should be able to enter the grid without being forced.

**One million logical volumes:** The logical volume limit is increased from 500,000 to one million. The logical volume limit is for the entire grid configuration, and is independent of the number of clusters in the grid. The number of logical volumes supported by a standalone cluster is also increased to one million.

**Copy Export:** This function provides support for the export of a copy of the data from a TS7700. With Release 1.3, Copy Export is only supported for standalone clusters. Copy Export for clusters in a grid will be supported with Release 1.4.

The export of a copy of the data from a TS7700 can be used for disaster recovery purposes, while the original data remains accessible by the production site. The Copy Export function builds on the existing capability to create a second copy of logical volumes on a secondary physical pool. During a copy export operation, all of the physical volumes with active data on them in a specified secondary pool are removed from the library associated with a specific TS7700 performing the operation. Only valid logical volumes resident on that TS7700 are considered during the execution of the operation. If they are in the cache, but have not yet been copied to the secondary pool, copies are performed as part of the copy export operation.

To restore access to the data on the physical volumes removed, all exported physical volumes for a source TS7700 are placed into a library that is attached to an empty TS7700. A disaster recovery procedure is then performed that restores access using the latest copy of the database.

If the TS7700 is in a grid configuration, only one of the TS7700 performs the copy export operation. Copies that have not been completed to that TS7700 are not considered during the
execution of the operation. During a disaster recovery operation using copy exported volumes, the data is restored to a standalone cluster. After the recovery is complete, a second cluster may be connected to the recovered cluster to reestablish the grid.

**Optical Fibre Adapter Connection for Grid Communications:** 1 Gbps Optical Shortwave (SW) adapter (feature number 1031) is available to be used for Grid Communications. With the availability of this feature, you have a choice of adapters for Grid Communications. You may choose 1 Gb Grid Copper Connection (feature number 1030) or 1 Gb Grid Optical SW Connection (feature number 1031).

**Host Console Request:** This function provides a host console command to request information about the current operational status of the TS7700, its logical and physical volumes, and its physical resources. The intent of the information is to allow an MVS™ console operator to perform basic problem determination without having to access a Web-based specialist. It is also intended to allow you to automate monitoring of the physical resources of the TS7700 using MVS facilities.

**Performance Throughput Increments:** 100 MB/sec Increment (feature number 5268) may now be ordered in any quantity from one to six, providing you the flexibility to tailor a solution to your specific performance needs.

Performance throughput capacity will be provided in terms of nominal 100 MB/sec increments measured as data transferred through the TS7740 Server in a cluster, prior to any effect of compression. Based on the number of increments installed, the TS7700 will limit the host data transfer rate evenly across all running jobs. All host data transfers through the cluster are taken into consideration for the data transfer limit regardless of the Tape Volume Cache cluster the data is sourced from or sent to.

The number of features installed dictates when the system will limit the total throughput. Throughput may also be limited by other factors, such as record block sizes, compression ratio, and host channel capabilities.

When the maximum number of increments are installed, the TS7700 does not limit the host data transfer rate.

The number of performance increments does not have to be the same on the different clusters in a TS7700 grid configuration.

**Secure Data Erase:** This function enables the secure data erasure reclamation policy. If an erasure is being performed on a 3592 tape drive and you or the CE needs to take the subsystem offline, the erasure can be cancelled without having to wait for it to complete. Cancelled erasures are automatically rescheduled when the system is brought back online.

The erasure function also takes into account whether a volume has been encrypted or not. If a volume has not been encrypted or only a portion of it was encrypted, the non-encrypted area of the volume is erased by loading it on a drive and having the drive perform a Data Security Erase operation. If all of the data area on a volume was encrypted, then instead of performing the Data Security Erase operation, the volume is loaded on a drive and the externally encrypted data key is erased from the media. Although the encrypted data remains on the cartridge, it is no longer accessible through normal processing methods.

**Purge Path Extended:** For System z, this capability enhances the reporting and understanding of failing channel, fabric, or adapter interfaces when link errors occur. Purge Path Extended support provides enhanced diagnostic reporting for errors on the TS7740’s FICON links.

**Converting or increasing the number of FICON adapters:** Existing TS7700 configurations with two FICON adapters (feature numbers 3441, 3442, or 3443) may be upgraded by adding two more FICON adapters. Existing FICON adapters may be converted from:

- Shortwave to longwave
- Longwave to shortwave
- Longwave 4 km to longwave 10 km

**Upgrading the number of Cache Drawers:** Existing TS7700 configurations with one TS7740 Cache Drawer (3956 Model CX6) may be upgraded by adding two more TS7740 Cache Drawers. This upgrade will increase the total usable disk cache from 3 TB to 6 TB.

**Upgrading the number of Performance Throughput and Cache Enablement increments:** Additional quantities of Cache Enablement (feature number 5267) and 100 MB/sec Increment (feature number 5268), also known as Performance Throughput, may be installed on an existing TS7700 configuration. The maximum quantity of each feature is six. There is no requirement to maintain equal quantities of feature number 5267 and feature number 5268 on a TS7700.
configuration.

**Upgrading a standalone cluster for Grid Communications:** The following grid MESs will be supported with release 1.3:

- Add an empty TS7700 cluster to an existing single cluster TS7700 to form a grid configuration.
- Add an empty third TS7700 cluster to an existing two cluster grid.

Release 1.4 includes support to:

- Merge two existing standalone clusters into a two cluster grid configuration.
- Merge an existing standalone cluster with an existing two cluster grid to form a three cluster grid.

**Migrating VTS data to TS7700:** Selected scenarios are supported to migrate from a 3494 Model B10 or B20 VTS to a TS7700. The TS7700 may not contain any user data. Every migration requires the VTS to use only 3592 backend tape drives and the VTS data must reside on 3592 media.

**Minimum cache configuration:** Release 1.4 supports TS7700 configurations with one drawer of disk cache using the TS7740 Cache Controller (3956 Model CC6). Prior to Release 1.4, the minimum configuration required two drawers of disk cache.

**Minimum Cache Enablement:** Release 1.4 supports TS7700 configurations with a single 1 TB Cache Enablement increment. The number of Cache Enablement increments may be increased as described in the section entitled Upgrading the number of Performance Throughput and Cache Enablement increments. Prior to Release 1.4, the minimum configuration required two 1 TB Cache Enablement increments.

**Previous releases:** Additional TS7700 functionality has been made available since the initial TS7700 announcement on August 29, 2006, and the 3592 Extended Media announcement on December 8, 2006. This additional functionality included support for:

- Ordering 1 TB Cache Enablement increments in any quantity from two to six
- TS7700 configurations containing one TS7740 Cache Drawer (3956 Model CX6)
- Out-of-Band Encryption by sub-pool
- Electronic Customer Care utilizing call home via broadband Internet
- TS7700 attachment to 3494 Tape Libraries

**Notes:** Optical fiber connections, Performance Throughput increments, Cache Enablement increments, FICON adapter upgrades, and cache drawer upgrades require specific TS7740 features. Data migration support requires specific VTS features. Refer to the Hardware requirements section for more details on these features.

All new and enhanced capabilities available in TS7740 Release 1.3 require machine code level 8.3.0.xxx, or later, to be installed on the TS7740 Server (3957 Model V06) and machine code level 535.0x, or later, to be installed on the Library Manager (either 3494 Model Lxx or 3953 Model L05). TS7740 Release 1.4 functionality requires TS7740 Server machine code level 8.4.0.xxx, or later, and Library Manager machine code level 535.1x, or later. TS7740 Server feature number 0521 may be used to order and expedite the delivery of the most current level of TS7740 machine code and the associated level of Library Manager machine code.

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**Product positioning**

The TS7700 Virtualization Engine tape solution is well suited for:

- Disaster backup
- Data consolidation
- Data protection
- Data sharing

The TS7700 is designed to provide the following benefits:
• Low operating costs, in areas such as:
  – Power
  – Maintenance
  – Operations and support staff
• Small batch window
• Small amount of floor space consumed by tape operations
• High operational quality
• High level of tape automation
• Excellent tape data availability
• Fast access to data
• Cross server data sharing
• Remote dual copy for use with:
  – Disaster backup and recovery
  – Remote tape vault

The TS7700 incorporates extensive self-management capabilities consistent with IBM on demand initiatives. These capabilities are designed to allow you to tailor the solution to your specific needs, to help reduce the cost of a TS7700 solution, and avoid the potential impact of human errors. A TS7700 can help improve the efficiency of mainframe tape operations by efficiently using disk storage, tape capacity, and tape speed, and by providing a large number of tape addresses. These benefits help make the TS7700 a suitable repository for local and remote backups, and archival data. The TS7700 can also help support your business intelligence initiatives by allowing shared volume access between mainframe platforms.

The TS7700 supports the Grid Communication feature for remote dual copy that you can use for disaster backup and recovery. With the Grid Communication feature, the TS7700 operates in a grid configuration by interconnecting two or three TS7700s and automatically maintaining volume copies in each TS7700. This option can help improve your sequential file data availability and recoverability. The redundant components of the TS7700 grid configuration can be separated, thus making it an excellent option for remote backup and recovery. If you have, or plan to have, a GDPS™ operation, a TS7700 cluster is compatible with GDPS and is well suited for the tape workload because of its remote dual copy capability. Alternatively, the entire TS7700 cluster can be used in a local environment to help improve data availability and recoverability. The TS7700 Grid Communication feature is the follow-on to the VTS Peer-to-Peer Copy feature.

The TS7700 uses disk storage and the unique performance and capacity of 3592 Tape Drives to help reduce the total cost of ownership of tape solutions for System z environments.

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).

BP Attachment for Announcement Letter 107-392


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The following publication, including support of the TS7740 Virtualization Engine™, are available at


<table>
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<th>Title</th>
<th>Order number</th>
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The IBM System Storage TS7740 Virtualization Engine Information Center is designed to provide comprehensive, browser-based information. It can help provide easy access to tasks, concepts, reference information, tutorials, and other product information. It contains assistance for the tasks that users must perform and links to additional information.

To find information, users can search, browse the contents, use the index, follow links from one topic to related topics, and print the topics they want to read offline. The information center is available at

http://publib.boulder.ibm.com/in focenter/ts7700ic/v1r0/index.jsp

The information center is also shipped with the product on CD.

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

**Technical information**

**Specified operating environment**

**Hardware requirements**: All new and enhanced capabilities available in TS7740 Release 1.3 require machine code level 8.3.0.xxx, or later to be installed on the TS7740 Server (3957 Model V06) and machine code level 535.0x to be installed on the Library Manager (either 3494 Model Lxx or 3953 Model L05). TS7740 Server feature #0521 may be used to order and expedite the delivery of the most current level of TS7740 machine code and the associated level of Library Manager machine code.
The configuration for a TS7740 Server (3957 Model V06) is updated to allow:

- A minimum quantity of one 100 MB/sec Increment, feature #5268. The previous minimum quantity for this feature was six.
- Two of either 1Gb Copper Grid Connection, feature #1030, or two of 1 Gb Optical Shortwave Grid Connection, feature #1031. Previously, two of feature #1030 were required.

Release 1.3 supports the following field upgrades to installed TS7700 configurations:

- Upgrading the number of FICON™ adapters — two FICON adapters (feature #3441, #3442, or #3443) may be added to an existing configuration with only two FICON adapters. It is not required for the new FICON adapters to be of the same type as the original two FICON adapters.
- Upgrading the number of Cache Drawers — the disk cache capacity of an existing TS7700 configuration with three terabytes of disk cache may be increased to the maximum capacity of six terabytes through the field installation of two TS7740 Cache Drawers (3955 Model CX6). Both new TS7740 Cache Drawers must be ordered with Field Merge CX6 in 3952 F05, feature #9355. Two of Field Install 3956 CX6, feature #5649, must be ordered on the customer-installed 3952 Model F05 Tape Frame.
- Upgrading the number of Cache Enablement and Performance Throughput Increments — existing TS7700 configurations with less than the maximum quantity of Cache Enablement increments, feature #5267, or less than the maximum quantity of 100 MB/Sec Increments, feature #5268, may be enhanced by field installation of additional feature increments in any quantity up to the combined plant and field installed maximum of six. There is no requirement for the number of #5267 and #5268 features to be equal; the total number of feature #5267 may be different (or equal to) the number of feature #5268.
- Grid Communications cluster upgrades — A standalone cluster may be enhanced to participate in Grid Communications through the field installation of Grid Communications, feature #4015, on the TS7740 Server (3957 Model V06). If the standalone cluster's existing Grid Communication adapters, features #1030 and #1031, were not connected to the IP network, they must be connected when feature #4015 is added. The customer is responsible for supplying the appropriate network cables. (Refer to 3957 Sales Manual for more information). A new TS7700 cluster must be ordered and shipped from the factory. This new cluster must also include feature #4015. During installation, it must be defined as a Grid Communication partner for the previously existing cluster.

An existing two cluster grid may also be enhanced by attaching a new TS7700 cluster ordered from the factory to create a three cluster grid. The new TS7700 requires feature #4015. Refer to the 3957 Sales Manual for additional information on the configuration requirements for a grid cluster.

Selected scenarios are supported to migrate from a 3494 Model B10 or B20 VTS to a TS7700. The TS7700 may not contain any user data. Every migration requires the VTS to use only 3592 backend tape drives and the VTS data must reside on 3592 media. Although VTS allows the use of either 2-Gbps or 4-Gbps fibre channel switches to connect to the backend tape drives, the TS7700 only supports 4-Gbps switches; 2-Gbps switches, previously connected to a VTS may not be reused with a TS7700. Feature #0522 supports migration scenarios where the TS7700 attaches to the same physical tape library the VTS was connected to. Feature #0523 supports migration scenarios where the TS7700 is attached to a different tape library than the VTS was connected to.

Release 1.3 supports the following migration scenarios when feature #0522 is ordered and installed on the VTS:

- A VTS attached to a 3584 Tape Library migrates to a TS7700 attached to the same 3584 Tape Library and 3953 Model F05 Tape Frame. One feature #9020 must be removed from the 3953 Tape Frame, and one feature #9013 must be added.
- A VTS attached to a 3494 Tape Library migrates to a TS7700 attached to the same 3494 Tape Library. Feature #9010 must be converted to feature #9013 on the 3494 Model D22 frame. One feature #9020 must be removed from the 3494 Model Lxx Library Manager, and one feature #9013 must be installed.
- A PtP VTS with each VTS attached to different 3584 Tape Libraries migrates to two grid attached TS7700s using the same 3584 Tape Libraries and 3953 Tape Frames. One feature #9020 must be removed from each 3953, and one feature #9013 must be added.
- A PtP VTS with each VTS attached to different 3494 Tape Libraries migrates to two grid
attached TS7700s using the same 3494 Tape Libraries. Feature #9010 must be converted to feature #9013 on each Model D22 frame. One feature #9020 must be removed from each 3494 Model Lxx Library Manager, and one feature #9013 must be installed.

- Two standalone VTSs, with each VTS attached to the same 3584 Tape Library, migrate to a single TS7700 attached to the same 3584 Tape Library and 3953 Tape Frame. Two of feature #9020 must be removed from the 3953, and one feature #9013 must be added.

Feature #0523 supports VTS migrations to TS7700 when the data cartridges are moved to a different library. The customer is responsible for moving the cartridges from the VTS's library to the TS7700's library. Release 1.3 supports the following migration scenarios when feature #0523 is ordered and installed on the VTS:

- A VTS attached to a 3494 Tape Library migrates to a TS7700 attached to a 3584 Tape Library. One feature #9010 must be removed from the 3494 Model D22 frame and one feature #9020 must be removed from the 3494 Model Lxx Library Manager. Feature #9013 must be added to the 3953 Model F05 Tape Frame.

- A PIP VTS with each VTS attached to different 3494 Tape Libraries migrates to two grid attached TS7700s attached to two 3953 Model F05 Tape Frames and 3584 Tape Libraries. One feature #9010 must be removed from each 3494 Model D22 frame and one feature #9020 must be removed from each 3494 Model Lxx Library Manager. Feature #9013 must be added to each 3953 Model F05 Tape Frame.

- Two standalone VTSs with each VTS attached to different 3494 Tape Libraries migrate to a single TS7700 attached to a 3953 Model F05 Tape Frame and a 3584 Tape Library. One feature #9010 must be removed from each 3494 Model D22 frame and one feature #9020 must be removed from each 3494 Model Lxx Library Manager. Feature #9013 must be added to the 3953 Model F05 Tape Frame.

For migration scenarios where the TS7700 attaches to the same 3494 Model D22 Tape Frame as the VTS, 3494 Model D22 feature #9010, Attached to VTS, should be converted to TS7700 Attach, feature #9013. When the TS7700 is attached to a different tape frame or tape library, feature #9010 should be removed from the 3494 Model D22. To successfully remove feature #9010, all tape drives must be removed from the Model D22 frame using feature #4772. These features must also be removed:

- Fibre Channel Switch Mount Kit, #3486
- 4Gb Fibre Channel Switch, #3488, or 2Gb Fibre Channel Switches, #3487

**Hardware requirements for Release 1.4**

All new and enhanced capabilities available in TS7740 Release 1.4 require machine code level 8.4.0.xxx, or later to be installed on the TS7740 Server (3957 Model V06) and machine code level 535.1x to be installed on the Library Manager (either 3494 Model Lxx or 3953 Model L05). Existing TS7740 Server feature #0521 may be used to order and expedite the delivery of the most current level of TS7740 machine code and the associated level of Library Manager machine code.

Release 1.4 supports the following migration scenarios when feature #0523 is ordered and installed on the VTS:

- A VTS attached to a 3584 Tape Library migrates to a TS7700 attached to a different 3584 Tape Library and 3953 Model F05 Tape Frame. One feature #9020 must be removed from the VTS's 3953 Tape Frame, and one feature #9013 must be added to the TS7700's 3953 Tape Frame.

- Two standalone VTSs with each VTS attached to a different 3584 Tape Library migrate to a single TS7700 attached to a 3584 Tape Library and 3953 Tape Frame. The TS7700's 3584 Tape Library may be the same as one of the VTS's 3584 Tape Library, or it may be different. Feature #9020 must be removed from each VTS's 3953 Tape Frame, and one feature #9013 must be added to the TS7700's 3953 Tape Frame. When the TS7700 will be attached to the same library as one of the VTSs, feature #0522 should be ordered on that VTS and feature #0523 should be ordered on the second VTS. When the TS7700 will be attached to a different library than either VTS, feature #0523 should be ordered on both VTSs.

The customer is responsible for moving the cartridges from the VTS's library to the TS7700's library for all migrations using feature #0523.
Release 1.4 supports the following field upgrades to installed TS7700 configurations:

- **Grid Communications cluster upgrades** — Release 1.4 supports merging a standalone cluster with an existing two-cluster grid to form a three-way grid. The standalone cluster requires the field installation of feature #4015, Grid Communications on the TS7740 Server (3957 Model V06). If the standalone cluster’s existing Grid Communication adapters, feature #1030 and #1031, were not connected to the IP network, they must be connected when feature #4015 is added. The customer is responsible for supplying the appropriate network cables. (Refer to the 3957 Sales Manual for more information). The combined total number of logical volumes, defined in the existing grid, and the standalone cluster must not exceed one million.

- Two existing standalone clusters may be connected with Grid Communications to form a two-cluster grid. Grid Communications, feature #4015, is required on each cluster. If the existing Grid Communication adapters, feature #1030 and #1031, were not connected to the IP network, they must be connected when feature #4015 is added. The customer is responsible for supplying the appropriate network cables. (Refer to the 3957 Sales Manual for more information). The combined total number of logical volumes, defined in the existing clusters, must not exceed one million.

**Software requirements:** Software support is available for System z™ FICON channel attachment to the TS7740 server. Operating system software support for the TS7700 is available for the following release levels:

<table>
<thead>
<tr>
<th>Operating system</th>
<th>Release level</th>
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<tbody>
<tr>
<td>z/OS (R)</td>
<td>V1R6, or later</td>
</tr>
<tr>
<td>z/VM (R)</td>
<td>V5.1.0, or later</td>
</tr>
<tr>
<td>z/VSE (R)</td>
<td>V3.1.2, or later</td>
</tr>
<tr>
<td>z/TPF</td>
<td>V1.1, or later</td>
</tr>
<tr>
<td>TPF</td>
<td>V4.1, or later</td>
</tr>
</tbody>
</table>

With z/OS, the TS7740 server is generally transparent to host software. In support of the TS7740 Release 1.3, host software support is provided for three-cluster grid, Host Console Request, and Copy Export support. Refer to APAR OA20065 for additional detail. In general, the recommendation is to install the host software support. Refer to the “VTS”, “PTP”, and “3957” PSP buckets for the latest information on Software Maintenance.

With z/VM, the TS7740 Server is transparent to host software. Host Console Request is not supported with z/VM.

- z/VM V5R1, or later, is required for both guest and native VM support.
- DFSMS/VM® Function Level 221 is required for native VM tape library support.
- EREP V3.5 plus PTFs is required.

With z/VSE, the TS7740 is transparent to host software. z/VSE supports the TS7740 as a standalone system in transparency mode. z/VSE V3.1.2, or later is required, with appropriate PTFs. Host Console Request and Copy Export are not supported in z/VSE.

With z/TPF and TPF V4.1, the TS7740 Server is supported in both a single node and a grid environment with the appropriate Software Maintenance. The category reserve and release functions are not supported in a grid environment. Host Console Request and Copy Export are not supported with z/TPF or TPF V4.1. These functions may be accessed from the z/OS system associated with TPF.

- z/TPF V1.1, or later
- TPF V4.1, or later

**Limitations:** The TS7740 Server, 3957 Model V06, must be located within 25 meters of the associated 3953 Library Manager Model L05 or 3494 Model Lxx Library Manager.

TS7700 configurations with a single disk cache drawer do not support upgrades that would add any number of TS7740 Cache Drawers (3956 Model CX6).

**Planning information**

**Customer responsibilities:** Physical planning is a customer responsibility. Detailed physical

It is the customer's responsibility to provide Cat 5e or Cat 6 cables to attach the 1Gb Grid Copper Connection (#1030) to the IP network when Grid Enablement (#4015) is installed. Cat 6 cables are recommended to avoid potential performance degradation with Cat 5e cables.

It is the customer's responsibility to provide multimode fiber cables to attach the 1Gb Grid Optical SW Connection (#1031) to the IP network when Grid Enablement (#4015) is installed.

It is the customer's responsibility to obtain the appropriate directors, adapters, and cables for FICON channel attachment. The customer is also responsible for ordering media. For information on which directors and channel extenders are supported, consult this link http://www.ibm.com/support/techdocs/atsmastr.nsf/webindex/FQ116133

To utilize the remote support facility, phone lines need to be installed close to the TS3500 Tape Library or TS7740 Server.

Cable orders: FICON cables for host attachment are available with features on the TS7740 Server (3957 Model V06).

Refer to the Cables section of the 3957 Model V06 Sales Manual for a list of available cable features.

Direct customer support: Eligible customers can obtain installation and usage assistance through ASK Support using the search words TS7700, TS7740, 3956, or 3957.

Supplies: None

Security, auditability, and control

This product uses the security and auditability features of 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

MES discount applicable: Equal to the volume commitment discount

Field installable feature: Yes

Warranty period: One year. This feature assumes the same warranty or maintenance terms as the machine in which it is installed for the full warranty or maintenance period announced for such machine.

Customer setup: No

Machine code: Same license terms and conditions as base machine

Prices

<table>
<thead>
<tr>
<th>Description</th>
<th>Machine type</th>
<th>Model</th>
<th>Feature number</th>
<th>Purchase price</th>
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<td>3494</td>
<td>B10, B20</td>
<td>0522</td>
<td>$8,890</td>
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Move VTS Database and Cartridges 3494 B10, B20 0523 8,890

1Gb Grid Optical SW Connection 3957 V06 1031 1,950

Field Install 3956 CX6 3952 F05 5649 7,500

Field Merge CX6 in 3952 F05 3956 CX6 9355 NC

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<th>Machine type</th>
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<td>9355</td>
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<td>N</td>
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If field installed on a purchased machine, parts removed or replaced become the property of IBM and must be returned.

**Feature conversion purchase price**

<table>
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<tr>
<th>Type</th>
<th>Feature From</th>
<th>Feature To</th>
<th>Returned parts</th>
<th>Continuous maintenance</th>
<th>Feature conversion purchase price</th>
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</table>

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

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**Note:** Shipments will begin after the planned availability date.

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