IBM Virtualization Engine TS7700 Release 3.1 delivers 8 Gb FICON adapter support, increased capacity, and other system enhancements

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**At a glance**

IBM® Virtualization Engine TS7700 Release 3.1 introduces support for:

- 8 Gb FICON® adapters for host attachment
- Up to eight FICON channel host attachments, doubling the previous number of channels available
- Up to 512 logical path definitions per FICON channel, doubling the previous number of logical paths per channel
- FlashCopy® for disaster recovery testing
- Support for a second TS7720 expansion frame attached to a TS7720 system for a total TS7720 system capacity up to 1 PB before compression
- New time-delayed replication policy

**Overview**

IBM Virtualization Engine TS7700 Release 3.1 is designed to increase the connectivity and maximum throughput of the TS7700 Virtualization Engine servers by adding support for 8 Gb dual-port FICON adapters and doubling the number of logical paths supported per port. Each adapter has one port active by default. An optional feature may be purchased to activate the second port on all installed 8 Gb FICON adapters. A memory upgrade feature must be installed in the TS7700 Virtualization Engine server to support the 8 Gb FICON adapters.

Other enhancements in TS7700 Release 3.1 include:

- FlashCopy for disaster recovery testing
- A time-delayed replication policy
- Support for a second TS7720 expansion frame attached to a TS7720 system for a total TS7720 system capacity up to 1 PB before compression

TS7700 Release 3.1 can only be installed on the TS7720 Model VEB and TS7740 Model V07. Release 3.1 is not supported on the previous generation of TS7700 models, TS7740 Model V06 and TS7720 Model VEA.
Key prerequisites

A TS7700 Virtualization Engine Server attaches to FICON channels on select IBM System z® servers with the appropriate levels of System z software. The host FICON channels must be capable of communicating at 2 Gbps, 4 Gbps, or 8 Gbps. A minimum of 32 GB RAM is required in the TS7700 server when 8 Gb FICON adapters are installed.

Four to sixteen 3592 tape drives in a TS3500 Tape Library must be attached to the TS7740 Virtualization Engine through specified Fibre Channel switches. Additional features may be required on the TS7700 Virtualization Engine components or tape library automation frames. Refer to the Technical information section for details.

TS7700 R3.1 machine code can only be installed on a TS7720 Model VEB or TS7740 Model V07. R3.1 machine code is not compatible with older server models.

Planned availability date

December 6, 2013

Availability of programs with an encryption algorithm in France is subject to French government approval.

Description

IBM Virtualization Engine TS7700 Release 3.1 is designed to deliver the following enhancements to the TS7700 family:

- Increased bandwidth and connectivity to System z hosts
- Increased maximum capacity of TS7720 systems
- Improved disaster recovery testing capability using flash copy
- Additional capabilities to manage data in the grid

TS7700 R3.1 is restricted to systems with Model VEB or Model V07 servers. Older generation servers may not upgrade to R3.1. If you have a Model VEA or Model V06 server and you wish to take advantage of the features and functions delivered in
R3.1, contact your IBM Sales Representative or your IBM Business Partner about replacing your server.

**8 Gb FICON**

TS7700 R3.1 introduces support for 8 Gb, dual-port FICON adapters, increasing the potential bandwidth to the System z host. Each adapter has one port active by default. These adapters may be attached to FICON channels supporting speeds of 2 Gbps, 4 Gbps, or 8 Gbps. Two or four 8 Gb FICON adapters may be installed in a TS7700 Server.

Existing configurations with Model V07 or Model VEB servers may replace all 4 Gb FICON adapters with 8 Gb FICON adapters. You may not intermix 4 Gb FICON adapters with 8 Gb FICON adapters in the same server.

All servers with 8 Gb FICON adapters require 32 GB of memory, an increase of 16 GB of memory to the default server configuration. This includes all field upgrades from 4 Gb to 8 Gb FICON. Feature number 3462 may be installed to provide this memory upgrade.

To further increase the available bandwidth to your TS7700 system, the second port on the 8 Gb dual-port adapters may be activated. To activate these ports, install feature number 3401 on your TS7700 server. A single instance of feature number 3401 will activate the second port on all 8 Gb FICON adapters installed. The enablement of the second port is a concurrent runtime upgrade. Once the feature is installed within the management interface, logical paths established down the second ports will be immediately available without a need to go offline.

R3.1 supports additional logical paths when 8 Gb FICON adapters are installed. Each 8 Gb FICON adapter port will support 512 logical paths, doubling the number of logical paths per port supported by the 4 Gb FICON adapters. A TS7700 with four 8 Gb adapters installed and with dual ports enabled will support a total of 4096 logical paths. 4 Gb FICON adapters will continue to be limited to 256 paths per port.

With the additional bandwidth and connectivity offered by 8 Gb FICON adapters, the maximum number of 100 MB/s throughput increments is increased. Up to 25 total throughput increments may be installed on any server with 8 Gb FICON adapters. Host throughput on servers with 25 increments installed will not be limited to 2,500 MB/s. TS7700 servers with 4 Gb FICON adapters installed will continue to be limited to 10 total throughput increments, and their host throughput will be unconstrained with 10 increments installed. The total number of throughput increments is the sum of features number 5268 plus number 9268.

**TS7720 Capacity**

Before compression, R3.1 supports over 1 PB of TS7720 capacity. The additional capacity is provided through the support of a second expansion frame in a TS7720 system. Traditionally, TS7720 configurations supported one expansion frame. R3.1 supports two expansion frames in a TS7720 system. The following configurations are supported in R3.1:

- TS7720 Encryption Capable Base Frame (Model F05 with feature number 7331) with 240 TB maximum capacity
  - Attach the first TS7720 Encryption Capable Expansion Frame (Model F05 with feature number 7331), providing 624 TB maximum system capacity.
  - Attach the second TS7720 Encryption Capable Expansion Frame, providing 1,007 TB maximum system capacity. The first TS7720 Encryption Capable Expansion Frame must be fully populated with fifteen Model XS9 drawers before the second expansion frame may be attached to the TS7720 system.
- TS7720 Base Frame (Model F05 with feature number 7322)
  - Attach one or two TS7720 Encryption Capable Expansion Frames, providing up to 384 TB additional capacity per expansion frame. The first TS7720 Encryption Capable Expansion Frame must be fully populated with fifteen Model XS9 drawers before the second expansion frame may be attached to the TS7720
system. The total system capacity is dependent on the capacity of the TS7720 Base Frame.

- TS7720 Base Frame with existing TS7720 Expansion Frame (Model F05 with feature number 7323)
  - Attach a TS7720 Encryption Capable Expansion Frame, providing up to 384 TB additional capacity. It is not required to fully populate the existing TS7720 Expansion Frame before attaching the TS7720 Encryption Capable Expansion Frame. The total system capacity is dependent on the capacity of the TS7720 Base Frame.

TS7720 systems with the second expansion frame RPQ installed may not attach a TS7720 Encryption Capable Expansion Frame.

**FlashCopy for Disaster Recovery Testing**

The most effective tests of disaster recovery (DR) procedures emulate true disaster scenarios as closely as possible. One major characteristic of a disaster is the unpredictable disruption that prevents volume consistency. The space efficient flash copy function included in TS7700 R3.1 is designed to allow customers to mimic the consistency, or inconsistency, of the DR site at time zero of a simulated disaster. Only data consistent within the DR site at time zero should be accessible to a DR test host. At the same time, most customers require their production data to continue to replicate during the DR test so that in the event of a true disaster, all data is replicated as designed.

To facilitate TS7700 flash copy, the user defines a "DR family" of one or more TS7700 clusters. DR families are independent of Cluster families used in some copy policies used prior to R3.1.

One step to establish the DR test environment is to enable write protection across all clusters in the DR family. This allows all DR family clusters to concurrently move to the write protected state at the same time. The clusters must have their write protection exclusion categories setup ahead of time and must be in agreement with each other.

Another step to establish the test environment is to perform a Volume Flash of the volume repository within all TS7720 clusters in a DR family. Volume Flash against a TS7740 is not supported in R3.1, although a TS7740 can still be a member of a DR family. When a Volume Flash occurs, all content in the TS7720 cache repositories receive a file system snapshot, providing an instant cloned point of isolation of the state of all files in the file system. Any changes to volumes from that point forward will be updated in the production file system, while the time zero view of the files remain unchanged and read only in the snapshot. This function is carried out among all TS7720 clusters in a DR family at the same time and is referred to as time zero. With these two steps complete, users may test their DR procedures using the snapshot, without interrupting the replication of production data to the clusters in the DR family. Once the DR test completes, the Volume Flash and all flashed tokens may be dissolved through a single command.

In a previous TS7700 release, Write Protect for DR Testing was introduced as a means to allow users to isolate volumes to be write protected during a DR test from volumes with full read-write access. Prior to R3.1, up to 16 categories defined to a DR TS7700 cluster could be excluded from write protection. Together with the FlashCopy function, the TS7700 DR test capabilities in R3.1 have been enhanced by doubling the maximum number of write protect exclusion categories to 32.

**Managing Data in the grid**

A new copy policy is introduced in R3.1 that defers replication until a specified number of hours has elapsed since volume creation. The specified elapsed time can be up to 65,535 hours. The new copy policy, referred to as 'T', for Time Delayed Copy, joins the existing copy policies 'S', 'R/I', 'D', and 'N'. One expected use for this copy policy is to a allow users with aggressive expire times on their volumes to avoid replication of nonessential volumes. By creating these volumes in a management class with the 'T' copy mode, many volumes can expire before the
delayed replication interval is reached. Only the small subset of volumes that do not expire before the defined interval will be replicated. This can greatly reduce the copy traffic on the grid network, as well as reduce excessive reclamation activity on TS7740 target clusters.

Accessibility by people with disabilities

A US Section 508 Voluntary Product Accessibility Template (VPAT) containing details on accessibility compliance can be requested at


Product positioning

The TS7700 virtual tape solution is well-suited for:

- Single or multi-site disaster recovery
- Single or multi-site data consolidation
- Single or multi-site continuous data protection
- Single or multi-site data sharing

The TS7700 is designed to provide the following benefits:

- Attachment to tape libraries (TS7740) or disk cache only (TS7720) virtual tape storage
- Ability to help lower operating costs in areas such as:
  - Power
  - Maintenance
  - Operations and support staff
- Batch window reduction
- Reduction in the amount of floor space consumed by data protection operations
- Automated tape operation
- High data availability
- Data security through disk-based encryption (TS7720 and TS7740) and support for physical tape encryption (TS7740)
- Ability to provide fast access to data
- Cross server System z data sharing
- Remote replication for use with:
  - Geographically Dispersed Parallel Sysplex™ (GDPS®)
  - 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 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 with near continuous data protection with automated failover and recovery.

The TS7740 model uses disk storage with the performance and capacity of TS1140 tape drives to help reduce the total cost of ownership of tape solutions for System z environments. The TS7720 model uses large capacity disk drives to deliver high-capacity repositories for customers with rapid recall requirements.
Multiple interconnected TS7700 systems (called clusters) use the Grid Communication feature for business continuance through metro and global volume replication. With the Grid Communication feature, a TS7700 system operates in a grid configuration by interconnecting up to six TS7700s, automatically maintaining one to six volume replicas within the grid and delivering a flexible set of options for business continuance and hierarchal storage management. The redundant components of the TS7700 grid configuration can be separated, making it an excellent option for replication and disaster recovery, as well as local and metro availability. 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 replication capability. Alternatively, the entire TS7700 cluster can be used in a local environment to help improve data availability and recoverability.

### Product number

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### Publications

The following TS7700 Virtualization Engine publication is now available:

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<tr>
<td>IBM Virtualization Engine TS7700 Series Introduction and Planning Guide</td>
<td>GA32-0567</td>
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To order, contact your IBM representative or access it on the web at


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http://www.ibm.com/services/continuity

For details on education offerings related to specific products, visit


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

Technical information

Specified operating environment

Homologation

This product is not certified for direct connection by any means whatsoever to interfaces of public telecommunications networks. Certification may be required by law prior to making any such connection. Contact an IBM representative or reseller for any questions.
Hardware requirements

TS7720 Minimum configuration with R3.1 Machine Code

- One 3952 Tape Frame Model F05 with the following required features:
  - TS7720 Encryption Capable Base Frame (#7331)
  - Plant Install 3957 VEB (#5627)
  - Plant Install 3956 CS9 (#5651)
  - Integrated Control Path (#5758)
  - Dual AC Power (#1903)
  - Ship with R3.1 Machine Code (#9114)
  - A power cord appropriate for the country of installation must be selected from feature #9954 through #9959, or #9966

- One TS7720 Server (3957 Model VEB) with the following required features:
  - 100MB/sec Throughput - Plant (#9268)
  - Mainframe Attach (#9000)
  - Ship with R3.1 Machine Code (#9114)
  - Plant Install in 3952 F05 (#9350)
  - Two of either 10 Gb Grid Optical LW Connection (#1035), 1 Gb Grid Dual Port Copper Connection (#1036), or 1 Gb Grid Dual Optical SW Connection (#1037)
  - Either two of host to Virtualization Engine FICON cables (#0201 or #0203) or one No Factory Cables (#9700)
  - Two FICON adapters chosen from the list below:
    - Two of FICON Shortwave Attachment (#3441)
    - Two of FICON Longwave Attachment (#3442)
    - Two of FICON 10 km Longwave Attachment (#3443)
    - Two of 8 Gb FICON Shortwave Attachment (#3438) with one Memory Upgrade (#3462)
    - Two of 8 Gb FICON Longwave Attachment (#3439) with one Memory Upgrade (#3462)
  - Console Attachment (#2715)
    - The obsolete TotalStorage Master Console for Service (#2713) does not support TS7700 solutions. 3957 Model VEB feature #2715 may not be attached to a TotalStorage Master Console for Service (#2713).
    - The TS3000 System Console (#2721) may be installed on 3953 Model F05, connecting to the TS7720 Server using Console Attachment (#2715).
    - The TS3000 System Console (#2730 and #2719) or TS3000 System Console with Internal Modem (#2732 and #2733) or Rackmount TS3000 System Console with USB modem (#2724 and #2734) may be installed on 3952 Tape Frame Model F05, connecting to the TS7720 Server using Console Attachment (#2715).
    - When feature number 2715 is installed on 3957 Model VEB, the Console Upgrade (#2719) is required on the machine type model where feature #2718, #2720, #2721, or #2730 is installed.

- One TS7720 Cache Controller (3956 Model CS9) with the following required features:
  - 36 TB SAS Storage (#7115)
  - Encryption (#7404)
  - Plant Install in 3952 F05 (#9352)

Refer to Hardware Announcement ZG11-0079, dated May 09, 2011, for the minimum configuration requirements for Machine Code R2.0/R2.1.
**TS7720 upgrades**

The following options may be installed to modify the minimum TS7720 Encryption capable configuration:

- **3952 Tape Frame Model F05**
  - TS3000 System Console (TSSC) (#2732) with Internal Modem (#2733) or Rackmount TS3000 System Console (TSSC) (#2724) with USB Modem (#2734)
  - Redundant Power (#1904) is required when TSSC features are installed

- **TS7720 Server (3957 Model VEB)**
  - Grid Enablement (#4015) allows this TS7700 Server to communicate to other TS7700 servers through the grid. Grid Enablement must be installed on each TS7700 Server that participates in the communication grid. The customer must provide appropriate Ethernet cables to attach the Grid Connection adapters (#1036 or #1037) to the communication grid when Grid Enablement (#4015) is installed.
  - Remove Cluster from a Grid (#4016) provides instructions to remove a cluster from a grid one time only. If the cluster rejoins a grid, and is to be removed from that grid in the future, another instance of #4016 must be purchased. #4016 is Field Install only. Up to 99 instances of #4016 may be ordered for a single TS7720 server.
  - Cluster Cleanup (#4017) facilitates a one time cluster cleanup. If the cluster is configured with #4015, Remove Cluster from a Grid (#4016) must be performed before Cluster Cleanup. Each instance of #4017 provides a single cleanup operation. If the cluster is returned to production, and requires cleanup in the future, another instance of #4017 must be purchased. #4017 is for Field Install only. Up to 99 instances of #4017 may be ordered for a single TS7720 server.
  - Enable Dual Port Grid Connections (#1034) activates the second port on the dual port grid adapters (#1036 or #1037) to provide four active 1 Gb Ethernet links for Grid communications.
  - Two additional FICON attachments may be installed to provide a total of four FICON attachments on the TS7700 Server. Valid total quantities of FICON Shortwave Attachment (#3441), FICON Longwave Attachment (#3442), FICON 10 km Longwave Attachment (#3443), 8 Gb FICON Shortwave Attachment (#3438), and 8 Gb FICON Longwave Attachment (#3439) are two or four. Features #3438 and #3439 are mutually exclusive with features #3441, #3442, and #3443.
  - Enable 8 Gb FICON Second Port (#3401) may be used to activate both ports on every 8 Gb FICON adapter installed in the server.
  - Additional 100MB/sec Increment (#5268) may be installed. When features #3441, #3442, or #3443 are installed in the TS7720 Server, the maximum number of #5268 is nine. When features #3438 or #3439 are installed in the TS7720 Server, the maximum number of #5268 is twenty-four.
  - Additional increments of 200,000 logical volumes, Increased Logical Volumes (#5270), may be installed, up to a maximum quantity of 15.
  - Selective Device Access Control (#5271) may be installed.
  - Enable Disk Encryption (#5272) may be installed, only if the Model CS9 TS7720 Cache Controller is the only disk controller installed in the TS7720 system.
  - When #5272 is installed on the Model VEB server, Encryption (#7404) is required on all 3956 Cache Controller Model CS9 and 3956 Cache Modules Model XS9 in the TS7720 system.

- **TS7720 Cache Drawer**
  - Up to nine 3956 Cache Drawers Model XS9 may be installed in the F05 frame with #7331. To include Model XS9s in a new cluster coming from the plant, include feature #9354, Plant Install in F05, on each 3956 Model XS9, and include one feature #5655, Plant Install 3956 XS9, on the 3952 Model F05 for each XS9.
Refer to Hardware Announcement ZG11-0079, dated May 09, 2011, for the upgrade options on systems running Machine Code R2.0/R2.1.

**TS7720 Encryption Capable Expansion frame**

One or two TS7720 Encryption Capable Expansion frames may be attached to a TS7720 base frame running R3.1 machine code, using the following configurations:

- **On a TS7720 encryption capable base frame (3952 Tape Frame Model F05 with feature #7331), the following features are required in addition to the minimum configuration and optional requirements defined above:**
  - One of Expansion Frame Attach (#9323) for each expansion frame attached
  - Nine of #5655 plus one #5656 are required

- **On a TS7720 base frame (3952 Tape Frame Model F05 with feature #7322), the following features are required in addition to the minimum configuration and optional requirements defined above:**
  - One of Expansion Frame Attach (#9323) for each expansion frame attached

- **On the TS7720 Server (3957 Model VEB) installed in the TS7720 base frame (3952 Tape Frame Model F05 with features #9323 and either #7322 or #7331), the following features are required in addition to the minimum configuration and optional requirements defined above:**
  - Dual Port FC HBA (#5241) on the 3957 Model VEB

- **One 3952 Tape Frame Model F05 with the following required features:**
  - TS7720 Encryption Capable Expansion Frame (#7332)
  - One of Plant Install 3956 CS9 (#5651)
  - Zero to fifteen of Plant Install 3956 XS9 (#5655)
  - Zero to fifteen of Field Install 3956 XS9 (#5656)

  **Note:** Valid quantities of #5655 plus #5656 are zero to fifteen.
  - Dual AC Power (#1903)
  - A power cord appropriate for the country of installation must be selected from feature #9954 through #9959, or #9966

- **When a second expansion frame is attached to a system with one TS7720 Encryption Capable Expansion Frame (3952 Model F05 feature #7332), the first expansion frame must contain fifteen Model XS9 Expansion Modules, and the TS7720 Server Model VEB must be installed in the TS7720 Base Frame. Other configuration rules for the #7332 expansion frame are unchanged.**

- **When a TS7720 Encryption Capable Expansion Frame (3952 Model F05 feature #7332), is attached to a TS7720 Base Frame (3952 Model F05 feature #7322) with one TS7720 Expansion Frame (3952 Model F05 feature #7323), the first expansion frame may contain zero to ten Model XS7 Expansion Modules. Other configuration rules for the #7332 expansion frame are unchanged.**

**TS7740 minimum configuration with R3.1 machine code**

- **One 3952 Tape Frame Model F05 with the following required features:**
  - TS7740 Base Frame (#7330)
  - Install 3957 V07 (#5629)
  - Plant Install 3956 CC9 (#5652)
  - Integrated Control Path (#5758)
  - Dual AC Power (#1903)
  - Ship with R3.1 Machine Code (#9114)
  - A power cord appropriate for the country of installation must be selected from features #9954 through #9959, or #9966

- **One TS7740 Server (3957 Model V07) with the following required features:**
  - One of 1 TB Cache Enablement (#5267)
- One of 100MB/sec Increment (#5268)
- Dual Port FC HBA (#5241)
- Mainframe Attach (#9000)
- Ship with R3.1 Machine Code (#9114)
- Attach to TS3500 (#9219)
- Plant Install in F05 (#9350)
- Two of either 10 Gb Grid Optical LW Connection (#1035), 1 Gb Grid Dual Port Copper Connection (#1036), or 1 Gb Grid Dual Optical SW Connection (#1037)
- Either two of host to Virtualization Engine FICON cables (#0201 or #0203) or one No Factory Cables (#9700)
- Two FICON adapters chosen from the list below:
  -- Two of FICON Shortwave Attachment (#3441)
  -- Two of FICON Longwave Attachment (#3442)
  -- Two of FICON 10 km Longwave Attachment (#3443)
  -- Two of 8 Gb FICON Shortwave Attachment (#3438) with one Memory Upgrade (#3462)
  -- Two of 8 Gb FICON Longwave Attachment (#3439) with one Memory Upgrade (#3462)
- Console Attachment (#2715)
  -- The obsolete TotalStorage Master Console for Service (#2713) does not support TS7700 solutions. 3957 Model V07 feature #2715 may not be attached to a TotalStorage Master Console for Service (#2713).
  -- The TS3000 System Console (#2730 and #2719) or TS3000 System Console with Internal Modem (#2732 and #2733) or Rackmount TS3000 System Console with USB modem (#2724 and #2734) may be installed on 3952 Tape Frame Model F05, connecting to the TS7740 Server using Console Attachment (#2715).
  -- When feature numbers 2714 or 2715 are installed on 3957 Model V07, the Console Upgrade (#2719) is required on the machine type model where feature #2718, #2720, #2721, or #2730 is installed.
- One TS7740 Cache Controller (3956 Model CC9) with the following required features:
  - 13.2 TB SAS Storage (#7124)
  - Plant Install in 3952 F05 (#9352)
- Two 4 Gb or 8 Gb Fibre Channel switches are required:
  - Both switches must be the same type; mixing one 4 Gb switch with one 8 Gb switch is not supported
  - To install new switches in a 3584 L23 or D23 frame or reinstall switches removed from a different subsystem, the following features are required:
    -- #4871 TS7700 BE SW Mounting Hardware
    -- #1950 Power Distribution Units
    -- One power cord feature #9954 through #9959 or #9966
  - Two new 8 Gb FC switches may be ordered for the 3584 frames using feature #4875, BE 8 Gb Switches

**Note:** If the TS7740 was previously attached to the TS3500 Tape Library through the 3953 Model L05 Library Manager, the customer may choose to leave the FC switches in the 3953 Model F05 Tape Frame, or the switches may be removed and reinstalled in the TS3500 Tape Library.

- If the switches remain in the 3953 Model F05, two of feature #3488, 4 Gb Fibre Channel Switches, or #4897, Reinstall 4 Gb Fibre Channel Switches, provide the switches
- To remove the switches from the 3953 Model F05, order feature #4748, Remove 4 Gb Switch, for each switch to be removed
- The switches removed from the 3953 Model F05 may be installed in the 3584 Model L23 or D23 frame using feature number #4873, Reinstall TS7700 BE Switches
- One or more 3584 Model L23 or D23 frames with:
  - From four to sixteen 3592 tape drives: All attached tape drives must operate in the same mode, therefore 3592 Model E05 tape drives operating in native mode may not be intermixed with 3592 Model J1A or Model E06 / EU6 tape drives, 3592 Model E06 and EU6 tape drives, and 3592 Model E07 tape drives may not be intermixed with older generation 3592 tape drives
  - Up to sixteen feature #4874, Adjacent Frame Support for Back End Switches

Refer to Hardware Announcement ZG11-0079, dated May 09, 2011, for the minimum configuration requirements for Machine Code R2.0/R2.1.

**TS7740 upgrades**

The following options may be installed to modify the minimum TS7740 Encryption capable configuration:

- 3952 Tape Frame Model F05
  - TS3000 System Console (TSSC)(#2732) with Internal Modem (#2733) or Rackmount TS3000 System Console (TSSC) (#2724) with USB Modem (#2734)
  - Redundant Power (#1904) is required when TSSC features are installed
- TS7740 Server (3957 Model V07)
  - Grid Enablement (#4015) allows this TS7700 Server to communicate to other TS7700 Servers through the grid. Grid Enablement must be installed on each TS7700 Server that participates in the communication grid. The customer must provide appropriate Ethernet cables to attach the Grid Connection adapters (#1035 through #1037) to the communication grid when Grid Enablement (#4015) is installed.
  - Remove Cluster from a Grid (#4016) provides instructions to remove a cluster from a grid one time only. If the cluster rejoins a grid and is to be removed from that grid in the future, another instance of #4016 must be purchased. #4016 is field install only. Up to 99 instances of #4016 may be ordered for a single TS7740 server.
  - Cluster Cleanup (#4017) facilitates a one time cluster cleanup. If the cluster is configured with #4015, Remove Cluster from a Grid (#4016) must be performed before Cluster Cleanup. Each instance of #4017 provides a single cleanup operation. If the cluster is returned to production and requires cleanup in the future, another instance of #4017 must be purchased. #4017 is field install only. Up to 99 instances of #4017 may be ordered for a single TS7740 server.
  - Enable Dual Port Grid Connections (#1034) activates the second port on the dual port grid adapters (#1036 or #1037) to provide four active 1 Gb Ethernet links for Grid communications.
  - Two additional FICON attachments may be installed to provide a total of four FICON attachments on the TS7700 Server. Valid total quantities of FICON Shortwave Attachment (#3441), FICON Longwave Attachment (#3442), FICON 10 km Longwave Attachment (#3443), 8 Gb FICON Shortwave Attachment (#3438), or 8 Gb FICON Longwave Attachment (#3439) are two or four. Features #3438 and #3439 are mutually exclusive with features #3441, #3442, and #3443.
  - Enable 8 Gb FICON Second Port (#3401) may be used to activate both ports on every 8 Gb FICON adapter installed in the server.
  - Additional 1 TB Cache Enablement (#5267) may be installed, up to a maximum quantity of 28.
  - Additional 100 MB/sec Increment (#5268) may be installed. When features #3441, #3442, or #3443 are installed in the TS7740 Server, the maximum number of #5268 is ten. When features #3438 or #3439 are installed in the TS7740 Server, the maximum number of #5268 is twenty-five.
- Additional increments of 200,000 logical volumes, Increased Logical Volumes (#5270), may be installed, up to a maximum quantity of 15.
- Selective Device Access Control (#5271) may be installed.
- Enable Disk Encryption (#5272) may be installed, only if the Model CC9 TS7720 Cache Controller is installed in the TS7740 system.

  -- When #5272 is installed on the Model V07 server, Encryption (#7404) is required on the 3956 Cache Controller Model CC9 and any 3956 Cache Modules Model CX9 in the TS7740 system.

- Encryption Configuration (#9900) allows this TS7700 Server to be configured to support encryption for designated storage pools. To use encryption with the TS7700, all attached tape drives must be TS1120 encryption capable tape drives, or TS1130 or TS1140 Tape Drives. TS1120 drives must be operating in 3592 Model E05 native mode.

- TS7740 Cache Drawer
  - One or two additional 3956 Model CX9 Cache Drawers may be installed.
  - 3956 Model CX9 Cache Drawers must be attached to a 3956 Model CC9 Cache Controller.
  - Valid total quantities of TS7740 Cache Drawer Model CX9 are zero, one, and two.
  - Each 3956 Model CX9 must contain feature #7124.

Refer to Hardware Announcement ZG11-0079, dated May 09, 2011, for the minimum configuration requirements for Machine Code R2.0/R2.1.

Cables

Refer to the IBM Virtualization Engine TS7700 Introduction and Planning Guide (GA32-0568) for cable planning information.

Software requirements

Software support is available for System z FICON channel attachment to the TS7740 and TS7720 servers. Operating system software support is available for the following release levels:

<table>
<thead>
<tr>
<th>Operating system</th>
<th>Release level</th>
</tr>
</thead>
<tbody>
<tr>
<td>z/OS</td>
<td>V1R12, or later</td>
</tr>
<tr>
<td>z/VM</td>
<td>z/VM® 5.4.0, or later</td>
</tr>
<tr>
<td>z/VSE</td>
<td>V4.3, or later</td>
</tr>
<tr>
<td>z/TPF</td>
<td>V1.1, or later</td>
</tr>
</tbody>
</table>

No new host software support is being provided for Release 3.1 of the TS7700.

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 and TS7720 are transparent to host software.

  • z/VM VSR4, or later, with the PTFs for APAR VM64979 is required for both guest and native VM support providing base CP functions.
  • Native VM Tape library support for these drives is provided by DFSMS/VM FL221 with PTFs for RMS APAR VM64773 and VM65005 and their prerequisite service.
  • EREP V3.5 plus PTFs is required.

With z/VSE®, the TS7740 and TS7720 are transparent to host software. z/VSE supports the TS7740 and the TS7720 as a standalone system in transparency mode. z/VSE 5.1 or later supports COPY EXPORT and Multi Cluster GRID.
With z/TPF the TS7740 and TS7720 are supported in both a single node and a grid environment with the appropriate software maintenance. The category reserve and release functions are not supported by the TS7700.

**Limitations**

Each TS7700 node must be located within 100 feet of the TSSC.

Clusters running R3.1 machine code can only be joined in a grid with clusters running either R2.1 or R3.0 machine code. No more than two machine code levels can be active across all clusters of a grid at any time.

Disk-based encryption requires 3956-CC9 or 3956-CS9 disk cache models to be installed as the exclusive disk cache models in the TS7700 system. Previous generation disk cache models do not support disk-based encryption.

TS7700 Release 3.1 machine code is not supported on TS7740 systems using the TS7740 Server Model V06, nor on TS7720 systems using the TS7720 Server Model VEA.

4 Gb FICON adapters and 8 Gb FICON adapters may not be intermixed on the same TS7700 server.

**Planning information**

**Customer responsibilities**

The customer is responsible for:

- Providing CAT 5e or CAT 6 cables to attach the 1 Gb Grid Dual Port Copper Connection (#1036) to the IP network when Grid Enablement (#4015) is installed. Cat 6 cables are recommended to avoid potential performance degradation with Cat 5e cables.
- Providing multi-mode fiber cables to attach the 1 Gb Grid Dual Port Optical SW Connection (#1037) to the IP network when Grid Enablement (#4015) is installed.
- Providing single-mode fiber cable to attach the Grid Optical LW Connection (#1035) to the IP network when Grid Enablement (#4015) is installed.
- Obtaining the appropriate directors, adapters, and cables for FICON channel attachment. The customer is also responsible for ordering tape media. For information on which directors and channel extenders are supported, visit 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 TS7700 Server.

This product may not be certified in your country for connection by any means whatsoever to interfaces of public telecommunications networks. Further certification may be required by law prior to making any such connection.

Contact IBM for further information.

You are responsible for downloading or obtaining from IBM, and installing designated Machine Code (microcode, basic input/output system code (called BIOS), utility programs, device drivers, and diagnostics delivered with an IBM machine) and other software updates in a timely manner from an IBM Internet website or from other electronic media, and following the instructions that IBM provides. You may request IBM to install Machine Code changes; however, you may be charged for that service.

**Cable orders**

FICON cables for host attachment are available with features on the TS7720 Server (3957 Model VEB) and TS7740 Server (3957 V07).
Refer to the IBM Virtualization Engine TS7700 Introduction and Planning Guide (GA32-0568) for cable planning information.

**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.

**Global Technology Services**

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

**Terms and conditions**

**Field installable feature**

Yes

**Warranty period**

One year

An IBM part or feature installed during the initial installation of an IBM machine is subject to a full warranty effective on the date of installation of the machine. An IBM part or feature that replaces a previously installed part or feature assumes the remainder of the warranty period for the replaced part or feature. An IBM part or feature added to a machine without replacing a previously installed part or feature is subject to a full warranty effective on its date of installation. Unless specified otherwise, the warranty period, type of warranty service, and service level of a part or feature are the same as those for the machine in which it is installed.

**Customer setup**

No

**Machine code**

Same license terms and conditions as base machine.

**Prices**

For all local charges, contact your IBM representative.

**Announcement countries**

All European, Middle Eastern, and African countries, except Iran, Sudan, and Syria.

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