



TS7700 expands the grid to support up to 8 systems

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At a glance

TS7700 R4.1.1 supports:

- Seven- and eight-way grids through request price quotation (RPQ)
- Grid status library request (LI REQ) command with diagnostic data

Overview

TS7700 release 4.1.1 supports seven- and eight-way grids with approved RPQs, and includes a new LI REQ command to provide more diagnostic details on the health of the grid.

Release 4.1.1 builds on the capabilities of release 4.0. For details about TS7700 release 4.0, refer to Hardware Announcement [116-042](#), dated May 10, 2016.

Product Preview

IBM^(R) plans to extend the capacity of the TS7760 base frame to over 600 TB, and to extend the capacity of a fully configured TS7760 system to over 2.45 PB, before compression, by supporting 8 TB disk drives.

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Key prerequisites

TS7700 servers attach to FICON^(R) channels on select IBM z SystemsTM servers and require the appropriate levels of z SystemsTM software.

TS7700 R4.0, and higher, requires a minimum of 32 GB RAM. Memory Upgrade feature number 3462 is required on TS7720 Server Model VEB and TS7740 Server Model V07 before R4.0, or higher, machine code can be installed.

16 Gbps Fibre Channel switches are required when connecting TS7760 Model VEC with a TS3500 or TS4500 Tape Library.

Additional features may be required on the TS7760 components or automation frames. Refer to the [Technical information](#) section for details.

Planned availability date

March 3, 2017

Description

TS7700 R4.1.1 enhances and expands grid support.

TS7700 grid enhancements

With support for up to eight clusters in a grid configuration, you can configure more available solutions with R4.1.1. Score RPQ approval is required for all grid configurations with more than four clusters.

Grid status with diagnostic response time information is available through LI REQ command parameters. This information displays the response time of each grid node for various actions to help you identify a cluster that is not responding as expected. Refer to [IBM Knowledge Center](#) for details.

Accessibility by people with disabilities

A US Section 508 Voluntary Product Accessibility Template (VPAT) containing details on accessibility compliance can be found on the [IBM Accessibility](#) website.

Section 508 of the US Rehabilitation Act

IBM TS7700 release 4.1.1 is capable as of March 3, 2017, when used in accordance with IBM's associated documentation, of satisfying the applicable requirements of Section 508 of the Rehabilitation Act, provided that any assistive technology used with the product properly interoperates with it. A US Section 508 Voluntary Product Accessibility Template (VPAT) can be found on the [IBM Accessibility](#) website.

Reference information

For more information about TS7700 R4.0 announcement, see Hardware announcement [116-042](#), dated May 10, 2016.

Product number

The following are newly announced features on the specified models of the IBM System Storage^(R) 3952 and 3957 machine types:

Description	Machine type	Model	Feature
Ship with R4.1 Machine Code	3952	F06	AGKE
Ship with R4.1 Machine Code	3957	VEC	AGKE

Model conversions

No model conversions are being announced.

Feature conversions

No feature conversions are being announced.

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^(R) ID and password are required (use IBMid).

[BP Attachment for Announcement Letter 117-014](#)

Publications

The following TS7700 publication is now available.

Title	Order number
<i>IBM TS7700 Introduction and Planning Guide</i>	GA32-0567

To order, contact your IBM representative or access the [Introduction and Planning Guide](#) on the web.

IBM Knowledge Center provides you with a single point of reference where you can access product documentation for IBM systems hardware, operating systems, and server software. Through a consistent framework, you can efficiently find information and personalize your access by going to [IBM Knowledge Center](#) for all your product information needs.

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Details on education offerings related to specific products can be found on the [IBM authorized training](#) website.

Technical information

Specified operating environment

Physical specifications

Tape Frame 3952-F06

- Width: 635 mm (25 in)
- Depth: 1397 mm (55.5 in)
- Height: 1930.4 mm (76 in)
- Weight*: 746 kg (1645 lb)

*Fully configured

TS7700 Cache Controller 3956-CSA

- Width: 449 mm (17.7 in)
- Depth: 540 mm (21.3 in)
- Height: 86 mm (3.4 in)
- Weight: 27.0 kg (59.6 lb)

TS7700 Cache Module 3956-XSA

- Width: 449 mm (17.7 in)
- Depth: 540 mm (21.3 in)
- Height: 86 mm (3.4 in)
- Weight: 26.3 kg (57.9 lb)

TS7700 Server 3957-VEC

- Width: 427.5 mm (16.8 in)
- Depth: 747.5 mm (29.4 in)
- Height: 86.5 mm (3.4 in)
- Weight: 29.5 kg (65 lbs)

Operating environment

TS7760 maximum configuration frame with all components

Total frame including VEC, CSA, nine XSA, TSSC, and integrated control path:

- Temperature: 10°C to 32.0°C (50°F to 89.6°F) up to 5,000 ft 10 to 28°C (50°F to 82.4°F) 5,001 to 7,000 ft
- Relative humidity: 20% to 80%
- Heat output (caloric value): 11.0 kBTU/hr, 2.76 kcal/hr
- Wet bulb (caloric value): 23°C
- Electrical power: 3140 watts
- Capacity of exhaust: 700 m3/h
- Noise level: 58 db
- Leakage: 10 mA

Hardware requirements

TS7760 base frame configuration rules with R4.1.1 Machine Code

- One 3952 Tape Frame Model F06 with the following required features:
 - TS7760 Encryption-Capable Base Frame (#7333)
 - Plant Install 3957 VEC (#5630)

- Plant Install CSA (#5657)
- Integrated Control Path (#5758)
- Dual AC Power (#1903)
- Ship with R4.1 Machine Code (#AGKE)
- A power cord appropriate for the country of installation must be selected from feature #9954 through #9959, or #9966
- One TS7760 Server (3957 Model VEC) with the following required features:
 - 100MB/sec Throughput - Plant (#9268)
 - Mainframe Attach (#9000)
 - Ship with R4.1 Machine Code (#AGKE)
 - Plant Install (#9350)
 - Two grid adapters: from the following list
 - 1 Gb Grid Dual Port Copper Connection (#1036)
 - 1 Gb Grid Dual Optical SW Connection (#1037)
 - 10 Gb Dual Port Grid Optical LW Connection (#1038)
 - Either two of host to TS7700 FICON cables (#0201 or #0203) or one No Factory Cables (#9700)
 - Two FICON adapters:
 - Two of 8 Gb FICON Shortwave Attachment (#3438)
 - Two of 8 Gb FICON Longwave Attachment (#3439)
 - Console Attachment (#2715)
 - PKCS #12 File Plant (#9277)
- One TS7760 Cache Controller (3956 Model CSA) with the following required features:
 - 48 TB SAS Storage (#7117)
 - Plant Install (#9352)

TS7760 upgrades

The following options may be installed to modify the minimum TS7760 encryption-capable configuration. These options may be installed in the plant or ordered as field upgrades unless explicitly stated otherwise.

- 3952 Tape Frame Model F06
 - Rackmount TS3000 System Console (TSSC) (#2725) with Console Expansion 26 Port Enet Switch (#2704), Optical Drive (#2748), and KVM (#5512).
 - Redundant Power (#1904) is required when TSSC features are installed.
- TS7700 Server (3957 Model VEC)
 - Grid Enablement (#4015) enables 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 or #1038) 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. Feature #4016 is field install only. Up to 99 instances of #4016 may be ordered for a single TS7700 server.
 - Cluster Cleanup (#4017) facilitates a one-time cluster cleanup. If the cluster is configured with Grid Enablement (#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 TS7700 server.

- Enable Dual Port Grid Connections (#1034) activates the second port on the dual port grid adapters to enable four active 1 Gb Ethernet links (with #1036 or #1037) or four active 10 Gb Ethernet links (with #1038) 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 8 Gb FICON Shortwave Attachment (#3438), or 8 Gb FICON Longwave Attachment (#3439) are two or four.
- Enable 8 Gb FICON Second Port (#3401) may be used to activate two ports on every 8 Gb FICON adapter installed in the server.
- Additional 100 MBps Increment (#5268) may be installed. 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.
- Disk Encrypt-Internal Key Mgr (#5272) may be installed.
 - When #5272 is installed, Encryption (#7404) is required on all 3956 Cache Controller Model CSA and 3956 Cache Modules Model XSA in the TS7700 system, including expansion frames.
- Disk Encrypt-External Key Mgr (#5276) may be installed.
 - When #5276 is installed, Encryption (#7404) is required on all 3956 Cache Controller Model CSA and 3956 Cache Modules Model XSA in the TS7700 system, including expansion frames.
 - The user must secure IBM Security Key Lifecycle Manager software entitlements for all hard disk drives installed in each model 3956-CSA and 3956-XSA device installed in this TS7700 system, including expansion frames.
- Additional Virtual Devices (#5275), may be installed, up to a maximum quantity of fifteen. Each increment of #5275 increases the number of available virtual tape drives by sixteen. 8 Gb FICON adapters are required before installing #5275.
- To create a tape-attached TS7760 (often referred to as a TS7760T) the following features are required, and may be installed in the plant or in the field:
 - TS7720/TS7760 Tape Attach (#5273) enables this TS7760 Server to recognize that physical tape drives have been attached to the cluster.
 - Enable 1 TB Pending Tape Capacity (#5274) designates that up to 1 TB of data across all tape-managed partitions may be waiting to be written to a physical tape cartridge. One instance of #5274 is required on a TS7760T. Up to 10 instances of #5274 may be installed.
 - Tape Library Attach (#9219)
 - Two 16 Gb Fibre Channel switches are required:

Switches for a TS3500 library are installed in Model TR1 using the following features: TS7700 BE SW Mounting Hdw (#4879), Two of TS7700 BE 16 Gb Switch (#4880), Two of Power Distribution Units (#1751).

Switches for a TS4500 library are installed in model L25 or D25 using the following features: TS7700 BE SW Mounting Hdw (#4879), Two of TS7700 BE 16 Gb Switch (#4880).
 - One or more TS3500 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.
 - One or more TS4500 Model L25 or D25 frames with from four to sixteen TS1140 or TS1150 tape drives.

- Encryption Configuration (#9900) is optional for the TA7760T, and may be installed in the plant or in the field. #9900 enables this TS7700 Server to be configured to support physical tape encryption for designated storage pools. To use encryption with the TS7700, all attached tape drives must be TS1120 encryption-capable tape drives, or newer. TS1120 drives must be operating in 3592 Model E05 native mode. Physical tape encryption is independent of disk-based encryption.
- Dual Port 16 Gb FC HBA (#5642) is required to attach TS7700 Expansion frames to the base frame containing this TS7700 Server Model VEC. See below for additional expansion frame rules.
- TS7700 Cache Drawer
 - Up to nine 3956 Cache Drawers Model XSA may be installed in the #7333 F06 frame.
 - To include Model XSAs with 4 TB disk drives in a new cluster coming from the plant, feature #5657, Plant Install 3956 CSA, must be present in the 3952 Model F06, and the following features are required:
 - Feature #7117, 48 TB SAS Storage, on each 3956 Model XSA
 - Feature #9354, Plant Install, on each 3956 Model XSA
 - Feature #5658, Plant Install 3956 XSA, on the 3952 Model F06 for each XSA configured
 - To field install Model XSAs with 4 TB disk drives in an existing TS7760, feature #5657, Plant Install 3956 CSA, must be present in the 3952 Model F06, and the following features are required:
 - Feature #7117, 48 TB SAS Storage, on each 3956 Model XSA
 - Feature #9355, Field Merge, on each 3956 Model XSA
 - Feature #5659, Field Install 3956 XSA, on the 3952 Model F06 for each XSA configured

TS7760 Encryption-Capable Expansion Frame

One or two TS7700 Encryption-Capable Expansion frames may be attached to a TS7700 base frame running R4.1 machine code, using the following configurations:

- One 3952 Tape Frame Model F06 with the following required features:
 - TS7700 Encryption-Capable Expansion Frame (#7334)
 - Plant Install CSA (#5657)
 - When #5657 is configured, the following features may be included:
 - Zero to fifteen of Plant Install XSA (#5658)
 - Zero to fifteen of Field Install XSA (#5659)
 - Valid quantities of #5657 plus #5658 plus #5659 are one to sixteen
 - 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 TS7760 Encryption-Capable Expansion Frame (3952 Model F06 feature #7334), the first expansion frame must contain fifteen Model XSA Cache Modules, and the TS7760 Server Model VEC must be installed in the TS7760 Base Frame.
- When the #7334 expansion frame is attached to a TS7760 encryption-capable base frame (3952 Tape Frame Model F06 with feature #7333), the following features are required on the base frame in addition to the minimum configuration and optional requirements defined above:
 - One of Expansion Frame Attach (#9323) for each expansion frame attached
 - Ten disk models are required in the following configuration:
 - One #5657 and nine of #5658 plus #5659
 - #5642 is required on Model VEC installed in this base frame, as described above

- When the #7334 expansion frame is attached to a TS7720 encryption-capable base frame (3952 Tape Frame Model F05 with feature #7331), the following features are required:
 - One of Expansion Frame Attach (#9323) for each expansion frame attached
 - Nine of #5655 plus #5656 are required
 - #5641 is required on Model VEB installed in this base frame
- 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
 - #5641 is required on Model VEB installed in this base frame
- When a #7334 expansion frame is attached to a TS7720 base frame (3952 Model F05 feature #7322 or #7331) with one TS7720 Encryption-Capable Expansion Frame (3952 Model F05 feature #7332), the first expansion frame must contain fifteen Model XS9 Cache Modules.
- When a #7334 expansion frame 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 Cache Modules.

For configuration requirements with TS7760 R4.0, see Hardware Announcement [116-042](#), dated May 10, 2016.

Software requirements

Software support is available for z Systems FICON channel attachment to the TS7700. Operating system software support is available for the following release levels:

Operating system	Release level
z/OS ^(R)	V2R1, or later
z/VM ^(R)	z/VM 5.4.0, or later
z/VSE ^(R)	V5.2, or later
z/TPF	V1.1, or later

In general, the recommendation is to install the host software support. Refer to the "VTS", "PTP" and "3957" Preventative Service Planning buckets for the latest information on Software Maintenance.

There is no new z/OS support for R4.1.1 of the TS7700. For R4.0, refer to OAM APAR OA49373. For R3.2, refer to OAM APAR OA44351 which increased the number of supported subsystems and devices per composite library.

With z/VM, the TS7700 is transparent to host software.

- z/VM V5R4, 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.

z/VSE V5.2, or later, transparently supports TS7700 R4.1.1. z/VSE V5.2, or later, supports a TS7700 both as a standalone system and in a multi-cluster grid environment. z/VSE V5.2, or later, supports the COPY EXPORT function.

With z/TPF, TS7700 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 by the TS7700.

Limitations

TS7700 Server models V07 and VEB must install the 16 GB memory update, feature #3462, before installing TS7700 R4.0, or higher, machine code.

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

Clusters running R4.1 machine code can only be joined in a grid with clusters running R2.1, or higher, machine code. No more than three machine code levels can be active across all clusters of a grid at any time.

Disk-based encryption requires disk cache models CS9, CSA, XS9, and XSA to be installed as the exclusive disk cache models in the TS7700 system. Previous generation disk cache models do not support disk-based encryption.

Release 4.0, or higher, machine code is not supported on TS7720 Server Model VEA.

Release 4.0, or higher, machine code is not supported on TS7740 Server Model V06.

Planning information

Customer responsibilities

It is the customer's responsibility to:

- Provide 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.
- Provide multimode fiber cables to attach the 1 Gb Grid Dual Port Optical SW Connection (#1037) to the IP network when Grid Enablement (#4015) is installed.
- Provide single-mode fiber cable to attach the Grid Optical LW Connection (#1035) to the IP network when Grid Enablement (#4015) is installed.
- Obtain 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, see the [IBM Techdocs FAQ](#).

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 more information.

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Cable orders

FICON cables for host attachment are available with features on the TS7700 Server (3957 Model VEC).

Refer to the *IBM TS7700 Introduction and Planning Guide* (GA32-0567) for cable planning information.

Direct customer support

Eligible customers can obtain installation and usage assistance through ASK Support using the search word TS7700, 3956, or 3957.

Security, auditability, and control

This product uses the security and auditability features of hardware, host software, and 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

No

Field installable feature

No

Warranty period

One year

To obtain copies of the IBM Statement of Limited Warranty, contact your reseller or IBM. An IBM part or feature installed during the initial installation of an IBM machine is subject to the full warranty period specified by IBM. 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. 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

International Warranty Service

International Warranty Service allows you to relocate any machine that is eligible for International Warranty Service and receive continued warranty service in any country where the IBM machine is serviced. If you move your machine to a different country, you are required to report the machine information to your Business Partner or IBM representative.

The warranty service type and the service level provided in the servicing country may be different from that provided in the country in which the machine was purchased. Warranty service will be provided with the prevailing warranty service type and service level available for the eligible machine type in the servicing country, and the warranty period observed will be that of the country in which the machine was purchased.

The following types of information can be found on the [International Warranty Service](#) website

- Machine warranty entitlement and eligibility
- Directory of contacts by country with technical support contact information

- Announcement Letters

Prices

The following are newly announced features on the specified models of the IBM System Storage 3952 machine type:

Description	Model number	Feature numbers	Initial / MES / Both / Support	CSU	RP MES
Ship with R4.1 Machine Code	F06	AGKE	Initial	No	No

The following are newly announced features on the specified models of the IBM System Storage 3957 machine type:

Description	Model number	Feature numbers	Initial / MES / Both / Support	CSU	RP MES
Ship with R4.1 Machine Code	VEC	AGKE	Initial	No	No

CSU = Customer setup

RP MES = Returnable parts MES

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