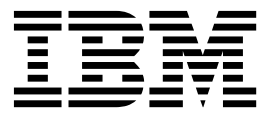


IBM TS7650G Deduplication Gateway for ProtecTIER®
Version 3 Release 4

Introduction and Planning Guide



Note

Before you use this information and the product it supports, read the information in the *Safety and Environmental Notices* publication, EC M13648 PN 00MG879, and "Notices" sections of this publication.

Edition notice

This edition applies to the IBM TS7650G Deduplication Gateway for ProtecTIER® and to all subsequent releases and modifications until otherwise indicated in new editions. This edition replaces GA32-0918-13.

© Copyright IBM Corporation 2011, 2017.

US Government Users Restricted Rights – Use, duplication or disclosure restricted by GSA ADP Schedule Contract with IBM Corp.

Contents

Figures v

Tables vii

Homologation statement ix

About this document xi

Terminology xi

Target audience xiii

Getting information, help, and service xiii

 Getting help online xiv

 Before you call for service xv

 Getting help by telephone xv

Related publications xvi

 TS7650G publications xvi

Chapter 1. Introduction 1

TS7650G hardware components 2

 Gateway server (3958 DD6) 9

 Gateway server (3958 DD5) 13

Software 18

 ProtecTIER Manager 18

 ProtecTIER VTL 18

 FSI 19

 TSSC microcode 21

Supported hardware and software 21

 Supported virtual devices 21

 Supported SAN switches 22

 Supported LUNs 22

 Supported operating systems 22

 Supported device drivers 23

Data management and advanced features 23

 RAID 23

 Fencing 23

 Two-node active-active support 24

 LUN masking 24

 Replication 24

Baseboard Management Controller 27

Remote support through Call Home 28

Chapter 2. Physical planning specifications 33

Site preparation 33

Lighting considerations 33

Upgrade considerations 33

Accommodating cables 34

Calculating space requirements 34

 TS7650G dimensions and weights 34

 Operator and service clearances 35

 Height requirements 35

 Floor requirements 35

Security considerations 36

Electrical power ratings 36

Acoustic declaration 36

Safety issues 37

 Providing a fire-suppression system 37

Chapter 3. Components and feature codes 39

TS7650G feature codes 39

 3958 DD6 gateway server feature codes 39

 3958 DD5 gateway server feature codes 45

 5639-PTA ProtecTIER Enterprise Edition V3.4

 Base Software 52

Chapter 4. Sizing, configuration, and usage considerations 55

Chapter 5. Customer installation responsibilities 57

System responsibilities 58

 ProtecTIER Manager workstation requirements 58

Hardware, cabling, and infrastructure

responsibilities 59

Cache configuration 60

Security, auditability, and control 62

Chapter 6. IBM service installation responsibilities 63

Chapter 7. Planning data migration 65

Appendix A. TS7650G equipment and documents that are provided by IBM 67

Appendix B. Company information worksheet 69

Appendix C. IP address worksheet. 73

Appendix D. Replication settings worksheet 81

Appendix E. Example cache configuration file 83

Accessibility for publications and ProtecTIER Manager 89

About the Windows-based accessibility features 89

About the Java-based tools 90

 Installing the Java Runtime Environment 90

 Installing the Java Access Bridge 91

Using a screen reader to install ProtecTIER Manager 92

Enabling the Windows High Contrast option 93

Using the Windows high contrast scheme with ProtecTIER Manager	95
Customizing the color palette	97

Notices 101

Red Hat Notice.	102
Trademarks	102
Electronic emission notices	103
Federal Communications Commission statement	103
Industry Canada compliance statement.	104
European Union Electromagnetic Compatibility Directive	104
Australia and New Zealand Class A Statement	105
Germany Electromagnetic compatibility directive	105

People's Republic of China Class A Electronic Emission statement	106
Taiwan Class A Statement	106
Taiwan contact information.	106
Japan Voluntary Control Council for Interference (VCCI) Class A Statement	107
Japan Electronics and Information Technology Industries Association (JEITA) Statement (less than or equal to 20 A per phase)	107
Korean Electromagnetic Interference (EMI) Statement	107
Russia Electromagnetic Interference (EMI) Class A Statement	107

Index 109

Figures

1. TS7650G 3958 DD6 stand-alone server frame components	4	10. 3958 DD5 server rear view with FSI configuration, Feature Code 3456	14
2. TS7650G 3958 DD5 stand-alone server frame components	5	11. 3958 DD5 server rear view with FSI configuration, Feature Code 3457	15
3. TS7650G 3958 DD5 single cluster frame components	6	12. Gateway server front view	16
4. TS7650G 3958 DD6 dual cluster frame components	7	13. Gateway server operator information panel	17
5. TS7650G 3958 DD5 dual cluster frame components	8	14. Tape library emulation	19
6. Server front view	10	15. TS3000 System Console Screen Login screen	21
7. Ops Panel	10	16. Dedicated zone topology	62
8. 3958 DD6 server rear view with a VTL configuration	11	17. Display tab	94
9. 3958 DD5 server rear view with VTL configuration	13	18. Settings for High Contrast	95
		19. ProtecTIER Manager window	96
		20. Preferences dialog box	96
		21. Normal contrast versus high contrast	97
		22. Color selection, Swatches tab.	98
		23. Default color versus custom color	99

Tables

1. IBM websites for help, services, and information	xiii	17. Company information worksheet	69
2. 3958 DD6 enclosure Ops panel	10	18. Country codes	70
3. 3958 DD6 server rear view: ports and connections for VTL.	11	19. Factory-default server IP addresses for a stand-alone VTL ProtecTIER server (3958 DD6)	74
4. 3958 DD6 server rear view: ports and connections for FSI (10GB)	12	20. Factory-default server IP addresses for a stand-alone VTL ProtecTIER server (3958 DD5)	74
5. 3958 DD5 server rear view: Slot assignments, ports, and connections for VTL	13	21. Factory-default server IP addresses for a single node FSI ProtecTIER server (3958 DD6)	75
6. 3958 DD5 server rear view: Slot assignments, ports, and connections for FSI	15	22. Factory-default server IP addresses for a single node FSI ProtecTIER server (3958 DD5)	75
7. Gateway server front view	16	23. Factory-default server IP addresses for a clustered VTL ProtecTIER system (3958 DD6)	76
8. Operator information panel	17	24. Factory-default server IP addresses for a clustered VTL ProtecTIER system (3958 DD5)	76
9. Maximum number of FSI streams and host connections	19	25. Customer IP addresses.	77
10. Remote support capabilities through ECC	29	26. Customer and Replication IP addresses for VTL	77
11. Remote support capabilities with a TSSC	30	27. Host names and DNS settings for setting up the TSSC with the TS7650G	78
12. TS7650G component dimensions	34	28. BMC IP addresses	80
13. TS7650G gateway enclosure weight	34	29. TSSC IP addresses	80
14. Power ratings for single-server TS7650G per power cable	36	30. ECC IP addresses	80
15. Power ratings for clustered TS7650G per power cable	36	31. Replication policy information	81
16. Acoustic declaration for the gateway servers	36		

Homologation statement

Attention: 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 an IBM representative or reseller if you have any questions.

About this document

This publication provides a basic understanding of the product features and capabilities. You can use this understanding to plan for product installation.

This document provides you with introductory and planning information for the IBM® TS7650G ProtecTIER® Deduplication Gateway (TS7650G). Use this document to:

- Gain an understanding of the basic features and capabilities of the TS7650G
- Plan for the installation of the TS7650G at your site

Technical changes in this edition are identified with a vertical bar (|) in the left margin of the page.

Terminology

Some terms and definitions in this publication are specific to this product.

TS7650G terminology

TS7650G or Gateway

These are terms for IBM's virtualization solution from the TS7650 family that does not include a disk storage repository, allowing the customer to choose from a variety of storage options. The TS7650G consists of the following:

Server There are five types of server that have been used in the Gateway. The following are the currently supported servers:

3958 DD6

This is a high performance server available since March 2016. The enclosure, or chassis, has space for two controller nodes in the rear, which accommodates a two-node cluster configuration in a 2u platform and eliminates the external cluster connection kit. In the front, the 3958 DD6 contains 24 SAS drive slots (only 2 of which actually contain SAS drives). The remaining 22 slots are unused by ProtecTIER, do not have any function, and are filled with dummy carriers. The 3958 DD6 also includes redundant power supplies in the rear of the unit.

3958 DD5

This server, which first shipped in May 2012, is based on the IBM System x7143 model. When used as a server in the TS7650G, its machine type and model are 3958 DD5. Use this machine type and model for service purposes.

3958 DD4

This server became available in December 2010 and is based on the IBM System x3850 X5 Type 7145-PBR. When used as a server in the TS7650G, its machine type and model are 3958 DD4. Use this machine type and model for service purposes.

System console

The system console is a TS3000 System Console (TSSC). This document uses the terms *system console* and *TSSC* interchangeably. The TSSC is not available (and does not work) with the 3958 DD6.

Under IBM best practices, the TS7650G also contains the following:

Disk controller

The customer must choose the disk controller for use with the TS7650G. A list of TS7650 compatible controllers can be generated at the IBM System Storage Interoperation Center.

Disk expansion unit

The customer must choose the disk expansion unit for use with the TS7650G. A list of TS7650 compatible expansion units can be generated at the IBM System Storage Interoperation Center.

IBM Tivoli Assist On-site (AOS)

IBM Tivoli Assist On-site (AOS) is a web-based tool that enables a remote support representative in IBM to view or control the management node desktop. More information is located at the Tivoli AOS website.

Replication terminology

replication

A process that transfers logical objects like cartridges from one ProtecTIER repository to another. The replication function allows ProtecTIER deployment to be distributed across sites. Each site has a single or clustered ProtecTIER environment. Each ProtecTIER environment has at least one ProtecTIER server. The ProtecTIER server that is a part of the replication grid has one or two dedicated replication ports that are used for replication. Replication ports are connected to the customer's WAN and are configured on two subnets as default.

replication grid

A set of repositories that share a common ID and can potentially transmit and receive logical objects through replication. A replication grid defines a set of ProtecTIER repositories and actions between them. It is configured by using the ProtecTIER Replication Manager. The ProtecTIER Replication Manager is a software component installed on a ProtecTIER server or a dedicated host. The ProtecTIER Replication Manager should be able to recognize all of the members of the entire network that it handles on both replication subnets. The ProtecTIER Replication Manager manages the configuration of multiple replication grids in an organization. An agent on every node in each ProtecTIER server interacts with the server and maintains a table of its grid members.

Note: Customers must license the Replication features on all ProtecTIER systems participating in the replication grid whether the system is sending or receiving data (or both).

replication grid ID

A number from 0 to 63 that identifies a replication grid within an organization.

replication grid member

A repository that is a member in a replication grid.

replication pairs

Two repositories within a replication grid that replicate from one to another.

replication policy

A policy made up of rules that define a set of objects (for example, VTL cartridges) from a source repository to be replicated to a target repository.

repository unique ID (RID)

A number that uniquely identifies the repository. The RID is created from the replication grid ID and the repository internal ID in the grid.

replication timeframe

A scheduled period of time for replication to take place for all policies.

shelf A container of VTL cartridges within a ProtecTIER repository.

virtual tape library (VTL)

The ProtecTIER virtual tape library (VTL) service emulates traditional tape libraries. By emulating tape libraries, ProtecTIER VTL allows you to switch to disk backup without replacing your entire backup environment. Your existing backup application can access virtual robots to move virtual cartridges between virtual slots and drives. The backup application perceives that the data is being stored on cartridges while ProtecTIER actually stores data on a deduplicated disk repository.

visibility switching

The automated process that transfers the visibility of a VTL cartridge from its master to its replica and vice versa. The visibility switching process is triggered by moving a cartridge to the source library Import/Export (I/E) slot. The cartridge will then disappear from the I/E slot and appear at the destination library's I/E slot. To move the cartridge back to the source library, the cartridge must be ejected to the shelf from the destination library. The cartridge will then disappear from the destination library and reappear at the source I/E slot.

Target audience

This publication is intended for storage administrators, system programmers, and performance capacity analysts.

Getting information, help, and service

If you need help, service, technical assistance, or want more information about IBM products, there is a wide variety of sources available from IBM to assist you. Available services, telephone numbers, and web links are subject to change without notice.

Information

IBM maintains pages on the World Wide Web where you can get information about IBM products and services and find the latest technical information. For more information, see Table 1.

Table 1. IBM websites for help, services, and information

Description	Web address (URL)
IBM home page	http://www.ibm.com

Table 1. IBM websites for help, services, and information (continued)

Description	Web address (URL)
Directory of worldwide contacts	http://www.ibm.com/planetwide
Support for IBM System Storage [®] and TotalStorage products	http://www.ibm.com/storage/support Note: Go to this site for information about the TS7650G and do the following steps. 1. Select Tape systems from the Product family list. 2. Select TS7650G with ProtecTIER from the Product list.

Help and service

You can call 1 (800) IBM SERV for help and service if you are in the US or Canada. You must choose the software or hardware option when you call for assistance.

Note: This product is equipped with a Software Call Home feature. When enabled, Call Home notifies IBM Service of software error events. Not all countries currently support this feature, contact your next level of support for more information.

Choose the software option if you are uncertain whether the problem involves software or hardware for the TS7650G. Choose the hardware option *only* if you are certain the problem solely involves the hardware.

When you contact IBM for service for the TS7650G, follow these guidelines for the software and hardware options:

Software option

Identify the TS7650G as your product and supply your customer number as proof of purchase. The customer number is a 7-digit numeric (0000000 - 9999999) assigned by IBM when the PID is purchased and is usually on the customer information worksheet or on the invoice from the software purchase.

Hardware option

Provide the serial number and appropriate 4-digit machine type for the hardware component that displays a problem. For example:

TS7650G

3958 DD4 ,3958 DD5, or 3958 DD6

Note: Disk modules and disk controllers are supported separately within the TS7650G. If the problem is known to be in the IBM attached storage component, select the hardware option and enter the appropriate machine type and serial number for the component. If the attached storage is not IBM branded, contact the appropriate service provider for the component.

Getting help online

Several web addresses provide help online and describe options available to help desks and support engineers to further diagnose and correct issues.

Visit the following support page for the TS7650G, complete with FAQs, parts information, technical hints and tips, technical publications, and downloadable files, if applicable:

www.ibm.com/storage/support/

IBM Tivoli Assist On-site (AOS)

IBM Tivoli Assist On-site (AOS) is a lightweight remote support program intended primarily for help desks and support engineers to diagnose and fix problems without the need of any external dependencies. Assist On-site is based on the IBM Tivoli Remote Control technology.

Assist On-site has been developed specifically to meet functionality, security, and privacy requirements of IBM and IBM customers. Support engineers and their customers can run it on various platforms. It currently has a native version for the 32 bit Windows environment and generic Linux compatible operating systems. Assist On-site uses IBM AES MARS encryption, NTLM authentication, and IBM intranet authentication for IBM support engineers.

Assist On-site provides a launch-in-context feature such that support engineers can start Assist On-site from within the session of the third-party support tool. For restricted use only, Assist On-site supports IBM diagnostic tools to function over the Assist On-site connection for the purpose of debugging hardware devices and IBM software.

More information is located at the website: Tivoli AOS website.

Before you call for service

Before you make a service call, check available resources for solutions that you can implement yourself.

Some problems can be solved without outside assistance:

- by using any online help
- by consulting online or printed documentation that comes with the TS7650G
- by consulting the support web page
- by consulting the information in any readme files and release notes that come with the TS7650G

Getting help by telephone

If other problem resolution methods fail, you can get help by telephone.

A software identifier comes with the original purchase of the TS7650G. The software identifier can be either the product name (TS7650G) or your proof of purchase. When you call, have the following information available:

- Description of the problem
- Exact wording of any error messages
- Hardware and software configuration information

If possible, have access to your computer when you call.

In the US and Canada, these services are available 24 hours a day, 7 days a week. In the U.K., these services are available Monday through Friday, from 9:00 a.m. to 6:00 p.m. In all other countries, contact your IBM reseller or IBM marketing representative.

Related publications

There are other publications that contain information about the product.

The following documents provide information about the components and related hardware for the TS7650G.

TS7650G publications

The following publications provide information about the TS7650G.

- *IBM TS7650G ProtecTIER Deduplication Gateway Installation Roadmap Guide, GA32-0921*
- *IBM ProtecTIER User's Guide for VTL Systems, GA32-0922*
- *IBM Problem Determination and Service Guide for the TS7650G ProtecTIER Deduplication Gateway, GA32-0923*
- *IBM Labeling Instructions for the TS7650 ProtecTIER Deduplication Appliance and TS7650G ProtecTIER Deduplication Gateway, PN 95P8942*
- *Best Practices Guide for IBM TS7600 ProtecTIER Deduplication Solutions, GA32-0924*

Chapter 1. Introduction

Note: This document applies only to the TS7650G.

The TS7650G is a data deduplication and replication solution that compresses and stores backup data on disk storage arrays.

System throughput is scalable; it can be set at a level suitable for the needs of your organization.

Restriction: Changing system throughput is not a dynamic operation. Raising or lowering throughput requires the system to be offline and forces the recreation of repositories.

The replication function allows ProtecTIER deployment to be distributed across sites. To facilitate backup applications that are designed for use with tape storage, the TS7650G emulates traditional tape library units. The TS7650G is available either in a stand-alone configuration or in a clustered configuration; the cluster facilitates increased throughput and higher availability.

When configured as a Virtual Tape Library (VTL) system, the solution uses IBM technology and software to emulate DTC VTF 0100, ATL P3000 0100 and TS3500 tape libraries. This emulation capability is designed to help customers achieve the following operational and throughput efficiencies:

- Backup window reduction
- Restoration time reduction
- Data sharing and resource virtualization optimization
- Operational efficiency
- Improved sharing of virtual tape libraries across applications and servers

When configured as a File System Interface (FSI) system, the TS7650G presents ProtecTIER as a network-attached storage (NAS) backup target, capable of using the HyperFactor[®] algorithm. FSI enables backup servers that run backup applications to access ProtecTIER over an Ethernet-based IP network, eliminating the need for Fibre Channel connectivity. Implementation of FSI supports:

- A 16-way, many-to-many replication topology group
- Single-node (non-clustered) ProtecTIER configurations
- Creation of backup images that are produced by backup applications (not intended for primary storage deduplication)
- File system access security by using a Microsoft workgroup domain (default) or Active Directory domain

For the TS7650G, the disk storage array is supplied by the customer. It attaches to the TS7650G through Fibre Channel connections and holds the repository of factored backup data. The amount of cache available depends on your disk subsystem and configuration. The TS7650G supports the following disk subsystems:

- IBM Storwize V7000
- IBM Storwize V3700
- IBM Storwize V5000
- IBMSystem Storage DS8100

- IBM System Storage DS8300
- IBM System Storage DS8700
- IBM System Storage DS8800
- IBM System Storage DS8870
- IBM FlashSystem 820
- IBM FlashSystem 840
- IBM XIV[®], Gen2
- IBM XIV, Gen3

For more information refer to the ProtecTIER Independent Software Vendor (ISV) matrix available on the Tape systems Web site at <http://www-03.ibm.com/systems/storage/tape/ts7650g/>.

Important: As of 3 April 2012, systems for which IBM has the responsibility for installation must be made available to IBM for installation within six months of shipment or else a fee will be charged.

TS7650G hardware components

The TS7650G is available in stand-alone and clustered configurations. For a stand-alone configuration, one IBM machine type and model 3958 DD6 server is required. For a clustered configuration, two 3958 DD6 controllers in the same 2U enclosure, along with the following:

- 8Gb Fibre Channel HBA
- Eight 25 meter OM3 Fiber Cable (LC)
- mounting hardware

Notes:

- The following cluster server combinations are supported:
 - two 3958 DD6 servers in the same 2U enclosure
 - two 3958 DD5 servers
 - one 3958 DD5 server and one 3958 DD4 server

In all cases, the clustered servers must be installed in the same frame.

- IBM supports two clustered pairs of TS7650G servers in a single frame. For clustered pairs 3958 DD5, 3958 DD4, or a combination of the two, each pair must have its own TSSC network. TSSC is not supported on 3958 DD6.

Red Hat Linux version 5.11 is required to run on the gateway server. For more information, see “TS7650G feature codes” on page 39.

For 3958 DD5 and 3958 DD4 an IBM Total Storage System Console (TSSC) and the accompanying Keyboard/Video/Monitor (KVM kit) (purchased separately) are also required for installation, service, and maintenance of the TS7650G. The TSSC is often installed in the same rack as the gateway server. However, an existing TSSC can be used, provided it is within 100 feet of the gateway server.

Attention: A TSSC, either purchased with the TS7650G or preexisting at the installation site, must be installed, connected, and configured in accordance with IBM installation documentation before you attempt configuration of the 3958 DD5 server or servers. Server configuration fails if a TSSC is not correctly installed and configured first.

For the TS7650G to be fully functional, more hardware components (purchased separately) are required. These components include frames, disk controllers, and disk expansion modules.

The following lists outline the additional hardware purchases that are commonly installed for each deployment option of the TS7650G:

Stand-alone Gateway

- One customer-supplied server frame
- One customer-supplied disk storage frame

Clustered Gateway

- One customer-supplied server frame
- One or more customer-supplied disk storage frames

Replication Gateway

- Two customer-supplied server frames
- One or more customer-supplied disk storage frames per server frame

Each customer-supplied frame must contain from two to four 220 V power distribution units, and provide sufficient rack space to accommodate the following scenarios.

- In a 3958 DD6 *stand-alone configuration*, the server frame must provide 2u rack space. You can optionally provide 4u of rack space if you plan to use a KVM tray.
 - 2 u of rack space for one 3958 DD6.
 - 2u of rack space for a KVM tray and its associated Ethernet switch or no additional rack space if a KVM tray is not required for your configuration

Attention: A KVM tray is not mandatory and the 3958 DD6 can be installed and configured without it. If you choose to use a KVM tray the tray and its associated Ethernet switch *must* be provided by the customer.

Figure 1 on page 4 identifies the server components present in a fully configured TS7650G 3958 DD6 in a stand-alone configuration.

EIA Holes	EIA Unit		EIA Unit	EIA Holes
106	36	Empty (1u)	36	106
103	35	Empty (1u)	35	103
100	34	Empty (1u)	34	100
97	33	Empty (1u)	33	97
94	32	Empty (1u)	32	94
91	31	Empty (1u)	31	91
88	30	Empty (1u)	30	88
85	29	Empty (1u)	29	85
82	28	Empty (1u)	28	82
79	27	Empty (1u)	27	79
76	26	Empty (1u)	26	76
73	25	Empty (1u)	25	73
70	24	Empty (1u)	24	70
67	23	Empty (1u)	23	67
64	22	Empty (1u)	22	64
61	21	Empty (1u)	21	61
58	20	Empty (1u)	20	58
55	19	Empty (1u)	19	55
52	18	Empty (1u)	18	52
49	17	Empty (1u)	17	49
46	16	Empty (1u)	16	46
43	15	Empty (1u)	15	43
40	14	Empty (1u)	14	40
37	13	Empty (1u)	13	37
34	12	Empty (1u)	12	34
31	11	Empty (1u)	11	31
28	10	Empty (1u)	10	28
25	9	Empty (1u)	9	25
22	8	Empty (1u)	8	22
19	7	Empty (1u)	7	19
16	6	ProtecTIER Server (2u)	6	16
13	5		5	13
10	4	Empty (1u)	4	10
7	3	Power Distribution Unit (1u)	3	7
4	2	Power Distribution Unit (1u)	2	4
1	1	Empty (1u)	1	1

ts761743

Figure 1. TS7650G 3958 DD6 stand-alone server frame components

- In a 3958 DD5 stand-alone configuration, the server frame must provide either 8u or 10u of rack space.
 - 2u of rack space for a KVM tray and its associated Ethernet switch
 - 1u of rack space for one 26-port Ethernet switch for the TSSC network, or no additional rack space if an existing TSSC network is used
 - 1u of rack space for one TSSC, or no additional rack space if an existing TSSC is used.
 - 4u of rack space for one 3958 DD5 gateway server.
 - 2u of rack space for two power distribution units

Figure 2 on page 5 identifies the server components present in a fully configured TS7650G 3958 DD5 in a stand-alone configuration.

EIA Holes	EIA Unit		EIA Unit	EIA Holes
106	36	Empty (1u)	36	106
103	35	Empty (1u)	35	103
100	34	Empty (1u)	34	100
97	33	Empty (1u)	33	97
94	32	Empty (1u)	32	94
91	31	Empty (1u)	31	91
88	30	Empty (1u)	30	88
85	29	Empty (1u)	29	85
82	28	Empty (1u)	28	82
79	27	Empty (1u)	27	79
76	26	Empty (1u)	26	76
73	25	Empty (1u)	25	73
70	24	Empty (1u)	24	70
67	23	Empty (1u)	23	67
64	22	Empty (1u)	22	64
61	21	Empty (1u)	21	61
58	20	Empty (1u)	20	58
55	19	KVM Switch	19	55
52	18	TSSC (1u)	18	52
49	17	KVM Tray (1u)	17	49
46	16	TSSC 1GB Network Switch (1u)	16	46
43	15	Empty (1u)	15	43
40	14	Empty (1u)	14	40
37	13	Empty (1u)	13	37
34	12	Empty (1u)	12	34
31	11	Empty (1u)	11	31
28	10	Empty (1u)	10	28
25	9	Empty (1u)	9	25
22	8	ProtecTIER Server (4u)	8	22
19	7		7	19
16	6		6	16
13	5		5	13
10	4	Empty (1u)	4	10
7	3	Power Distribution Unit (1u)	3	7
4	2	Power Distribution Unit (1u)	2	4
1	1	Empty (1u)	1	1

ts761164

Figure 2. TS7650G 3958 DD5 stand-alone server frame components

- In a 3958 DD6 single cluster configuration, the server frame must provide 2u of rack space. You can optionally provide 4u of rack space if you plan to use a KVM tray.
 - 2u of rack space for two 3958 DD6 gateway servers
 - 2u of rack space for a KVM tray and its associated Ethernet switch or no additional rack space if a KVM tray is not required for your configuration

Attention: A KVM tray is not mandatory and the 3958 DD6 can be installed and configured without it. If you choose to use a KVM tray the tray and its associated Ethernet switch *must* be provided by the customer.

Note: The clustered configuration for the 3958 DD6 includes two controllers in the same 2U enclosure as shown in Figure 1 on page 4 with the lower server in the frame as Server A and the upper server in the frame as Server B.

- In a 3958 DD5 single cluster configuration, the server frame must provide 15u or 17u of rack space.

- 2u of rack space for a KVM tray and its associated Ethernet switch
- 1u of rack space for one 26-port Ethernet switch for the TSSC network, or no additional rack space if an existing TSSC network is used
- 1u of rack space for one TSSC, or no additional rack space if an existing TSSC is used.
- 8u of rack space for two 3958 DD5 gateway servers
- 2u of rack space for two Ethernet switches
- 1u of rack space for one network power switch
- 2u of rack space for two power distribution units

Figure 3 identifies the server components present in a fully configured 3958 DD5 TS7650G in a single cluster configuration.

EIA Holes	EIA Unit		EIA Unit	EIA Holes
106	36	Empty (1u)	36	106
103	35	Empty (1u)	35	103
100	34	Empty (1u)	34	100
97	33	Empty (1u)	33	97
94	32	Empty (1u)	32	94
91	31	Empty (1u)	31	91
88	30	Empty (1u)	30	88
85	29	Empty (1u)	29	85
82	28	Empty (1u)	28	82
79	27	Empty (1u)	27	79
76	26	Empty (1u)	26	76
73	25	Empty (1u)	25	73
70	24	Empty (1u)	24	70
67	23	Empty (1u)	23	67
64	22	Empty (1u)	22	64
61	21	Empty (1u)	21	61
58	20	Empty (1u)	20	58
55	19	KVM Switch	19	55
52	18	TSSC (1u)	18	52
49	17	KVM Tray (1u)	17	49
46	16	TSSC 1GB Network Switch (1u)	16	46
43	15	1 Gb Network Switch (1u)	15	43
40	14	1 Gb Network Switch (1u)	14	40
37	13	ProtectTIER Server B (4u)	13	37
34	12		12	34
31	11		11	31
28	10		10	28
25	9	Empty (1u)	9	25
22	8	ProtectTIER Server A (4u)	8	22
19	7		7	19
16	6		6	16
13	5		5	13
10	4	Network Power Switch (1u)	4	10
7	3	Power Distribution Unit (1u)	3	7
4	2	Power Distribution Unit (1u)	2	4
1	1	Empty (1u)	1	1

ts761165

Figure 3. TS7650G 3958 DD5 single cluster frame components

- In a 3958 DD6 dual cluster configuration, the server frame must provide 4u of rack space. You can optionally provide 6u of rack space if you plan to use a KVM tray.

- 4u of rack space for four 3958 DD6 gateway servers
- 2u of rack space for a KVM tray and its associated Ethernet switch or no additional rack space if a KVM tray is not required for your configuration

Attention: A KVM tray is not mandatory and the 3958 DD6 can be installed and configured without it. If you choose to use a KVM tray the tray and its associated Ethernet switch *must* be provided by the customer.

Figure 5 on page 8 identifies the server components present in a fully configured TS7650G 3958 DD6 in a dual cluster configuration.

EIA Holes	EIA Unit		EIA Holes	EIA Unit
106	36	Empty (1u)	36	106
103	35	Empty (1u)	35	103
100	34	Empty (1u)	34	100
97	33	Empty (1u)	33	97
94	32	Empty (1u)	32	94
91	31	ProcTIER Server B (1U) Cluster 2	31	91
88	30	ProcTIER Server A (1U) Cluster 2	30	88
85	29	Empty (1u)	29	85
82	28	Empty (1u)	28	82
79	27	Empty (1u)	27	79
76	26	Empty (1u)	26	76
73	25	Empty (1u)	25	73
70	24	Empty (1u)	24	70
67	23	Empty (1u)	23	67
64	22	Empty (1u)	22	64
61	21	Power Distribution Unit (1u)	21	61
58	20	Power Distribution Unit (1u)	20	58
55	19	KVM Switch (only if provided by the client)	19	55
52	18	Empty (1u)	18	52
49	17	KVM Tray (1u) (only if provided by the client)	17	49
46	16	Empty (1u)	16	46
43	15	Empty (1u)	15	43
40	14	Empty (1u)	14	40
37	13	ProcTIER Server B (1U) Cluster 1	13	37
34	12	ProcTIER Server A (1U) Cluster 1	12	34
31	11	Empty (1u)	11	31
28	10	Empty (1u)	10	28
25	9	Empty (1u)	9	25
22	8	Empty (1u)	8	22
19	7	Empty (1u)	7	19
16	6	Empty (1u)	6	16
13	5	Empty (1u)	5	13
10	4	Empty (1u)	4	10
7	3	Power Distribution Unit (1u)	3	7
4	2	Power Distribution Unit (1u)	2	4
1	1	Empty (1u)	1	1

Figure 4. TS7650G 3958 DD6 dual cluster frame components

- In a 3958 DD5 dual cluster configuration, the server frame must provide 28u or 30u of rack space.
 - 2u of rack space for a KVM tray and its associated Ethernet switch
 - 1u of rack space for one 26-port Ethernet switch for the TSSC network, or no additional rack space if an existing TSSC network is used

- 1u of rack space for one TSSC, or no additional rack space if an existing TSSC is used.
- 16u of rack space for four 3958 DD5 gateway servers
- 4u of rack space for four Ethernet switches
- 2u of rack space for two network power switches
- 4u of rack space for four power distribution units

Figure 5 identifies the server components present in a fully configured TS7650G in a dual cluster configuration.

EIA Holes	EIA Unit		EIA Unit	EIA Holes
106	36	Empty (1u)	36	106
103	35	Empty (1u)	35	103
100	34	Empty (1u)	34	100
97	33	1 Gb Network Switch (1u)	33	97
94	32	1 Gb Network Switch (1u)	32	94
91	31	ProtecTIER Server B (4u) Cluster 2	31	91
88	30		30	88
85	29		29	85
82	28		28	82
79	27	Empty (1u)	27	79
76	26	ProtecTIER Server A (4u) Cluster 2	26	76
73	25		25	73
70	24		24	70
67	23		23	67
64	22	Network Power Switch (1u)	22	64
61	21	Power Distribution Unit (1u)	21	61
58	20	Power Distribution Unit (1u)	20	58
55	19	KVM Switch	19	55
52	18	TSSC (1u)	18	52
49	17	KVM Tray (1u)	17	49
46	16	TSSC 1GB Network Switch (1u)	16	46
43	15	1 Gb Network Switch (1u)	15	43
40	14	1 Gb Network Switch (1u)	14	40
37	13	ProtecTIER Server B (4u) Cluster 1	13	37
34	12		12	34
31	11		11	31
28	10		10	28
25	9	Empty (1u)	9	25
22	8	ProtecTIER Server A (4u) Cluster 1	8	22
19	7		7	19
16	6		6	16
13	5		5	13
10	4	Network Power Switch (1u)	4	10
7	3	Power Distribution Unit (1u)	3	7
4	2	Power Distribution Unit (1u)	2	4
1	1	Empty (1u)	1	1

ts761166

Figure 5. TS7650G 3958 DD5 dual cluster frame components

When configured for replication, the server frames that are required depend on the planned hardware configuration of the source and destination servers. If the configuration is from stand-alone server to stand-alone server, duplicate the stand-alone configuration for the second frame. If the source and destination frames are clustered, duplicate the clustered configuration for the second site.

Possible existing gateway upgrade scenarios:

- Existing TS7650G installation with DD4 servers, adding new DD6 servers for replication.
- Existing TS7650G installation with DD5 servers, adding new DD6 servers for replication.

Attention: While DD6 servers can replicate to and from existing DD4 and DD5 servers, the Hub must be upgraded to ProtecTIER v3.4

- Existing TS7650G installation with DD4 servers, adding new DD5 servers for replication.
- Existing TS7650G installation with DD4 or DD5 servers, with the replication capability. No new hardware is required for DD5 or DD4.
- Existing DD4 clustered with a new DD5 VTL system.
- DD5 VTL system that is clustered with another DD5 VTL system.

Possible new gateway installation scenarios:

- New TS7650G installation, that is either clustered or stand-alone, with replication (VTL).
- New TS7650G installation, that is clustered or stand-alone, without replication (VTL).
- New TS7650G installation, stand-alone only, with or without replication (FSI).

For the disk storage frames, the amount of rack space and the number of frames that are required varies, depending on the type of disk storage that is being used. For example, one IBM System Storage DS4700 disk controller and six IBM System Storage DS4000[®] EXP810 disk expansion modules require 21u of rack space in the frame. In a clustered configuration with two controllers and 12 expansion modules, an additional disk storage frame might be required.

Gateway server (3958 DD6)

The gateway enclosure provides the connections to the customer SAN network (for connection to the client hosts and virtual tape libraries). The server contains several components that are replaceable. These components are field-replaceable units (FRUs) that IBM service technicians must replace.

Attention: After FRU replacement, the server attempts an automatic firmware update upon startup. Do not power off the server during this process. Powering off the server during a firmware update might result in system corruption or loss of data integrity.

3958 DD6 enclosure front view

The 3958 DD6 gateway enclosure front view shows the 24 slots for serial-attached SCSI (SAS) drives. Of the 24 slots available, only two, slots 1 and 24, are used for logging. The remaining 22 slots are unused by ProtecTIER, do not have any function and are filled with dummy carriers. The enclosure front panel incorporates an Operators (Ops) Panel housed on the left hand mounting flange and connected to the Midplane via a flexible cable.



Figure 6. Server front view

Operators (Ops) panel

The enclosure front panel incorporates an Operators (Ops) Panel housed on the left hand mounting flange and connected to the Midplane via a flexible cable. The following illustration shows the controls, LEDs, and connectors on Ops panel.

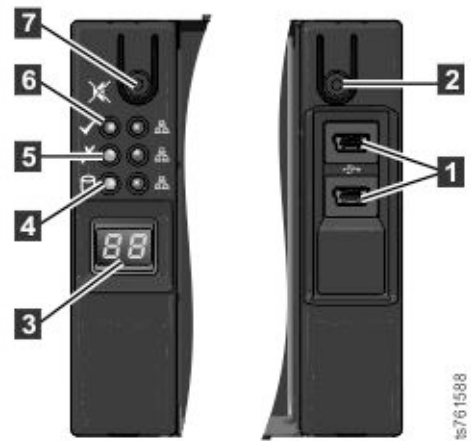


Figure 7. Ops Panel

Table 2. 3958 DD6 enclosure Ops panel

Item	Description
1	<p>USB Sockets:</p> <p>Two Mini-B type USB 2.0 sockets, one connected to each controller.</p>
2	<p>Power Button:</p> <p>The power button can be used in one of two ways:</p> <ul style="list-style-type: none"> • A quick press of the button causes a soft shutdown of the controllers. • Holding the button for 4 seconds immediately performs a hard power off of the controllers - this could cause data loss.
3	<p>Unit ID Display:</p> <p>Usually displays the enclosure identification number (for use with multiple enclosure systems), but can be configured via VPD.</p>
4	<p>Logical Fault LED:</p> <p>Amber when there is a fault or change of state from something other than the enclosure management system (usually a disk drive).</p>

Table 2. 3958 DD6 enclosure Ops panel (continued)

Item	Description
5	Module Fault LED: Amber when there is a system hardware fault. There may also be an associated fault LED on a PCM or controller identifying the faulty component.
6	System Power LED: Amber when the system is in standby (not operational). Green when the system is on (operational).
7	Input/mute switch: Used in the setting of the LED display. Also used to transition alarm states (although this is dependent on the VPD setup).

Server rear view (VTL)

When configured for VTL, the 3958 DD6 servers are equipped with:

- one 3958 DD6 Controller module equipped with:
 - One full height PCIe 2.0
 - One low profile PCIe 2.0
 - One 1 gigabit (Gb) Ethernet port
 - Two Ethernet 1 Gb or 10 Gb ports
 - Two 12 Gb mini SAS-HD ports
 - Two USB 2.0 ports (rear)
 - Onboard 12 Gb SAS (non-RAID)

See Figure 8 and Table 3.

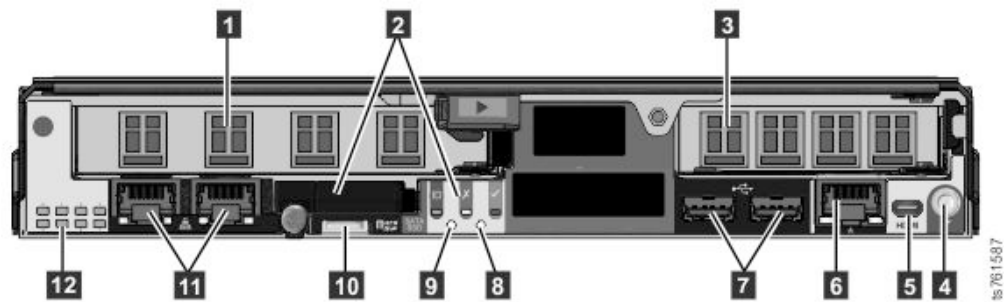


Figure 8. 3958 DD6 server rear view with a VTL configuration

Table 3. 3958 DD6 server rear view: ports and connections for VTL

Item	VTL use	ethX value (if applicable)
1	Emulex 8Gbs Fibre Channel 2.0 - 00WT000 <ul style="list-style-type: none"> • Label port 1 = Fibre Channel port 1 • Label port 2 = Fibre Channel port 2 • Label port 3 = Fibre Channel port 3 • Label port 4 = Fibre Channel port 4 	
2	SATA Solid State Drive	

Table 3. 3958 DD6 server rear view: ports and connections for VTL (continued)

Item	VTL use	ethX value (if applicable)
3	Emulex 8Gbs Fibre Channel 3.0 - LPe15004 <ul style="list-style-type: none"> • Label port 1 = Fibre Channel port 0 • Label port 2 = Fibre Channel port 1 • Label port 3 = Fibre Channel port 2 • Label port 4 = Fibre Channel port 3 	
4	Serial Port	
5	HDMI Connector	
6	Integrated Management Ethernet Connector	eth2
7	Universal Serial Bus Connectors 1 and 2	
8	Power On Button	
9	Reboot Button	
11	Integrated Ethernet Ports 1 and 2	eth1 (left) eth0 (right)
12	Post LEDs	

Server rear view FSI

When configured for FSI, the 3958 DD6 servers are equipped with

Table 4. 3958 DD6 server rear view: ports and connections for FSI (10GB)

Item	FSI (10GB) use	ethX value (if applicable)
1	Emulex 8Gbs Fibre Channel 2.0 - 00WT000 <ul style="list-style-type: none"> • Label port 1 = Fibre Channel port 1 • Label port 2 = Fibre Channel port 2 	
2	SATA Solid State Drive	
3	Emulex 8Gbs Fibre Channel 3.0 - LPe15004 <ul style="list-style-type: none"> • Label port 1 = Fibre Channel port 0 • Label port 2 = Fibre Channel port 1 • Label port 3 = Fibre Channel port 2 • Label port 4 = Fibre Channel port 3 	
4	Serial Port	
5	Micro HDMI Connector	
6	Integrated Management Ethernet Connector	eth2
7	Universal Serial Bus Connectors 1 and 2	
8	Power On Button	
9	Reboot Button	
11	Integrated Ethernet Ports 1 and 2	eth1 (left) eth0 (right)
12	Post LEDs	

For more information about the gateway server ports, see “Hardware, cabling, and infrastructure responsibilities” on page 59.

Gateway server (3958 DD5)

The gateway server provides the connections to the TSSC and the customer SAN network (for connection to the client hosts and virtual tape libraries). The server contains several components that are replaceable. These components are field-replaceable units (FRUs) that IBM service technicians must replace.

Attention: After FRU replacement, the server attempts an automatic firmware update upon startup. Do not power off the server during this process. Powering off the server during a firmware update might result in system corruption or loss of data integrity.

Server rear view (VTL)

When configured for VTL, the 3958 DD5 servers are equipped with:

- two Emulex Fibre Channel host bus adapters (HBA)
- two QLogic Fibre Channel HBAs
- one 1 gigabit (Gb) quad-port Ethernet adapter
- two on-board Ethernet ports

See Figure 9 and Table 5.

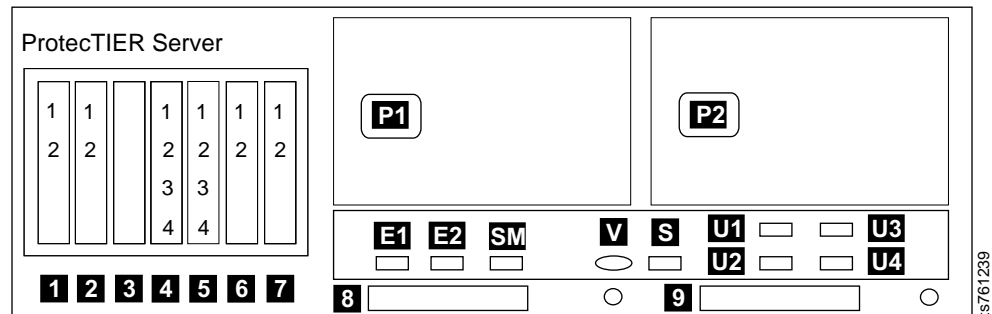


Figure 9. 3958 DD5 server rear view with VTL configuration

Table 5. 3958 DD5 server rear view: Slot assignments, ports, and connections for VTL

Item	VTL use	ethX value (if applicable)
1	Slot 1: Emulex Fibre Channel HBA <ul style="list-style-type: none"> • Label port 1 = Fibre Channel port 2 • Label port 2 = Fibre Channel port 3 	
2	Slot 2: Emulex Fibre Channel HBA <ul style="list-style-type: none"> • Label port 1 = Fibre Channel port 0 • Label port 2 = Fibre Channel port 1 	
3	Slot 3: not used	
4	Slot 4: not used	
5	Slot 5: Intel Pro Quad-port gigabit Ethernet adapter	<ul style="list-style-type: none"> • eth0 (port 1) • eth1 (port 2) • eth2 (port 3) • eth3 (port 4)
6	Slot 6: QLogic HBA	

Table 5. 3958 DD5 server rear view: Slot assignments, ports, and connections for VTL (continued)

Item	VTL use	ethX value (if applicable)
7	Slot 7: QLogic HBA	
8	QPI Slot 1: not used	
9	QPI Slot 2: not used	
E1	Integrated Ethernet 1 port	eth4
E2	Integrated Ethernet 2 port	eth5
SM	SYS MGMT Ethernet port: System management Ethernet port that is used by the IMM as a web interface for system-management information control; for example, for access to the IMM Event log.	
V	IMM Video port	
S	Serial Attached SCSI (SAS) port	
U1	Universal Serial Bus (USB) port 1	
U2	USB port 2	
U3	USB port 3	
U4	USB port 4	
P1	Power connection	
P2	Power connection	

Server rear view FSI

When configured for FSI, the 3958 DD5 servers are equipped with

- one of the following Ethernet adapter configurations:
 - If two instances of Feature Code 3456 are installed, three 1 Gb quad-port Ethernet adapters (Figure 10)
 - If two instances of Feature Code 3457 are installed, two 10 Gb dual-port Ethernet adapters for use with Fibre Channel cabling and one 1 Gb quad-port Ethernet adapter (Figure 11 on page 15)
- two dual-port QLogic Fibre Channel HBAs
- two on-board Ethernet ports.

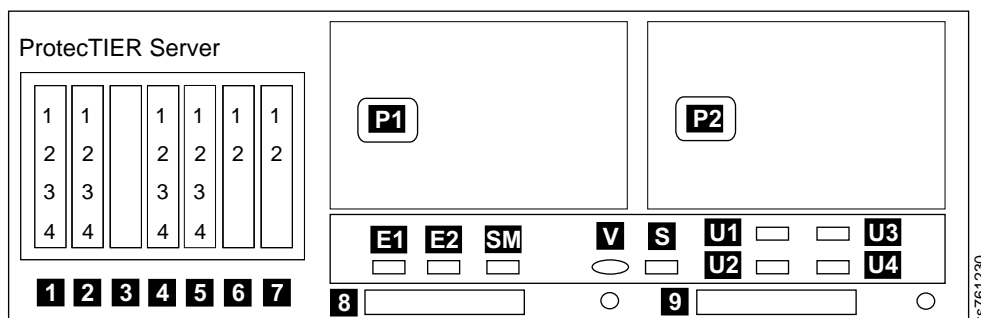


Figure 10. 3958 DD5 server rear view with FSI configuration, Feature Code 3456

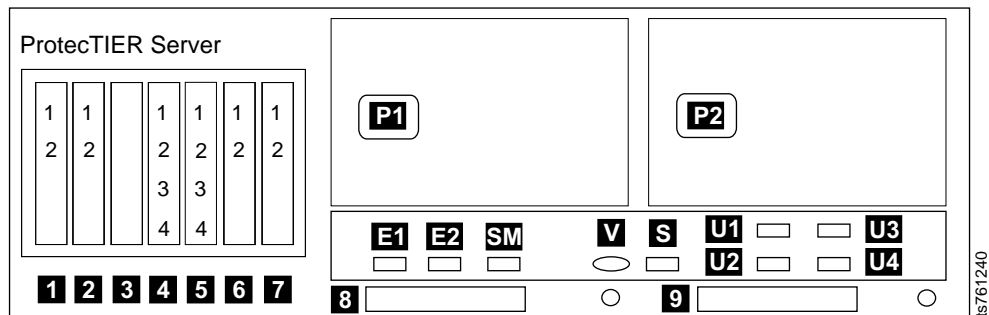


Figure 11. 3958 DD5 server rear view with FSI configuration, Feature Code 3457

Table 6. 3958 DD5 server rear view: Slot assignments, ports, and connections for FSI

Item	FSI use, FC 3456	ethX value (if applicable), FC 3456	FSI use, FC 3457	ethX value (if applicable), FC 3457
1	Slot 1: not used			
2	Slot 2: not used			
3	Slot 3: Intel Pro Quad-port gigabit Ethernet adapter	<ul style="list-style-type: none"> • eth4 (port 1) • eth5 (port 2) • eth6 (port 3) • eth7 (port 4) 	Slot 3: Dual-port 10-gigabit Ethernet adapter	<ul style="list-style-type: none"> • eth4 (port 1) • eth5 (port 2)
4	Slot 4: Intel Pro Quad-port gigabit Ethernet adapter	<ul style="list-style-type: none"> • eth8 (port 1) • eth9 (port 2) • eth10 (port 3) • eth11 (port 4) 	Slot 4: Dual-port 10-gigabit Ethernet adapter	<ul style="list-style-type: none"> • eth6 (port 1) • eth7 (port 2)
5	Slot 5: Quad-port gigabit Ethernet adapter	<ul style="list-style-type: none"> • eth0 (port 1) • eth1 (port 2) • eth2 (port 3) • eth3 (port 4) 	Slot 5: Quad-port gigabit Ethernet adapter	<ul style="list-style-type: none"> • eth0 (port 1) • eth1 (port 2) • eth2 (port 3) • eth3 (port 4)
6	Slot 6: QLogic HBA			
7	Slot 7: QLogic HBA			
8	QPI Slot 1: not used			
9	QPI Slot 2: not used			
E1	Integrated Ethernet 1 port	eth12	Integrated Ethernet 1 port	eth8
E2	Integrated Ethernet 2 port	eth13	Integrated Ethernet 2 port	eth9
SM	SYS MGMT Ethernet port: System management Ethernet port that is used by the IMM as a web interface for system-management information control; for example, for access to the IMM Event log.			
V	IMM Video port			
S	SAS port			
U1	USB port 1			
U2	USB port 2			
U3	USB port 3			

Table 6. 3958 DD5 server rear view: Slot assignments, ports, and connections for FSI (continued)

Item	FSI use, FC 3456	ethX value (if applicable), FC 3456	FSI use, FC 3457	ethX value (if applicable), FC 3457
U4	USB port 4			
P1	Power connection			
P2	Power connection			

For more information about the gateway server ports, see “Hardware, cabling, and infrastructure responsibilities” on page 59.

The following illustration shows the controls, LEDs, and connectors on the front of the server.

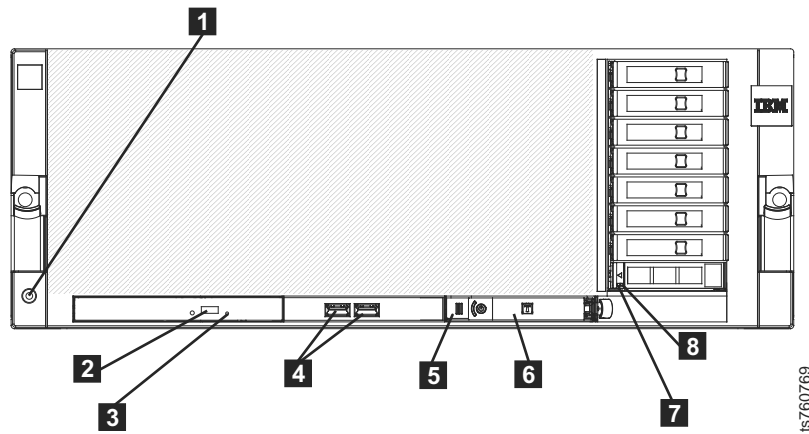


Figure 12. Gateway server front view

Table 7. Gateway server front view

Item	Description
1	Electrostatic discharge connector
2	DVD-eject pushbutton: Press this pushbutton to release a CD or DVD from the DVD drive.
3	DVD drive activity LED: When this LED is lit, it indicates that the DVD drive is in use.
4	USB connectors: Connect USB devices to these connectors.
5	Scalability LED
6	Operator information panel: This panel contains controls and LEDs.
7	Hard disk drive activity LED: On some server models, each hot-swap hard disk drive has an activity LED. When this LED is flashing, it indicates that the drive is in use.

Table 7. Gateway server front view (continued)

Item	Description
8	Hard disk drive status LED: On some server models, each hot-swap hard disk drive has a status LED. When this LED is lit continuously, that individual drive is faulty. When the drive is connected to the integrated SAS controller with RAID capabilities, a flashing status LED indicates that the drive is a secondary drive in a mirrored pair and the drive is being synchronized.

The following illustration shows the controls and LEDs on the operator information panel.

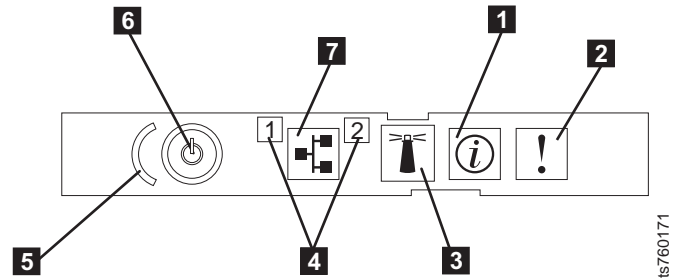


Figure 13. Gateway server operator information panel

Table 8 describes the LEDs and controls on the operator information panel.

Table 8. Operator information panel

Item	Description
1	Information LED: When this LED is lit, it indicates that there is a suboptimal condition in the server and that light path diagnostics will light an additional LED to help isolate the condition. This LED and LEDs on the light path diagnostics panel remain lit until you resolve the condition or you press the remind button.
2	System-error LED: When this LED is lit, it indicates that a system error has occurred. An LED on the light path diagnostics panel is also lit to help isolate the error.
3	Locator button/locator LED: Press this button to turn the locator LED on and off manually. In multi-node configurations, press this button to turn the locator LED on and off in all nodes in the configuration.
4	Ethernet port activity LEDs: When these LEDs flash, they indicate that there is activity between the server and the network on the indicated port.
5	Power control button cover: Slide this cover over the power-control button to prevent the server from being turned off accidentally.
6	Power control button/power-on LED: Press this button to turn the server on and off manually.
7	Ethernet icon LED: This LED lights the Ethernet icon.

Software

ProtecTIER is a disk-based data storage system. It uses data deduplication technology to store data to disk arrays. With Feature Code 9022, the ProtecTIER Virtual Tape Library (VTL) service emulates traditional automated tape libraries. With Feature Code 9024, a stand-alone TS7650G can be configured as FSI.

Note: A single repository supports either Feature Code 9022 (VTL emulation) or 9024 (FSI); the two options cannot be combined in a single repository.

ProtecTIER Manager

The ProtecTIER Manager workstation is a customer-supplied workstation that runs the ProtecTIER Manager software. The ProtecTIER Manager software provides the management GUI interface to the TS7650G.

System requirements for the workstation are provided in this document in “ProtecTIER Manager workstation requirements” on page 58.

Complete information about installing and operating the ProtecTIER Manager workstation is provided in the *IBM ProtecTIER User's Guide for VTL Systems*, GA32-0922.

Note: ProtecTIER Manager is not optimal on all resolutions. 1024 × 768 is the minimum supported; 1280 × 1024 is optimal.

ProtecTIER VTL

The ProtecTIER VTL service emulates traditional tape libraries. By emulating tape libraries, ProtecTIER VTL provides the capability to transition to disk backup without having to replace your entire backup environment. Your existing backup application can access virtual robots to move virtual cartridges between virtual slots and drives. ProtecTIER presents virtual tape cartridges to the backup application as the storage medium while actually transferring data to and from a deduplicated repository on disk storage. ProtecTIER supports an absolute maximum of 62,000 virtual cartridges, slots, and tape drives, although the maximum number might be lower for individual systems because of available storage space.

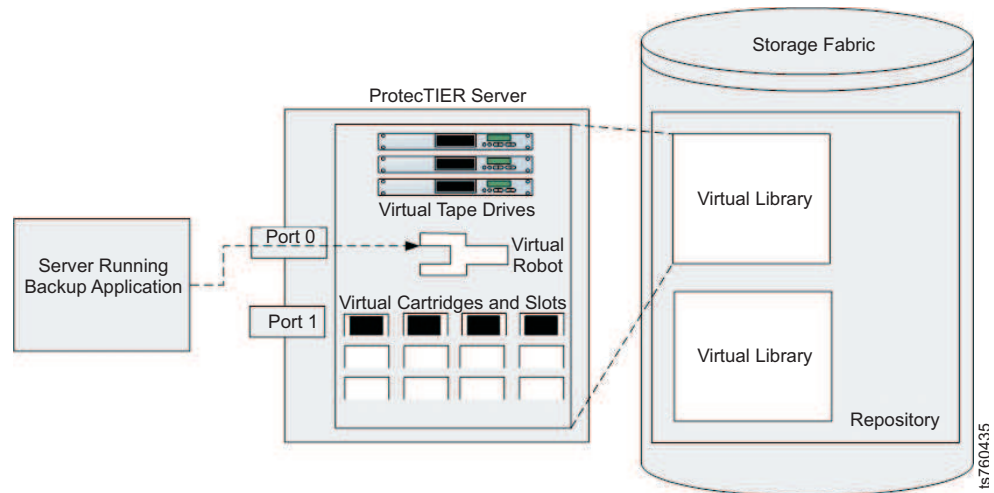


Figure 14. Tape library emulation

FSI

When configured for FSI, ProtecTIER emulates a NAS backup target that is capable of using both HyperFactor and ProtecTIER replication bandwidth reduction techniques for storing and replicating deduplicated data. ProtecTIER FSI enables servers that run backup applications to connect over IP networks to ProtecTIER servers without Fibre Channel connections, and permits the use of existing tools and capabilities to integrate a ProtecTIER NAS-based backup target into your environment.

FSI systems support:

- Sixteen-way, many-to-many, replication topology groups
- Creation of backup images that are produced by backup applications (not intended for primary storage deduplication)
- File system access security by using a Microsoft workgroup domain (default) or Active Directory domain
- The maximum number of concurrent streams and host connections that are listed in Table 9

Restriction: Because backup applications might assign a backup job to more than one stream, the maximum number of backup jobs available at your installation might be lower than the maximum number of streams that are supported by FSI listed in Table 9.

Table 9. Maximum number of FSI streams and host connections

Maximum number of concurrent...	For the 3958 DD5 server
streams	192
host connections	64

ProtecTIER exposes virtual interfaces to the host, such as a media server with the plug-in installed. In version 3.4.3, the physical Ethernet ports are assigned to one virtual application interface. Currently, the physical ports are assigned to virtual interface eth0 or eth1, depending on the server configuration. This assignment

option is used to group several physical interfaces into a single virtual interface, and create a bond configuration of several physical interfaces. Each virtual interface used must be configured with a corresponding IP address.

Attention: Each configured IP address on the same server needs to be on a different subnet, and each subnet needs to be on a different VLAN. If separate subnets and VLAN's are not used, in certain environments and networks, network packets can move to other subnets, which can harm network performance and potentially reduce the network's quality of service.

In addition, each virtual interface containing more than one physical interface (configured as a bond) needs to be configured with a load balancing method. For a server with 10 Gb interfaces, where bonding is implemented, the recommended load balancing method is Link Aggregation Control Protocol (LACP) with L3L4.

For more information about bonding, the different load balancing methods, and whether to configure bonds at all, refer to the *IBM ProtecTIER Implementation and Best Practices*, Redbooks publication SG24-8025, available at: <http://www.redbooks.ibm.com/Redbooks.nsf/RedpieceAbstracts/sg248025.html?Open> or the *IBM ProtecTIER Implementation and Best Practices*, Redbooks publication SG24-8025, available at: <http://www.redbooks.ibm.com/Redbooks.nsf/RedpieceAbstracts/sg248025.html?Open>.

TSSC microcode

Note: TSSC is not supported on 3958 DD6 servers but will continue to be supported on 3958 DD5 and 3958 DD4 servers.

If you are using an existing TSSC, before you install or upgrade ProtecTIER, the TSSC microcode must be 7.0.x or later. To check the version, go to the TS3000 System Console Screen Login screen as shown in Figure 15.

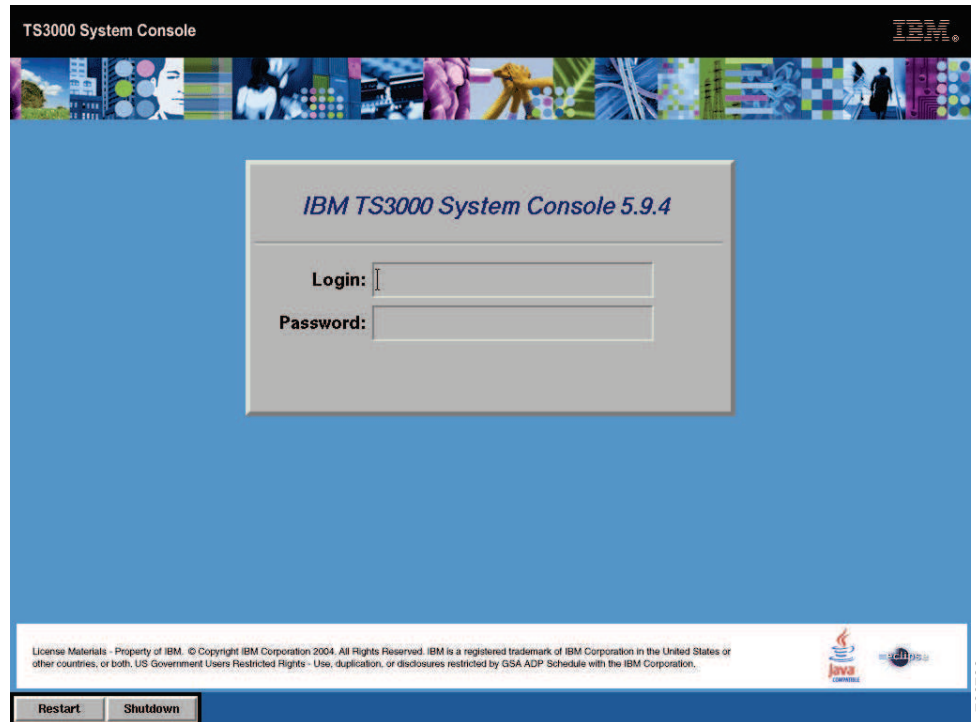


Figure 15. TS3000 System Console Screen Login screen

If an update is required, contact IBM Service.

Supported hardware and software

You can find support information for the TS7650G in the following areas:

- “Supported virtual devices”
- “Supported operating systems” on page 22
- “Supported device drivers” on page 23
- “Supported SAN switches” on page 22
- “Supported LUNs” on page 22

Supported virtual devices

The latest firmware and driver code requirements for connection to these devices are posted on the IBM website.

The following virtual tape libraries and drives are supported:

- DTC VTF 0100 virtual tape libraries
- ATL P3000 0100 virtual tape libraries

- Quantum DLT 7000 drives
- IBM LTO-2 drives
- IBM TS3500 virtual tape libraries

The latest firmware and driver code requirements for connection to these devices are posted on the IBM website:

www.ibm.com/storage/support/

Select **Tape Systems** from the Product family menu and select **TS7650G** from the Product menu. Click the Plan or Upgrade tab, and under Product Considerations, click **TS7650G product information**.

Supported SAN switches

The TS7650G supports a wide variety of switches in the SAN environment. All switches that are attached directly to the TS7650G must be capable of the loop protocol.

For information about supported switches and required code levels for the switches, choose one of the following options:

- For a list of compatible switches for the TS7650G, visit the web at:
www.ibm.com/storage/support/
Select **Tape & optical** from the Product family menu and select **TS7650G** from the Product menu.
- Contact your IBM marketing representative.
- If you attach your TS7650G to a platform that is not acquired from IBM, or use software not acquired from IBM, contact your software vendor to obtain a matrix of compatible hardware, software, firmware revisions, and adapters.
- You must use an additional connectivity device between the optical fiber that is directly connected to optical adapters (for example, Fibre Channel, ESCON, or FICON[®]) and an external public network. It can be a patch panel, router, switch, or other suitable device. Optical fiber connectivity that does not go over a public network does not require an additional connectivity device.

Supported LUNs

The LUNs that you define for use with the TS7650G must meet certain requirements.

- The maximum LUN size that is supported for the TS7650G is 24TB. This limit includes both metadata and user data LUN classifications.
- The minimum LUN size that is supported for the TS7650G is 1 GB, the minimum for the quorum LUN.
- The maximum number of LUNs that is supported for the TS7650G is 1000.
- The minimum number of LUNs that is supported for the TS7650G is four: one for user data, one for the quorum LUN, and two for metadata.

Supported operating systems

The TS7650G can be accessed by a wide variety of servers, operating systems, and adapters.

To determine the latest attachments, or to obtain a comprehensive list of compatible software, choose one of the following options.

- For a list of compatible software, operating systems, and servers to access the TS7650G, visit the web at:
www.ibm.com/storage/support/
Select **Tape & optical** from the Product family menu and select **TS7650G** from the Product menu.
- Contact your IBM marketing representative.

Note: If you attach your TS7650G to hardware or software that is not provided by IBM, contact your software vendor to obtain a matrix of compatible hardware, software, firmware revisions, and adapters.

Supported device drivers

IBM provides support for device drivers for the components of the TS7650G.

IBM provides device driver support for the TS7650G. IBM maintains the latest levels of device drivers and driver documentation. IBM Service provides device driver support as needed.

Data management and advanced features

The TS7650G is designed with data management and advanced features. These features provide secure processing and access to your data to suit to your business needs.

RAID

A redundant array of independent disks (RAID) is a method of configuring multiple disk drives in a storage subsystem for high availability and high performance. The collection of two or more disk drives presents the image of a single disk drive to the system. If a single device fails, data can be read or regenerated from the other disk drives in the array.

Note: TS7650G 3958 DD6 does not support RAID configurations.

The TS7650G supports the following RAID configurations:

- RAID 1 for the internal hard disk drives of the gateway server
- RAID 5 for user data on attached disk storage
- RAID 6 for user data on attached SATA disk storage
- RAID 10 for meta data on attached disk storage

Configure other items such as block size and channel protection in accordance with the instructions from your disk storage manufacturer and with the *Best Practices Guide for IBM TS7600 ProtecTIER Deduplication Solutions*, publication GA32-0924.

Fencing

Fencing is a method to minimize downtime that is caused by hardware or software failure.

The fencing option for servers in the TS7650G provides higher availability for operations by minimizing the downtime that can occur if hardware or software fails in a server. You can use two-node active-active support to share disk storage between two servers in a clustered configuration.

In the fencing design for the TS7650G, two servers are installed in the same frame and configured to monitor each other. If one server fails, the other server resets the failed server and provides for an orderly reconstruction of the resources of the failed server.

Fencing requirements

Fencing is available only in a clustered TS7650G configuration, among other restrictions.

You must have one of the following combinations of gateway servers in a single frame:

- two 3958 DD6 servers
- two 3958 DD5 servers
- two 3958 DD4 servers

Note: Fencing with two gateway servers in different frames is not possible, because both gateway servers must be connected to the same network power switch.

Two-node active-active support

Two-node active-active support provides the capability to share disk storage between servers.

You can use two-node active-active support in the storage subsystem to share disk storage between two gateway servers in a clustered configuration. However, the DS3000, DS4000, and DS5000 families are only capable of active-passive support.

LUN masking

This section describes the LUN masking function.

LUN masking is used to control device visibility by allowing specific devices (for example, tape drives or robots) to be seen only by a selected group of host initiators. A host initiator is the WWN, or the physical address of a port of a fiber card of the host (that is, the server that the backup application is installed on).

LUN masking allows you to assign specific devices to a specific host running backup application modules. It enables multiple initiators to share the same target FC port without having conflicts on the devices being emulated.

The LUN masking setup can be monitored and modified at all times during system operation. LUN masking in ProtecTIER influences the visibility of the devices by the hosts systems. Keep in mind that every modification to LUN masking in ProtecTIER may affect the host configuration and may require re-scanning by the hosts.

Replication

You can use replication for system backup and for distribution of your ProtecTIER deployment across several sites.

Note: You must have a license for the replication feature for each ProtecTIER server in the replication grid.

The replication function provides complete system backup and allows ProtecTIER deployment to be distributed across sites. Each site has a single or clustered ProtecTIER environment. Each ProtecTIER environment has at least one ProtecTIER

server. The ProtecTIER server that is a part of the replication grid has two dedicated ports that are used for replication. Replication ports are connected to your wide area network and are configured on two subnets by default.

Note: Do not configure the replication ports on the same subnet as the external LAN port (eth0) or on the same subnets as each other. Doing so can cause replication errors.

Many-to-one replication

ProtecTIER many-to-one replication supports both single node and clustered ProtecTIER configurations.

Many-to-one replication provides the following functionality and support:

- **Setting replication performance limits** - This feature allows the user to set system-wide physical and/or nominal limits in order to indicate to the replication engine the maximal replication transfer rate allowed in the network for a specific repository. The performance limits refer to overall resource consumption of the system, and is reflected on the network transfer rate. Performance limits are based on the Replication Rate Control (RRC). Current RRC is used when a user does not provide a time frame and the system replicates continuously. The rate calculation uses performance limits to understand the maximum rate possible in both levels of system usage (IDLE, BUSY), and then it normalizes the rate accordingly.
- **Reserving space for hub repository** - This feature provides the ability to exclusively assign a fragment of a hub repository's capacity for local backups. In large deployments with many spokes replicating, capacity management done by the user might cause a situation where replication is trying to occupy all the space in hub repository. Since the assumption is that backup has precedence over replication, this feature has been added to ensure that capacity is reserved only for local backup, so that replication cannot be written to this storage fragment. Error notifications appear in the event the capacity reserved for the local backup or the capacity reserved for replication on the repository hub is running out of space.
- **Enhanced monitoring of repository space consumption** - This enhancement is displayed in the GUI as a nominal data pie, where a user can get at-a-glance the proportion of the nominal data out of the repository and the internal capacity distribution of replication data vs. local backup data and free space.
- **Additional Replication information in Repository's cartridge view** - This feature reports cartridge replication properties such as: last update time, destination, etc. to a replication view that displays replication properties for cartridges which are also displayed in the regular cartridge view. This feature allows the user to see replication properties for a batch of cartridges each in a single row. Sorting capability for the replication fields is equivalent to the sorting capabilities for the rest of the cartridge fields.
- **Disaster Recovery site replaces production site operation** - This feature supports a scenario where a disaster recovery site (the hub) is chosen to replace one of its spokes permanently. The feature allows the user to "take over" the responsibility for the cartridges of the old spoke after running the replace repository wizard from the Replication Manager.
- **Enhanced Timeframe support** - This feature enhances the repository timeframe attribute to be a weekly scheduler on a repository level. The timeframe is a set of 30 minute time intervals across a full week. The user chooses at which time interval the replication should run during a single week. The timeframe also uses the performance limits feature for limiting the replication rate when in timeframe.

- **Command Line Interface for Disaster Recovery** - This feature is a Command Line Interface (CLI) that allows a user to run complex queries on cartridges and provides cartridge batch move operation during a manual DR procedure. The feature allows the user to query ProtecTIER in order to obtain a list of cartridges that falls under specific criteria. The query criteria are cartridge replication properties and cartridge location properties.

Replication grid

The replication grid is defined as an entity that supports replication between its members. The replication grid members are PT repositories and are configured using a Replication Manager (RM). The RM is a software component that may be installed on a on a PT machine in a grid. The RM should be able to detect all members of the various networks that the RM handles on both replication subnets.

A replication grid defines a set of PT repositories and actions between them. The RM is server software that is separately deployed on the customer's WAN or on a PT machine. The RM on a stand-alone installation can manage the configuration of multiple replication grids in an organization. An agent on each PT system (specifically on every node) interacts with the server and maintains a table of its grid's members.

There are two types of replication grid:

Many-to-one

In a *many-to-one* environment, replication groups are created where multiple source repositories (*spokes*) can receive local backups and replicate to a single destination (*hub*). The destination repository can then act as a Disaster Recovery site for any number of the source repositories while still allowing local backups and replication from the active source repositories.

Many-to-one replication defines the following two roles in a replication grid:

- Spoke - A backup target that can only replicate to a single hub, may not be a target for replication.
- Hub - A replication and backup target, may receive replication from up to 12 spokes, may not replicate (besides failback).

A group of one hub and one or more spokes is referred to as a *topology group*. A single grid may include up to eight hubs and therefore up to eight topology groups. Spokes do not need physical connections between them. All repositories need a network connection to the replication manager server (a PT or dedicated host via RPQ approval).

Currently, the only many-to-one topology group supported is a VTL 12-way configuration, which consists of one to twelve spokes associated with one hub.

Note: When upgrading from one-to-one replication to many-to-one replication, the Replication Manager server automatically upgrades the grid's database; therefore all replication pairs will be set as hub and spoke accordingly. The GUI behaves as its multiple many-to-one pairs.

Many-to-many

In a *many-to-many* environment, replication groups are created where multiple repositories can replicate to each other. A many-to-many replication group can be defined with multiple repositories, where each repository assumes the responsibility of a hub repository and can receive

local backups, replicate data to remote hub repositories, as well as receive replicated data from remote hub repositories.

The following many-to-many topology groups are supported:

VTL 4-way

In a VTL configuration, up to four repositories act as both hub and spoke.

FSI 16-way

In an FSI configuration, up to sixteen repositories act as both hub and spoke.

For all many-to-one and many-to-many configurations, the same cartridge can be replicated from its principal repository to up to three destination repositories. Different cartridges can be replicated between multiple hub repositories in a bidirectional manner.

Important: Be sure to coordinate between the source and destination sites to ensure that the servers at both locations are fully configured before the you use the ProtecTIER Replication Manager GUI to create the replication grid. Consult with Solutions Assurance and your IBM Representative for assistance and information.

Supported replication configurations

- DD6 (Source server) + DD6 (destination server) - (s+s), (c+c), (c+s), (s+c)
- DD6 (source server) + DD5 (destination server) - (s+s), (c+c), (c+s), (s+c)
- DD5 (source server) + DD6 (destination server) - (s+s), (c+c), (c+s), (s+c)
- DD4 (source server) + DD6 (destination server) - (s+s), (c+c), (c+s), (s+c)
- DD5 (source server) + DD5 (destination server) - (s+s), (c+c), (c+s), (s+c)
- DD5 (source server) + DD4 (destination server) - (s+s), (c+c), (c+s), (s+c)
- DD4 (source server) + DD5 (destination server) - (s+s), (c+c), (c+s), (s+c)
- DD4 (source server) + DD4 (destination server) - (s+s), (c+c), (c+s), (s+c)

Legend: s = stand-alone c = cluster

Notes:

- The DR node or cluster should be of a higher capability when used as a multiple destination.
- When connecting two 3958 DD6 systems for replication, the infrastructure must allow for 10Gbase-T connections (RJ45).
- Replication between a 3958 DD6 and any other model of server (3958 DD5 or 3958 DD4) may require infrastructure changes on the switch to convert 10GbE fiber (3958 DD5 or 3958 DD4) connections to 10Gbase-T copper connections.

Baseboard Management Controller

The Baseboard Management Controller interface allows you to manage your TS7650G 3958 DD6 servers. The BMC interface is located in the same port used for the external connection; however, the BMC has its own IP address and can be accessed through a special web interface. This allows you to open a console and perform setup, installation, and maintenance functions on your server as if you were using a monitor and a keyboard connected directly to the server.

Note: The BMC IP address is initially set up during installation and configuration of ProtecTIER V3.4.3. Once the BMC IP is set up, you will be able to access the console through the web interface.

Refer to the *IBM TS7650G ProtecTIER Deduplication Gateway Installation Roadmap Guide*, GA32-0921 for detailed information about configuring the BMC.

Remote support through Call Home

Remote support is available for the TS7650G through the Call Home capability provided either in the ProtecTIER software or with TSSC. Please note that TSSC with the Call Home feature is not available on the 3958 DD6 server; however, Call Home is supported for 3958 DD6 using native call home tools provided in the ProtecTIER software. The Call Home feature reports failures detected by the ProtecTIER servers. Whenever a failure is detected, Call Home sends detailed error information to IBM (*home*). The IBM Service Representative can then prepare an action plan to handle the problem before traveling to the affected installation. The appliance or gateway might also periodically send support information (such as configuration, code versions, and error logs) to IBM. Doing so speeds-up problem determination and fault resolution. When enabled on the appliance and gateway, Call Home uses a connection on your Ethernet network to transmit hardware and software problem reports to IBM. Call Home is enabled and tested by IBM Service Representatives during initial system installation.

Tip: To enable Call Home, go to the TSSC General Settings page. The Call Home option allows you to select either a Modem or Ethernet interface. Set the Call Home option to use the Ethernet interface for the most reliable error notification.

When the Reliability, Availability, and Serviceability (RAS) software on the ProtecTIER server detects an error condition, Call Home sends detailed error information to IBM (*home*). If the error indicates a problem with a field replaceable unit (FRU), an IBM Service Representative can then prepare an action plan to handle the problem before traveling to your site.

The TS7650G four Call Home capabilities: Problem Call Home, Heartbeat Call Home, Test Call Home, and User-Initiated Call Home; descriptions follow. RAS sends data files that may be helpful to IBM Support Center personnel for all four types of Call Home. These data files include error logs and configuration information, such as the Machine Reported Product Data (MRPD) log.

Test Call Home

The IBM Service Representative sends a Test Call Home signal after enabling the Call Home feature during initial installation. You can also send a Test Call Home to ensure that the setup is correct and that the appliance or gateway can successfully open a Problem Management Record (PMR) in the IBM Remote Technical Assistance Information Network (RETAIN).

Problem Call Home

When RAS detects a problem, RAS initiates a Call Home operation to create a PMR in RETAIN. The PMR is a single page of text data that enables the Support Center or the Service Representative to access an action plan and a list of applicable FRU components.

Heartbeat Call Home

To ensure proper ongoing Call Home functionality, the system sends a Heartbeat Call Home on a regularly-scheduled basis. The heartbeat interval is user-defined.

User-Initiated Call Home

You can manually initiate Call Home from the TSSC GUI to collect a product engineering (PE) package.

For more information about Electronic Customer Care (ECC) and TSSC, refer to the following topics:

- “Call Home through ECC”
- “Call Home through the TSSC” on page 30

Call Home through ECC

Electronic Customer Care (ECC) is an integrated service tool that uses the Call Home feature to provide automation of error reporting.

Electronic Customer Care is provided as a native tool of ProtecTIER software. For ECC communication to function properly, verify the following:

- Ports 80 and 443 and FTP port 21 are open for outbound traffic.
- Outgoing connections are allowed through the firewall; otherwise, unpredictable results will occur.
- The firewall is set to block and allow connections by both hostname and IP address to avoid unpredictable results.
- The ProtecTIER node can pass through any firewall to which the above IPs have access.

Refer to the IP address worksheet in Appendix B of the Installation Roadmap Guide for information regarding the default IP addresses for the Electronic Customer Care.

Table 10 presents the capabilities of remote support with an ECC.

Table 10. Remote support capabilities through ECC

Customer site	Call Home events	<ul style="list-style-type: none">• Error initiated• Heartbeat (regular interval)• Test
	Support capability	<ul style="list-style-type: none">• Error-initiated problem reporting for up to 43 subsystems• Staged, error-specific data gathering• Subsystem and system console heartbeat reporting• Wellness checking• Log file storage (daily)• Code image and documentation repository (from media and RETAIN Fix Distribution Library)
	Remote support service tools	<ul style="list-style-type: none">• Code image broadcast• Call home event log review• End-of-call completion report

Table 10. Remote support capabilities through ECC (continued)

IBM support	Remote access	<ul style="list-style-type: none"> • Authenticated, secure remote access • Simultaneous call in and call home • Data transmission (TCP/IP) supported
	IBM call home database	<ul style="list-style-type: none"> • 24/7 access by IBM support staff • Error analysis and search capability

Call Home through the TSSC

The TSSC is a service tool that **must** be present in an IBM-supported 3958 DD4 or 3958 DD5 TS7650G server. You can either order a TSSC with your gateway, or use a TSSC already installed at your site.

Note: Please note that TSSC with the Call Home feature is not available on the 3958 DD6 server; Call Home is supported for 3958 DD6 using native call home tools provided in the ProtecTIER software.

Attention: While it is possible to operate a 3958 DD4 or 3958 DD5 without a connected TSSC, note that IBM **does not support** this configuration.

Tip: To enable Call Home, go to the TSSC General Settings page. The Call Home option allows you to select either a Modem or Ethernet interface. Set the Call Home option to use the Ethernet interface for the most reliable error notification.

To enable Call Home, go to the TSSC General Settings page. The Call Home option allows you to select either a Modem or Ethernet interface. Set the Call Home option to use the Ethernet interface for the most reliable error notification.

Table 11 presents the capabilities of remote support with a TSSC.

Table 11. Remote support capabilities with a TSSC

Customer site	Call Home events	<ul style="list-style-type: none"> • Error initiated • Heartbeat (regular interval) • Test
	TSSC support capability	<ul style="list-style-type: none"> • Error-initiated problem reporting for up to 43 subsystems • Staged, error-specific data gathering • Subsystem and system console heartbeat reporting • Wellness checking • Log file storage (daily) • Code image and documentation repository (from media and RETAIN Fix Distribution Library)
	TSSC and remote support service tools	<ul style="list-style-type: none"> • Code image broadcast • Call home event log review • End-of-call completion report

Table 11. Remote support capabilities with a TSSC (continued)

IBM support	TSSC remote access	<ul style="list-style-type: none">• Authenticated, secure remote access• Simultaneous call in and call home• Data transmission (TCP/IP) supported
	IBM call home database	<ul style="list-style-type: none">• 24/7 access by IBM support staff• Error analysis and search capability

Chapter 2. Physical planning specifications

You must plan for physical deployment of the TS7650G, and your site must meet certain specifications.

Before the TS7650G is installed at your site, verify that the planned installation site meets requirements, or prepare the site so that it does meet them. Preparations might involve meeting area requirements, environmental requirements, and electrical requirements for installation, service, and operation.

Site preparation

Planning for installation includes accounting for physical layout and site infrastructure.

Use the following information to prepare a location for installation of the components of the system.

Prepare a floor plan that includes the following information:

- Power outlet locations, types, and ratings
- Frame locations
- Operator and service clearances
- Dimensions of the areas that are designated to contain system components

Before hardware installation can begin, the local installation planning representative must verify that all installation planning and preparation is complete. User responsibilities include planning for the following items:

- Cabling and wiring for connections to the host
- Cooling and heating
- Safety and security
- Fire detection and suppression
- Floors (both raised and non-raised) that meet the operational and structural requirements necessary for the system components

Important: You must have a license for the replication feature for each ProtecTIER server in the replication grid. For replication to be enabled, the servers at both source and destination locations must be fully installed and configured before any other steps are taken. Use this information for planning at both sites as needed. Consult with Solutions Assurance and your IBM representative for assistance and information.

Lighting considerations

The TS7650G is designed for lights-out operation. No special lighting considerations apply.

Upgrade considerations

Consult your IBM representative for current planning information about upgrades to the TS7650G.

Accommodating cables

You must plan for accommodation of cabling requirements.

Review the following considerations when you plan for cabling accommodations.

Electrical power cabling

Plan for the TS7650G before delivery. This planning includes cabling for a second source if you order the dual power option and plan to use independent power sources.

Fibre Channel cabling

Planning for Fibre Channel cabling includes consideration of the following items.

- Connection from the TS7650G adapters to the attached host servers or switch fabric
- Connection from the server frame to the disk storage frame

Ethernet cabling

Category 6a or higher Ethernet cabling is required for attaching the TS7650G to the operator consoles and to the network for replication and Call Home.

Clustered configurations

In clustered configurations, a network connection between the Ethernet ports on the two TS7650G servers is required for mutual operational state monitoring.

Calculating space requirements

You must calculate space requirements, such as dimensions, clearances, and weights, for your TS7650G.

When you plan the installation location, first calculate the total amount of space that is needed for the TS7650G components. Your calculation must include all service clearances and weight distribution areas. See the following subsections.

- “TS7650G dimensions and weights”
- “Operator and service clearances” on page 35
- “Height requirements” on page 35
- “Floor requirements” on page 35

TS7650G dimensions and weights

Table 12 lists the TS7650G component dimensions.

Table 12. TS7650G component dimensions

Component	Height	Width	Depth
3958 DD6	88.9 mm (3.5 in)	483.0 mm (19.0 in)	630.0 mm (24.8 in)

The total weight of the TS7650G depends on the number of components that are installed. Table 13 displays the weight of the gateway server.

Table 13. TS7650G gateway enclosure weight

Unit	Weight
TS7650G 3958 DD6	24 kg (52.9 lb)

Operator and service clearances

Clearances are required around system components for the operator and the service representative to perform certain tasks. The service clearance is the area that is required to open the service covers and to pull out components for servicing. The weight distribution area is the area that is required to distribute the weight of the storage unit.

Notes:

- Size is defined by the depth from the outside of the frame and either the width of a stand-alone frame or the length along any frames that are installed side-by-side. The width is on a frame-to-frame basis; space that is required in front or behind each frame is additive. The access space for individual frames overlaps.
- The required clearance around the frame is shown in the following list.
 - Front: 690 mm (27.2 in.)
 - Back: 660 mm (26.0 in.)
 - Side: 0 mm (0 in.)
- Unlike weight distribution areas that are required to handle floor loading, service clearances of adjacent unrelated storage units can overlap.

Note: The terms *service clearance area* and *weight distribution area* are often confused with each other. The service clearance is the area that is required to open the service covers and to pull out components for servicing. The *weight distribution area* is the area that is required to distribute the weight of the storage unit.

Height requirements

The minimum floor-to-ceiling clearance that is required for installation, and the required operating and service clearances, are determined by the dimensions of the frames. For the TS7650G, IBM server components must be installed in a separate frame from disk storage components.

For more information, see “TS7650G hardware components” on page 2.

Floor requirements

A frame can be installed on a raised or solid floor that meets the minimum leveling and floor-loading capacity requirements.

Floor level requirements

You must meet floor level requirements at the installation site.

The maximum out-of-level condition is 25.4 mm (1 in.) over the length and width of the frame. For the TS7650G, the frame that you provide must include leveling pads that can be adjusted to compensate for an uneven floor where the frame is to be installed.

Weight distribution and floor loading

The floor loading (FL) for your TS7650G must not exceed the floor load rating (FLR) of its installation location. Use the guidance in *IBM Corporate Standard: Machine Mobility, Stability, Size and Mass: Design Requirements, C-S 1-3705* to determine maximum FLR for your installation. These determinations do not include transient loading by personnel or equipment traffic.

If the frame is installed on a raised floor, the raised floor must be stabilized to prevent a horizontal shift of the raised floor structure.

Security considerations

You must consider security measures that need to be taken with the TS7650G.

Controlling access to the TS7650G is your responsibility. Consider installing the system in a controlled-access area to prevent unauthorized access to the hardware components, and the ProtecTIER Manager console.

For troubleshooting purposes, an IBM service representative might need to open an SSH session to the gateway server. To do so, the IBM service representative needs the *ptadmin* account password. If you change the default password, you must make the new password available to the IBM service representative upon request.

Electrical power ratings

Your installation site must meet the electrical power requirements for the TS7650G.

You must supply two 220 V power distribution units in the supplied frame.

Table 14. Power ratings for single-server TS7650G per power cable

Product	Input voltage	Input frequency	Current	Inrush current	Power	Apparent power	KBtu/hr
3958 DD5	200 - 240 V ac	50 - 60 Hz	7 A	250 A	1400 W	1.4 kVA	4.8
3958 DD6	100 - 240 V ac	50 - 60 Hz	24-7 A	<25 AKp	1220 W	1.22 kVA	4.2

Table 15. Power ratings for clustered TS7650G per power cable

Product	Input voltage	Input frequency	Current	Inrush current	Power	Apparent power	KBtu/hr
3958 DD5	200 - 240 V ac	50 - 60 Hz	14 A	250 A	2800 W	2.8 kVA	9.6
3958 DD6	100 - 240 V ac	50 - 60 Hz	12-14 A	<25 Akp	2440 W	2.44 kVA	8.3

Note: The clustered TS7650G is connected through an included remote network power switch. These quantities refer to the requirements for that configuration.

Acoustic declaration

Table 16 describes the acoustical noise emissions for the 3958 DD5 gateway server.

Table 16. Acoustic declaration for the gateway servers

Sound power	
Operating	Idling
< 6.3 bel (declared)	5.8 bel (declared)

Note: 10 dB (decibel) = 1 B (bel)

Safety issues

You must consider various safety issues when you plan your TS7650G location.

The following list identifies some of the safety issues that you must consider.

- Fire suppression
- Earthquake safety

Providing a fire-suppression system

You are responsible for providing a fire suppression system for your TS7650G.

IBM designs and manufactures equipment to internal and external standards that require certain environments for reliable operation. Because IBM does not test any equipment for compatibility with fire-suppression systems, IBM does not make compatibility claims of any kind. IBM does not provide recommendations on fire-suppression systems.

Consult your insurance underwriter, local fire marshal, or local building inspector about selecting a fire-suppression system that provides an appropriate level of coverage and protection.

Chapter 3. Components and feature codes

Descriptions of required and optional feature codes for each TS7650G component are provided to help you select the features appropriate to your needs.

TS7650G feature codes

You can review the details of required and optional features for the TS7650G to determine which feature combination best meet your needs.

Feature codes are provided for the following components:

- “3958 DD6 gateway server feature codes”
- “3958 DD5 gateway server feature codes” on page 45
- “5639-PTA ProtecTIER Enterprise Edition V3.4 Base Software” on page 52

Attention: The license keys that are necessary for TS7650G feature enablement require you to install and make operational the TS7650G console software before any IBM TS7650G ProtecTIER Deduplication Gateway features can be enabled.

3958 DD6 gateway server feature codes

You can review the details of required and optional features that are specific to the TS7650G gateway server to determine which feature combination best meets your needs.

A KVM is required for servicing the TS7650G 3958 DD4 and 3958 DD5 servers. The KVM is the service console that provides the ability to use Keyboard, Video and Mouse over an Ethernet connection.

Note: Please note that the KVM is no longer provided and *must* be supplied by the customer.

Service for the 3958 DD6 server can be handled utilizing the Baseboard Management Controller (BMC). Therefore, connection to a working KVM is optional for the 3958 DD6 server.

Feature Code	Feature name	Description	Planning information
3958 DD6	TS7650G Server	<p>Gateway server – 1 3958 DD6 Enclosure with rack mounting hardware, two Power Control Modules (PCMs), one SAS logging drive (600 Gb) for a single node or two SAS Logging drives for a cluster node, two power cords to connect to a PDU in the rack, 1U controller with 10Gb/s Ethernet, memory configuration (128 Gb), 1 SSD (128 Gb), low profile, quad port 8Gb/s Fiber Channel HBA for back-end disk attachment, and a build in 1 Gb/ 10 Gb Ethernet port for replication.</p> <p>Note: The 3958 DD6 enclosure contains 24 SAS drive slots of which only 2 (slots 1 and 24) are used for logging. The remaining slots are filled with dummy carriers.</p>	
AGK2	25 meter OM3 fibre cable (LC)	This feature provides a 25 meter 50.0/125 micrometer fiber optic cable terminated with LC Duplex connectors.	<p>Feature type: Chargeable</p> <p>Required: No</p> <p>Maximum number: 8</p> <p>Minimum number: Zero</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> • Either FC AGK2 or FC 9700 is required • Valid quantities: 0, 4, or 8 <p>Corequisite: None</p> <p>Installation: Plant or field</p> <p>Removable: Yes</p>

Feature Code	Feature name	Description	Planning information
AGK4	FSI node with 1 GB-e	This feature installs a File System Interface (FSI) processor module using a quad port 1-Gbps 10/100/1000Base-TX PCIe Ethernet adapter for host side connections and a quad port 8 Gb fibre channel HBA for back-end disk connections. The Ethernet adapter has an RJ-45 connector for attaching Cat6 cables. This adapter conforms to the IEEE 802.3ab 1000Base-T standard. It supports distances of up to 100 meters using four pairs of Cat6 balanced copper cabling.	<p>Feature type: Chargeable</p> <p>Required: Yes</p> <p>Maximum number: Two</p> <p>Minimum number: Zero</p> <p>Prerequisite: FC 9024</p> <p>Limitations: A maximum of one FC AGK6, AGK9 or AGKE, or two of AGK4 plus AGK5 plus AGK7 plus AGK8 plus AGKE is allowed.</p> <p>Installation: Plant or field</p> <p>Removable: Yes</p>
AGK5	8 Gb FC HBA	This feature installs a quad port 8 Gb fibre channel HBA for host connections.	<p>Feature type: Chargeable</p> <p>Required: No</p> <p>Maximum number: One</p> <p>Minimum number: Zero</p> <p>Prerequisite: FC 9022</p> <p>Corequisite: None</p> <p>Installation: Plant only</p> <p>Removable: No</p>
AGK6	VTL Clustered Node	This feature installs the second processor module required for a clustered VTL system. Each processor module includes two quad port 8 Gb fibre channel HBAs for host and back-end disk connections.	<p>Feature type: Chargeable</p> <p>Required: No</p> <p>Maximum number: One</p> <p>Minimum number: Zero</p> <p>Prerequisite: FC 9022, AGK5</p> <p>Limitation: A maximum of one FC AGK6, AGK9 or AGKE, two of AGK4 plus AGK5 plus AGK7 plus AGK8 plus AGKE is allowed.</p> <p>Corequisite: None</p> <p>Installation: Plant only</p> <p>Removable: Yes</p>

Feature Code	Feature name	Description	Planning information
AGK7	FSI node with 10 Gb-e	This feature installs a quad port 10-Gbps 10/100/1000Base-TX PCIe Ethernet adapter for host side connections in the Model DD6. The Ethernet adapter has an RJ-45 connector for attaching Cat6 cables. This adapter conforms to the IEEE 802.3ab 1000Base-T standard. It supports distances of up to 100 meters using four pairs of Cat6 balanced copper cabling.	<p>Feature type: Chargeable</p> <p>Required: No</p> <p>Maximum number: One</p> <p>Minimum number: Zero</p> <p>Prerequisite: FC 9024</p> <p>Corequisite: None</p> <p>Limitations: One FC AGK4 or AGK7 is required.</p> <p>Installation: Plant only</p> <p>Removable: Yes</p>
AGK8	Second FSI node with 1 Gb-e	This feature configures the second processor node, logging drive, and additional 1 Gb Ethernet adapter for a TS7650G server with two stand-alone (non-clustered) nodes. The two nodes in this configuration can NOT share the same back-end repository.	<p>Feature type: Chargeable</p> <p>Required: No</p> <p>Maximum number: One</p> <p>Minimum number: Zero</p> <p>Prerequisite: FC 9024</p> <p>Corequisite: None</p> <p>Installation: Plant or Field</p> <p>Removable: Yes</p>
AGK9	Second FSI node with 10 Gb-e	This feature configures the second processor node, logging drive, and additional 10 Gb Ethernet adapter for a TS7650G server with two stand-alone (non-clustered) nodes. The two nodes in this configuration can NOT share the same back-end repository.	<p>Feature type: Chargeable</p> <p>Required: No</p> <p>Maximum number: One</p> <p>Minimum number: Zero</p> <p>Prerequisite: FC 9024</p> <p>Corequisite: None</p> <p>Installation: Plant or Field</p> <p>Removable: Yes</p>

Feature Code	Feature name	Description	Planning information
AG00	Shipping and Handling - No charge	This feature indicates the TS7650G will not have a shipping and handling charge added to the order. Note: Select either FC AGKA or FC AG00 on the order.	Feature type: No Charge Required: No Maximum number: One Minimum number: Zero Prerequisite: None Corequisite: None Installation: Plant only Removable: No
AGKA	Shipping and Handling	This feature indicates the TS7650G model DD6 will have a shipping and handling charge added to the order. Note: Select either FC AGKA or FC AG00 on the order.	Feature type: No Charge Required: No Maximum number: One Minimum number: Zero Prerequisite: None Corequisite: None Installation: Plant only Removable: No
0983	TAA Compliance	This feature indicates that the product is TAA compliant.	Feature type: No Charge Required: No Maximum number: One Minimum number: Zero Prerequisite: None Limitation: FC 0983 is not available in India. Corequisite: None Installation: Plant only Removable: No

Feature Code	Feature name	Description	Planning information
AGKC	ProtecTIER V3.4 Enterprise	This feature instructs Manufacturing to preload ProtecTIER Enterprise Edition version 3.4 software (PID 5639-PTA) on the TS7650G gateway model. A separate order for the software is required.	<p>Feature type: No Charge</p> <p>Required: Yes</p> <p>Maximum number: Two</p> <p>Minimum number: One</p> <p>Prerequisite: None</p> <p>Limitation: Two feature #AGKC are required on the model DD6 when #AGK6 is ordered.</p> <p>Corequisite: None</p> <p>Installation: Plant only</p> <p>Removable: No</p>
9022	ProtecTIER Virtual Tape Library (VTL)	This feature designates that this ProtecTIER system to be configured for use as a virtual tape library management system.	<p>Feature type: Chargeable</p> <p>Required: Yes</p> <p>Maximum number: One</p> <p>Minimum number: One</p> <p>Prerequisite: FC AGK5 or AGK6 is required</p> <p>Corequisite: None</p> <p>Installation: Plant only</p> <p>Removable: No</p>
9024	FSI	This feature designates that this ProtecTIER system to be configured for use as a File System Interface system.	<p>Feature type: Chargeable</p> <p>Required: No</p> <p>Maximum number: Two</p> <p>Minimum number: Zero</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> • FC AGK4 or AGK7 is required • At least one of FC 9022, 9023, or 9024 is required <p>Corequisite: None</p> <p>Installation: Plant or field</p> <p>Removable: No</p>

Feature Code	Feature name	Description	Planning information
9700	No Factory Cables	This feature should be specified if you do not want the factory to ship any Fibre Channel cable features with the new machine. These Fibre Channel cables are for attachment to switches or host servers.	Feature type: Chargeable Required: No Maximum number: One Minimum number: One Prerequisite: One of FC 9700 is required when FC AGK2 is zero Corequisite: None Installation: Plant only Removable: Yes

3958 DD5 gateway server feature codes

You can review the details of required and optional features that are specific to the TS7650G gateway server to determine which feature combination best meets your needs.

Note: Please note that TSSC with the Call Home feature is not available on the 3958 DD6 server; however, it continues to be supported on 3958 DD5 and 3958 DD4 TS7650G servers.

A TSSC is required for servicing the 3958 DD5 and 3958 DD4 TS7650G servers. FC 2715 provides connectivity to an existing TSSC. FC 2724 provides the first TSSC.

The connection to a working TSSC is required for the 3958 DD5 server. The TSSC is the service console and supports remote access and Call Home functions.

The 3958 DD5 server gathers logs and sends them to the TSSC as part of a Call Home packet that is sent to RETAIN. In cases where external connection for the TSSC is not allowed, the TSSC is the repository of the logs and is still a requirement.

FC 2724 is the TSSC feature code. FC 2715 provides connectivity to an existing TSSC.

Feature Code	Feature name	Description	Planning information
3958 DD5	TS7650G Server	Gateway server – x3850X5 (MT 7143) – Seven 5.0 Gb PCIe I/O (one x16, five x8, one x4) sockets. Four 10-core Intel Xeon E7-4870 processors, 2.26 GHz, 64 GB of memory	

Feature Code	Feature name	Description	Planning information
2704	Console Expansion 26 Port Ethernet Switch/Rack mount	The feature provides a 26-port Ethernet switch and an attachment cable for connection to a TS3000 System Console or Master Console for Service. Up to 24 connections are provided by this feature for connection of FC 2715 or another FC 2704.	<p>Feature type: Chargeable</p> <p>Required: One of FC 2704, 2715, 2722, or 2724</p> <p>Maximum number: Two of FC 2704, 2715, 2722, or 2724</p> <p>Minimum number: One of FC 2704, 2715, 2722, or 2724</p> <p>Prerequisite: None</p> <p>Corequisite: None</p> <p>Installation: Plant or field</p> <p>Removable: Yes</p>
2715	Console Attachment	This feature provides a cable to attach to the Ethernet hub provided by an existing TSSC (features FC 2720, FC 2721, FC 2722, FC 2724, FC 2730, or FC 2732), IBM TotalStorage Master Console for Service (FC 2718), or Console Expansion (FC 2704). A maximum of 40 of FC 2715 can be included in a single console facility.	<p>Feature type: Chargeable</p> <p>Required: One of FC 2704, FC 2715, FC 2722, or FC 2724</p> <p>Maximum number: Two of FC 2704, FC 2715, FC 2722, or FC 2724</p> <p>Minimum number: One of FC 2704, FC 2715, FC 2722, or FC 2724</p> <p>Prerequisite: None</p> <p>Corequisite: None</p> <p>Installation: Plant or field</p> <p>Removable: Yes</p>
2724	Rack Mount TS3000 TSSC	This feature provides the enhanced rack-mountable TS3000 System Console and an Ethernet cable for connection of one machine to an IBM supplied modem to enable remote enhanced service.	<p>Feature type: Chargeable</p> <p>Required: One of FC 2704, 2715, 2722, or 2724</p> <p>Maximum number: Two of FC 2704, 2715, 2722, or 2724</p> <p>Minimum number: One of FC 2704, 2715, 2722, or 2724</p> <p>Prerequisite: One of FC 2704</p> <p>Corequisite:</p> <ul style="list-style-type: none"> • FC 2734 • FC 5510 and FC 5512 <p>Installation: Plant or field</p> <p>Removable: Yes</p>

Feature Code	Feature name	Description	Planning information
2734	USB Modem	This feature provides a USB modem for use with FC 2724, TS3000 System Console.	Feature type: Chargeable Required: No Maximum number: One Minimum number: Zero Prerequisite: None Corequisite: One of FC 2724 Installation: Plant or field Removable: Yes
3437	Cluster Connection Kit	This feature provides a network power switch, two Ethernet switches, and associated cables and mounting hardware to create a clustered configuration between two TS7650 servers. The network power switch is used to automatically control the power to a failed node. Note: <ul style="list-style-type: none"> The Cluster Connection Kit is not supported on ProtecTIER V3.4.3; however support remains for V3.3 and earlier. Only one Cluster Connection Kit is required for each pair of clustered nodes. Both clustered servers must be installed in the same rack. This feature delivers the required power cords and Ethernet cables to attach the two servers with the network power switch and Ethernet switches. The Cluster Connection Kit must be installed in the same rack as the servers. 	Feature type: Chargeable Required: No Maximum number: One Minimum number: Zero Prerequisite: None Corequisite: None Restrictions: Mutually exclusive with FC 9024 Installation: Plant only Removable: No

Feature Code	Feature name	Description	Planning information
3456	1 Gbps quad-port Ethernet adapter	This feature provides a quad-port 1 Gbps 10/100/1000Base-TX PCIe Ethernet adapter. This adapter has an RJ-45 connector for attaching Cat6 cables. This adapter conforms to the IEEE 802.3ab 1000Base-T standard. It supports distances of up to 100 meters by using four pairs of Cat6 balanced copper cabling.	<p>Feature type: Chargeable</p> <p>Required: No</p> <p>Maximum number: Two</p> <p>Minimum number: Zero</p> <p>Prerequisite: Two of FC 3456 or FC 3457 are required with FC 9023 and 9024.</p> <p>Corequisite: None</p> <p>Restrictions: Mutually exclusive with FC 3457</p> <p>Installation: Plant only</p> <p>Removable: Yes</p>
3457	10 Gbps dual-port Ethernet adapter	This feature provides a dual-port 10-Gbps Ethernet longwave adapter. This adapter has an SC Duplex connector for attaching 9-micron single mode fiber cable. It is a standard longwave (1,310 nm) adapter that conforms to the IEEE 802.3ae standards. It supports distances up to 10 km.	<p>Feature type: Chargeable</p> <p>Required: No</p> <p>Maximum number: Two</p> <p>Minimum number: Zero</p> <p>Prerequisite: Two of FC 3456 or FC 3457 required with FC 9023 and 9024.</p> <p>Corequisite: None</p> <p>Restrictions: Mutually exclusive with FC 3456</p> <p>Installation: Plant or field</p> <p>Removable: No</p>
3458	8-Gb FC Dual Port HBA - Host	This 8-Gb FC dual-port PCIe HBA provides the connections to the host servers or switches.	<p>Feature type: Chargeable</p> <p>Required: No</p> <p>Maximum number: Two</p> <p>Minimum number: Zero</p> <p>Prerequisite: FC 9022</p> <p>Corequisite: None</p> <p>Installation: Plant only</p> <p>Removable: No</p>

Feature Code	Feature name	Description	Planning information
3468	10-core processor card	This feature provides a 10-way processor card to support server hardware requirements.	Feature type: Chargeable Required: Yes Maximum number: Two Minimum number: Two Prerequisite: None Corequisite: None Installation: Plant only Removable: No
3469	8-GB memory unit	This feature provides an 8-GB memory card (in the form of two 4 GB DIMMs) to support server hardware requirements.	Feature type: Chargeable Required: Yes Maximum number: Four Minimum number: Four Prerequisite: None Corequisite: None Installation: Plant only Removable: No
5510	Plant install KVM Switch	This feature provides the KVM switch, cables, and mounting hardware to be plant-installed in the frame or delivered for installation in a rack.	Feature type: Chargeable Required: No Maximum number: One Minimum number: Zero Prerequisite: None Corequisite: FC 2722 or FC 2724, and FC 5512 Installation: Plant or field Removable: Yes
5512	KVM Display, Keyboard, Mouse	This feature provides the KVM display, keyboard, mouse, and mounting hardware to be plant-installed in the frame or delivered for installation in a rack.	Feature type: Chargeable Required: No Maximum number: One Minimum number: Zero Prerequisite: FC 2722 or FC 2724 Corequisite: FC 5510 Installation: Plant or field Removable: Yes

Feature Code	Feature name	Description	Planning information
5513	KVM adjacent frame connection	This feature provides a cable to connect one or two gateways to the KVM switch in an adjacent unit with feature FC 5510 and FC 5512 installed. This configuration allows the keyboard, mouse, and video display that is installed with FC 5512 to be used by this ProtecTIER system. A maximum of four FC 5513S can be attached to a single FC 5510.	<p>Feature type: Chargeable</p> <p>Required: No</p> <p>Maximum number: One</p> <p>Minimum number: Zero</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> • FC 2704 or FC 2715 • FC 5510 and FC 5512 must exist in an adjacent frame or rack. <p>Corequisite: None</p> <p>Installation: Plant or field</p> <p>Removable: Yes</p>
5514	2nd server in adjacent frame	This feature designates the second gateway which uses the FC 5513 cable to share the keyboard, mouse, and video display from an adjacent frame with FC 5512 installed.	<p>Feature type: Chargeable</p> <p>Required: No</p> <p>Maximum number: One</p> <p>Minimum number: Zero</p> <p>Prerequisite:</p> <ul style="list-style-type: none"> • FC 2704 or FC 2715 • FC 5513 on another ProtecTIER server in the same rack or frame. <p>Corequisite: None</p> <p>Installation: Plant or field</p> <p>Removable: Yes</p>
AGK2	25-Meter LC/LC OM3 Fibre Channel Cable	This feature provides a 25 meter (82 ft.) 50.0/125 micrometer short wavelength multimode OM3 fiber-optic cable with LC duplex connectors on both ends. Note: This cable is for attaching a ProtecTIER server with an LC duplex connector to switches, disk subsystem, or hosts with LC duplex Fibre Channel connectors. Host cables only.	<p>Feature type: Chargeable</p> <p>Required: No</p> <p>Maximum number: Four (Maximum of eight with cluster support.)</p> <p>Minimum number: Zero</p> <p>Prerequisite: None</p> <p>Corequisite: None</p> <p>Restrictions: One of FC 9700 or at least four of FC AGK2 must be installed</p> <p>Installation: Plant or field</p> <p>Removable: No</p>

Feature Code	Feature name	Description	Planning information
9022	ProtecTIER Virtual Tape Library (VTL)	This feature designates that this ProtecTIER system to be configured for use as a virtual tape library management system.	Feature type: Chargeable Required: No Maximum number: One Minimum number: Zero Prerequisite: Two of FC 3458 Corequisite: None Restrictions: Mutually exclusive with FC 3456, FC 3457, FC 9023, and FC 9024 Installation: Plant only Removable: No
9024	FSI	This feature designates that this ProtecTIER system to be configured for use with FSI.	Feature type: Chargeable Required: No Maximum number: One Minimum number: Zero Prerequisite: Two of FC 3456 or FC 3457 Corequisite: None Restrictions: Mutually exclusive with FC 3437, FC 3458, FC 9022, and FC 9023 Installation: Plant only Removable: No
9319	ProtecTIER V3.3 EE preinstalled software	This feature instructs IBM manufacturing to load ProtecTIER V3.3 Enterprise Edition software (PID 5639-PTA) on the ProtecTIER server. A separate order for the software is required.	Feature type: No charge Required: Yes Maximum number: One Minimum number: One Prerequisite: None Corequisite: None Installation: Plant only Removable: No

Feature Code	Feature name	Description	Planning information
9340	Rack Mount	This specify code indicates that this ProtecTIER server is to be mounted in a customer-provided, industry standard 19-inch rack.	Feature type: Chargeable Required: Yes Maximum number: One Minimum number: One Prerequisite: None Corequisite: None Installation: Plant only Removable: No
9700	No Factory Cables	Specify this feature if you do not want the factory to ship any Fibre Channel cable features with the new system. These Fibre Channel cables are for attachment to switches or host servers.	Feature type: Chargeable Required: No Maximum number: One Minimum number: Zero Prerequisite: None Corequisite: None Restrictions: One of FC 9700 or at least four of FC AGK2 must be installed Installation: Plant only Removable: Yes

One of the following disk attachment features is required:

- FC 9030, Attach new DS8000®
- FC 9031, Attach new DS5000
- FC 9033, Attach new XIV
- FC 9034, Attach new Storwiz V7000
- FC 9038, Attach other new IBM disk
- FC 9039, No new IBM disk

5639-PTA ProtecTIER Enterprise Edition V3.4 Base Software

This software provides the base functionality for ProtecTIER EE.

The software supports any capacity of FC or SATA disk drives in its disk storage pool. It is ordered on a 'per server' basis.

Capacity support

This is the base function for ProtecTIER EE. It supports any capacity of either FC and SATA disk drives in its disk storage pool. It is ordered on a 'per terabyte' basis for usable capacity of the whole configuration, by using the following capacity tiers.

- Per Terabytes (1-12)
- Per Terabytes (13-32)
- Per Terabytes (33-64)
- Per Terabytes (65 - 100)
- Per Terabytes (101-250)
- Per Terabytes (251+)
- Per 250 Terabytes (251+)

Clustering

This feature allows the server that is running this software to share a common disk storage pool with a second server that is running ProtecTIER EE with the clustering feature. This feature is ordered on a 'per terabyte' basis with the same capacity tiers as Capacity support.

Replication

This feature allows the server that is running this software to replicate data to a second system that is running ProtecTIER EE with the replication feature. This feature is ordered on a 'per terabyte' basis with the same capacity tiers as Capacity support.

Note: You must have a license for the replication feature for each ProtecTIER server in the replication grid.

- DATs and Chargeable Components for the base software
- PID# 5639-PTA ProtecTIER Enterprise Edition V3.4
- CC#1 ProtecTIER (IPLA178V1, IASP387V1, IASP390V1, IASP388V1, IASP389V1, IASP391V1)
 - Per Server with 1-year SW Maintenance
 - Media Deliverable
- CC#2 Capacity Support (IPLA480V1, IASP480V1, IASP481V1, IASP482V1, IASP483V1, IASP484V1)
 - Per Terabytes (1-12) with 1-year SW Maintenance
 - Per Terabytes (13-32) with 1-year SW Maintenance
 - Per Terabytes (33-64) with 1-year SW Maintenance
 - Per Terabytes (65 - 100) with 1-year SW Maintenance
 - Per Terabytes (101-250) with 1-year SW Maintenance
 - Per Terabytes (251+) with 1-year SW Maintenance
 - Per 250 Terabytes (251+) with 1-year SW Maintenance
 - Media deliverable (code that is shipped via CC#1)
- CC#3 Clustering Support (IPLA480V1, IASP480V1, IASP481V1, IASP482V1, IASP483V1, IASP484V1)
 - Per Terabytes (1-12) with 1-year SW Maintenance
 - Per Terabytes (13-32) with 1-year SW Maintenance
 - Per Terabytes (33-64) with 1-year SW Maintenance
 - Per Terabytes (65 - 100) with 1-year SW Maintenance
 - Per Terabytes (101-250) with 1-year SW Maintenance
 - Per Terabytes (251+) with 1-year SW Maintenance
 - Per 250 Terabytes (251+) with 1-year SW Maintenance

- Media deliverable (code that is shipped via CC#1)
- CC#4 Replication Support (IPLA480V2)
 - Per Terabytes (1-12) with 1-year SW Maintenance
 - Per Terabytes (13-32) with 1-year SW Maintenance
 - Per Terabytes (33-64) with 1-year SW Maintenance
 - Per Terabytes (65 - 100) with 1-year SW Maintenance
 - Per Terabytes (101-250) with 1-year SW Maintenance
 - Per Terabytes (251+) with 1-year SW Maintenance
 - Per 250 Terabytes (251+) with 1-year SW Maintenance
 - Media deliverable (code that is shipped via CC#1)
- ProtecTIER EE SWMA PIDs for Enterprise Edition are:
 - 5639-XXC – 1-year Registration & Renewal
 - 5639-XXD – 1-year After License
 - 5639-XXE – 3-year Registration
 - 5639-XXF – 3-year Renewal
 - 5639-XXG – 3-year After License
 - 5639-XXJ – 2-year Registration
 - 5639-XXK – 4-year Registration
 - 5639-XXL – 5-year Registration
- CC#4 Replication Support (IASP480V2, IASP481V2, IASP482V2, IASP483V2, IASP484V2, IASP737V1, IASP738V1, IASP739V1)
 - Per Terabytes (1-12) with 1-year SW Maintenance
 - Per Terabytes (13-32) with 1-year SW Maintenance
 - Per Terabytes (33-64) with 1-year SW Maintenance
 - Per Terabytes (65 - 100) with 1-year SW Maintenance
 - Per Terabytes (101-250) with 1-year SW Maintenance
 - Per Terabytes (251+) with 1-year SW Maintenance
 - Per 250 Terabytes (251+) with 1-year SW Maintenance
 - Media deliverable (code that is shipped via CC#1)

Chapter 4. Sizing, configuration, and usage considerations

Sizing, configuration, and usage TS7650G are among the items that you must consider when you plan for installation.

The performance of components that you supply, such as backup servers and storage arrays, can greatly effect solution performance. Understanding other factors, such as the amount of time that is allotted for backups; the type of data that is being stored; and the rate at which the data changes; helps you to decide about the design for your TS7650G solution. Your IBM representative can discuss these factors with you to help you design a solution that meets your needs.

Backup servers

Understanding the various methods for connecting the backup servers to the gateway server and configuring the backup server applications for optimal performance with the TS7650G.

SAN connectivity

Understanding how the TS7650G can be installed in your existing SAN environment.

Storage arrays

Understanding the performance benefits of Fibre Channel drives over SATA drives, comparisons of different RAID levels, and recommendations for configuring LUNs.

Data types

Understanding how the compressibility of different data types affects the amount of storage that is required for your TS7650G solution.

Replication configuration requires careful planning, decision-making, and coordination of effort. Before you get started, it is strongly recommended that you complete these tasks:

- Make sure that TCP ports 6520, 6530, 6540, 6550 are open in your firewall. Each ProtecTIER server being used for replication must allow TCP access through these ports.
- Ensure that the replication ports are on a different subnet than the external local area network (LAN) port. Having the replication ports and the external LAN port on the same subnet may cause replication errors.

Chapter 5. Customer installation responsibilities

You must meet certain responsibilities before system installation.

Before you begin

Before you begin to install the TS7650G, you must have a completed Technical Delivery Assessment (TDA). You must also complete the planning worksheets and prepare the installation site.

You must plan for each TS7650G system by completing a TDA with assistance from an IBM installation planning representative or IBM service representative. The documents located at <http://w3-03.ibm.com/support/assure/assur30i.nsf/WebIndex/SA982> describe how to plan and prepare for a TS7650 system installation.

The TDA and the worksheets provided in Appendixes B - D in this manual detail the information you must complete for each TS7650G system and give to the IBM installation planning representative or IBM service representative. The recorded information in the worksheets is used to install and configure the TS7650G system. Before you start an installation, ensure that you have these completed worksheets.

You must prepare the installation site before the equipment is delivered. Ask your IBM Sales representative or Business Partner to engage a Technical Advisor as soon as possible to assist with planning process.

Your role in installation planning

You are responsible for preparing the installation site, as described in Chapter 2, "Physical planning specifications," on page 33, before installation of the TS7650G.

All physical planning for the TS7650G is your responsibility. In summary, you are responsible for providing network connections (cables and switches), SNMP catcher, email servers, host clients, KVM and email services for Call Home and IMM alerts. You must provide IBM with all necessary IP addresses for the installation of the TS7650G:

- two IP addresses per 3958 DD5 or 3958 DD6 server (for a clustered installation), or
- one IP address per 3958 DD5 or 3958 DD6 server (for a stand-alone installation)
- two IP addresses for the 3958 DD6 Baseboard Management Controller (for a clustered installation), or
- one IP address for the 3958 DD6 Baseboard Management Controller (for a stand-alone installation)
- one IP address for the TSSC. You must supply an analog telephone line for the TSSC, or provide for Internet Call Home and support. You must supply a USB keyboard and SVGA monitor for use during the installation process.

Notes:

- For certain operations such as a Firmware upgrade, an additional IP address for the BMC is required. This address should be in the same subnet as the external adapter.

- IBM TSSC is not supported on ProtecTIER V3.4.3 or the 3958 DD6 hardware. For 3958 DD6 RAS support is provided using the Electronic Customer Care (ECC) feature embedded in ProtecTIER software. To utilize this feature, 3958 DD6 must be configured for broadband access.
- The OpenStorage host interface requires more IP addresses. Please note that OpenStorage is not supported on ProtecTIER V3.4.3; however support remains on previous versions of ProtecTIER
- FSI requires more IP addresses. Refer to the *IBM ProtecTIER User's Guide for FSI Systems*, GA32-2235 for more information.

You are responsible for obtaining a ProtecTIER Manager workstation and the appropriate adapters and cables. For the most efficient installation, configuration, and maintenance of the TS7650G the workstation should be local to the system. Fibre Channel cables are required to attach the TS7650G to various server adapters. For a list of cables for the attachment of the TS7650G, see "TS7650G feature codes" on page 39. You are also responsible for providing client systems and required Fibre Channel and Ethernet switches as described in the following sections. For a gateway, there are eight Fibre Channel connections for each node. Additional Fibre Channel switch ports are required for the storage connectivity.

You are also responsible for installing designated software programs, device drivers, and other software updates in a timely manner from an IBM website or from other electronic media, and following the instructions that are provided.

Important: You must have a license for the replication feature for each ProtecTIER server in the replication grid. The systems at both the source and destination sites must be installed and configured for replication before the installation of the replication function of the TS7650G can begin. Consult with Solutions Assurance and your IBM Representative for assistance and information.

For the TS7650G, frames, disk controllers, and disk expansion modules that you supply must be fully installed and operational before the installation of the TS7650G can begin. You are required to have an approved disk subsystem available and configured according to the guidelines in the "Cache configuration" on page 60 before the installation of the TS7650G. You must also supply the appropriate Fibre Channel cables, which an IBM service representative uses to attach the TS7650G to the disk subsystem that you supply. You must also order the appropriate feature code for the selected disk subsystem. For more information, see "TS7650G feature codes" on page 39.

Note: All aspects of the disk repository, including configuration, monitoring, code updates, and repair actions, are the responsibility of you and your disk supplier.

System responsibilities

You are responsible for several hardware and system requirements.

In addition to meeting the requirements that are presented in Chapter 2, "Physical planning specifications," on page 33, you must provide the following hardware and systems.

ProtecTIER Manager workstation requirements

The workstation that you provide to run ProtecTIER Manager must meet certain requirements.

You use the ProtecTIER Manager software to configure, manage, and monitor the operation of the TS7650G. You are responsible for providing the workstation where the ProtecTIER Manager software is installed.

You can install the software from the ProtecTIER Manager application CD. Complete information about installing and operating ProtecTIER Manager is provided in the *IBM(r) ProtecTIER(r) User's Guide for Enterprise Edition*.

The following list presents the hardware and operating environment requirements for the ProtecTIER Manager workstation.

Hardware requirements

- x86 (Pentium or higher) microprocessor
- 256 MB memory
- 1.2 GB of disk space
- Access to the IP address of the ProtecTIER service node (Port 3501 and 3503 are open on the firewall.)
- Keyboard, mouse, and CD drive
- Resolution: 1024 × 768 pixels (minimum), 1280 × 1024 pixels (optimum)
- 24-bit color or higher

Operating environments that are supported

- Windows 2007
- Windows XP
- Windows 2008
- Windows 2012
- Linux Red Hat 64 bit (Red Hat Enterprise 4, 5 or 6)

Hardware, cabling, and infrastructure responsibilities

In general, you are responsible for providing the appropriate infrastructure resources, cables, and switches required to support TS7650G connections to the ProtecTIER Manager console.

Note: The customer must use an additional connectivity device between the optical Fibre directly connected to RMSS optical adapters (for example, Fibre, ESCON, or FICON) and an external public network. It can be a patch panel, router, switch, or other suitable device. Optical Fibre connectivity that does not go over a public network does not require an additional connectivity device.

You must provide the following hardware and cabling resources before installation of the TS7650G.

- One 36U 19" rack with two 220 V power distribution units.
- Attached storage, as required, based on the amount of rack space that is needed for the disk storage components. Each frame must have two 220 V power distribution units.
- Fibre Channel cables for interconnecting SAN and connecting the disk controllers to the disk expansion modules.
- Category 6 Ethernet cables for 3958 DD6 clustered configurations to allow communication between the nodes.
- Category 5e Ethernet cables for the connection between the TS7650G and the TSSC.

Notes:

- TSSC is not supported on 3958 DD6 servers.
- Category 5 cables do not provide sufficient data transfer rates for the TS7650G. You must use Category 5e or above.
- One external USB DVD Player and a HDMI "type D" male converter to VGA female in order to connect a SVGA monitor to the canister.

Notes: You also provide monitor connections as follows:

- Connect an HDMI "type D" male cable to an HDMI "type A" male for connection to an HDMI monitor.
- Connect an HDMI "type D" male cable to a DVI-D male for connection to a DVI type monitor.
- Fibre Channel cables for connecting the TS7650G server to the host.
- One SVGA monitor and one USB keyboard.
- Consider Feature Code 2722 for the provision of the required TSSC.

Note: You must verify as operational all hardware components that you supply, including frames, switches, client host platforms, and media, before installation of the TS7650G.

Cache configuration

The disk storage array that connects to the TS7650G is a critical element of the TS7650G environment. You must consider key factors and common configuration requirements of the back end disk storage array that must be set appropriately in order to establish a proper environment for ProtecTIER.

- Use RAID for data protection and performance. Consider RAID 5 with at least five disk members (4+1) per group for Fibre Channel user data LUNs (5+1 or 7+1 for SATA disks) and RAID 10 groups for metadata LUNs (with layout per planning requirements). Even if you use SATA drives for user data LUNs, consider Fibre Channel disks for metadata LUNs.
- For SATA configurations, use RAID 6 instead of RAID 5 for user data LUNs, and enable dual-parity to sustain dual disk failure.
- Create at least 24 user data RAID groups for performance optimization. The number of metadata RAID groups is dictated by the planning session/wizard, and can range at least 2 RAID groups. The number of RAID groups that are needed is based on repository size, factoring ratio, and performance needs.
- Create only one LUN per RAID group; that is, one LUN that spans the entire RAID group. The only exceptions are the single 1-GB metadata LUN or when the LUNs on the RAID group exceed 8 TB. The 1 GB metadata LUN can be created on any of the metadata RAID groups, but optimally on the first.
- Set the ProtecTIER server host type in the host connectivity settings for a Linux *device-mapper-multipath* client. It can be generally designated as a *Linux* host.
- A repository requires a minimum of four LUNs, one for the cluster database, one for user data and two for metadata. At least 27 LUNs (one cluster, two metadata and 24 user data) give best performance.
- The size of the required metadata LUNs or file systems is a function of the nominal capacity of the repository (physical space and expected factoring ratio) and must be determined before the system installation by trained ProtecTIER specialist.
- The size of user data RAID groups and LUNs must be consistent. For example, do not mix 7+1 SATA user data LUNs with 3+1 SATA LUNs. Smaller disk

groups reduce the performance of the larger groups and degrade overall system throughput. Follow this policy for metadata.

- When you expand the repository, use the same tier of RAID groups (spindle type & quantity) for metadata or user data as the existing meta and user data groups. For example, if the original two metadata LUNs were built on RAID 4+4 groups, new metadata RAID groups that are added must be at least 4+4 to maintain the same level of performance. Using storage from 2+2 or 4+1 RAID groups for the expansion might result in performance degradation because of input/output bottlenecks.
- In storage arrays with active-active controller support (that is, a LUN can be accessed from both controllers simultaneously), map LUNs to both controllers for optimum load-balancing and redundancy.
- In arrays with only active-passive support (that is, a LUN can be accessed by only one controller at a time), LUN mapping that is interleaved between controllers (that is, LUN 0 on controller A, LUN 1 on B, 2 on A, and so on) provides optimum load-balancing.
- Each VTL ProtecTIER node must have at least one Fibre Channel link/path to each disk array controller. With low SAN switching speeds (for example, 1 GB or 2 GB), two paths per controllers are optimum. Details regarding the number of paths between ProtecTIER nodes are provided in the *Best Practices Guide for IBM TS7600 ProtecTIER Deduplication Solutions*, publication GA32-0924.
- When you use only two Fibre Channel links, use separate HBA ports on the TS7650G to protect against HBA hardware failure.
- If possible, use patch cords and loop topology between the TS7650G and the disk storage array. This configuration saves expensive fabric ports and reduces the risk of SAN failure.
- If you use SAN peer-to-peer topology to connect the TS7650G to the disk array, create a dedicated zone for ProtecTIER back end ports. Do *not* mix the back end ports (QLogic) with the front end ProtecTIER ports (Emulex) or any other SAN devices in the same zone.

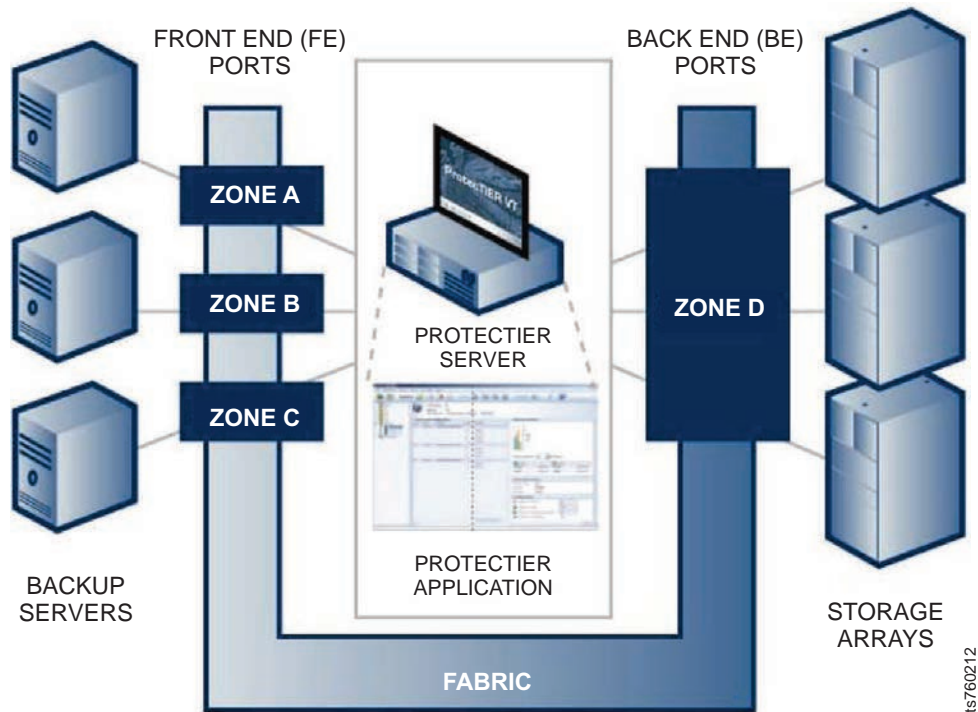


Figure 16. Dedicated zone topology

- If possible, dedicate the disk storage array to the TS7650G. If not possible, use zoning and LUN masking to isolate the TS7650G from other applications. The TS7650G must never share RAID groups or LUNs with other applications.
- ProtecTIER is a *random read* application. 80% - 90% of I/O in a typical TS7650G environment is random reads with a block size of 60 kB. Implement the performance optimizations and tuning recommended by the disk vendor for this I/O profile, or as noted in the *Best Practices Guide for IBM TS7600 ProtecTIER Deduplication Solutions*, publication GA32-0924.
- The disk storage array firmware version level must be equal to or greater than the firmware version level listed in the ProtecTIER Interoperability Matrix.
- Ensure that the ISL links between SAN switches that are connected to TS7650G ports and disk storage arrays are not oversubscribed.

For a sample configuration file for a TS7650G with an IBM System Storage DS4000 disk storage array, see Appendix E, "Example cache configuration file," on page 83.

Security, auditability, and control

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

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

For troubleshooting purposes, an IBM service representative might need to open an SSH session to the gateway server. To do so, the IBM service representative needs the *ptadmin* account password. If you changed the default password, you must provide new password to the IBM service representative upon request.

Chapter 6. IBM service installation responsibilities

IBM System Services Representative (SSR) is responsible for installation and configuration of 3958 DD6 servers.

The SSR performs the following tasks during the installation of the TS7650G:

- Connecting the network cables provided by the customer to the network switches provided by the customer
- Setting IP addresses according to network assignments provided by the customer
- Enabling licenses
- Configuring the operating system on the gateway servers
- Configuring RAS
- Configuring the ProtecTIER software (RAS and BMC configuration are embedded)
- Verifying that the TS7650G hardware is functioning properly. For example, LEDs on all components are displayed and green indicating a healthy state.
- Installing monitor connections in one of the following ways based on the equipment provided by the customer.
 - Connect an external USB DVD Player and a HDMI "type D" male converter to VGA female in order to connect a SVGA monitor to the canister.
 - Connect an HDMI "type D" male cable to an HDMI "type A" male for connection to an HDMI monitor.
 - Connect an HDMI "type D" male cable to a DVI-D male for connection to a DVI type monitor.
- Configuring the Baseboard Management Controller (BMC)
- Installing and configuring the TSSC on 3958 DD5 and 3958 DD4 servers. This includes connecting the analog phone line and network cable provided by the customer. TSSC is not supported on the 3958 DD6 server or ProtecTIER V3.4.3; however support remains for previous versions of ProtecTIER and 3958 DD5 and 3958 DD4 servers.

Note: For TSSC to function properly, the supplied analog phone line must be a minimum of a 26 AWG type wire and comply with one of the following standards:

- CSA NO. 233
- UL 1863
- Verifying connection to the BMC through a Web Browser.
- Verifying communications among TS7650G, TSSC and ProtecTIER Manager console.

Chapter 7. Planning data migration

You are responsible for planning data migration.

Use data migration considerations to formulate your data migration plan.

There are three levels to consider when you select the best method for your environment. At the first level, consider broad questions about your environment to create a generic profile of your needs. At the second level, compare which migration methods fit your generic profile. At the third level, review a set of hints and other guidelines that apply to specific environments or that might help you take advantage of a migration to optimize your environment.

The following questions are key when you define your generic migration environment.

- Why is the data migrating?
- How much data is migrating?
- How quickly must the migration be performed?
- What duration of service outage can be tolerated?
- Is the data migration to and from the same type storage?
- What resources are available for the migration?

After you determine general answers to the preceding questions, a better understanding of some of the migration options, along with their advantages and disadvantages, you can use this information to select the subset of acceptable options to use in your generic profile.

Appendix A. TS7650G equipment and documents that are provided by IBM

The TS7650G shipment includes the following components. Part numbers are subject to change.

Ship group

- 3958 DD6 Ship Group MFI
- ISO bill of material
- DVD: Customer Knowledge Center
- DVD: Service Knowledge Center
- (1x) Hotline Card

Microcode

- (1x) License Agreement for Machine Code, Z125-5468-04

ProtecTIER software

- (1x) *IBM(r) System Storage(tm) ProtecTIER Manager V3.4 DVD*
- (1x) *IBM(r) System Storage(tm) ProtecTIER Enterprise Edition V3.4 DVD*
- (1x) *IBM ProtecTIER Maintenance and Recovery Disk*

Labels

- (1x) Fibre Channel Label set for stand-alone or clustered system
- (1x) Power Label set

Miscellaneous

IBM System Storage ProtecTIER source code (as requested)

(2x) Ethernet cable

Publications

- (1x) Start Here guide
- (1x) Statement of Limited Warranty
- (1x) System Safety Notices
- (1x) Environmental Notices and User Guide CD
- (1x) readme file: 3958 DD6 Ethernet card reseating instruction
- (1x) readme file: 3958 DD6 missing device drive
- (1x) *IBM TS7650 with ProtecTIER Publications CD* (contains):
 - (1x) *IBM TS7650G ProtecTIER Deduplication Gateway Installation Roadmap Guide, GA32-0921*
 - *IBM TS7650G ProtecTIER Deduplication Gateway Installation Roadmap Guide, GA32-0921*
 - *IBM ProtecTIER User's Guide for VTL Systems, GA32-0922*
 - *IBM TS7650 ProtecTIER Software Upgrade Guide, SC27-3643*
 - *IBM Problem Determination and Service Guide for the TS7650G ProtecTIER Deduplication Gateway, GA32-0923*
 - *IBM Labeling Instructions for the TS7650 ProtecTIER Deduplication Appliance and TS7650G ProtecTIER Deduplication Gateway, PN 95P8942*

TSSC code and publications (supplied through TSSC features)

Note: TSSC is not supported on 3958 DD6 servers.

- (1x) TSSC Version 7.0.x or higher microcode
- (1x) TSSC Documentation CD
- (1x) TSSC MI
- (1x) DS4000 GUI CD

Appendix B. Company information worksheet

IBM service representatives use the information that is provided on the company information worksheet to customize your IBM storage complex. When you use any of the remote support features, the TSSC sends this information to IBM so an IBM service representative can contact you.

Table 17. Company information worksheet

Required information	Description	Your information
Business company name	The full name of your company. IBM service representatives use this information to identify your company when they receive Call Home reports from your IBM storage system. Ensure that the company name provided is consistent with all other machines that correspond to your IBM customer account.	
Customer number	The IBM-assigned customer number for your company. This is provided by the customer.	
Country code	The two-character code that must be used in order to reach your country by phone or fax, from another country. This is not the three-digit RETAIN country code. See Table 18 on page 70.	
SMTP Server ID / IP address		
SMTP email address	The email address of the administrator who receives failure alerts for the server. This may or may not be the administrator listed below.	
System administrator information		
Provide information about your storage system administrator in the following section.		
Administrator name	The name of the individual at your site who IBM service representatives should contact about IBM storage system service matters.	
Administrator email address	The storage system administrator's email address.	
Voice phone number	The primary telephone number that IBM service representatives should use to contact the storage system administrator. Include the area code and the country code, if appropriate.	
Fax number	The primary fax number that IBM service representatives should use to fax documents to the storage system administrator. Include the area code and the country code, if appropriate.	

Table 17. Company information worksheet (continued)

Required information	Description	Your information
Alternate fax number	An alternate fax number that IBM service representatives can use to fax documents to the storage system administrator. Include the area code and the country code, if appropriate.	
Administrator mailing address	The postal mailing address for the storage system administrator. provide the full street address, building (if appropriate), city or locality, state or province, and postal or zip code.	
Storage system information		
Provide basic information about your storage system and the TSSC in the following section.		
Machine location	The address of the facility where the TS7650 server(s) reside. If different from the administrator mailing address above, provide the full street address, building (if appropriate), city or locality, state or province, and postal or zip code.	
Call back phone number	The phone number of the modem being used for Call Home. Include the area code and the country code, if appropriate.	
Disk array machine type(s) and model number(s)	The machine type(s) and model number(s) for the attached disk array storage subsystem(s). For non-IBM equipment, also provide vendor name(s). Use an additional sheet if necessary.	
Disk array serial number(s)	The serial number(s) for the attached disk array storage subsystem(s).	

Use the information in the following table to convert a country to a code, and use that code as an entry in the **Country code** field of the Table 17 on page 69.

Table 18. Country codes

Country	Code	Country	Code	Country	Code	Country	Code	Country	Code
Afghanistan	af	Cook Islands	ck	Iceland	is	Nauru	nr	Solomon Islands	sb
Albania	al	Costa Rica	cr	India	in	Nepal	np	Somalia	so
Algeria	dz	Croatia	hr	Indonesia	id	Netherlands	nl	South Africa	za
American Samoa	as	Cuba	cu	Iran	ir	Netherlands Antilles	an	South Korea	kr
Andorra	ad	Cyprus	cy	Iraq	iq	Neutral Zone	nt	Spain	es
Angola	ao	Czech Republic	cz	Ireland	ie	New Caledonia (French)	nc	Sri Lanka	lk
Anguilla	ai	Denmark	dk	Israel	il	New Zealand	nz	Sudan	sd
Antarctica	aq	Djibouti	dj	Italy	it	Nicaragua	ni	Suriname	sr
Antigua and Barbuda	ag	Dominica	dm	Ivory Coast (Cote D'Ivoire)	ci	Niger	ne	Svalbard and Jan Mayen Islands	sj

Table 18. Country codes (continued)

Country	Code	Country	Code	Country	Code	Country	Code	Country	Code
Argentina	ar	Dominican Republic	do	Jamaica	jm	Nigeria	ng	Swaziland	sz
Armenia	am	East Timor	tp	Japan	jp	Niue	nu	Sweden	se
Aruba	aw	Ecuador	ec	Jordan	jo	Norfolk Island	nf	Switzerland	ch
Australia	au	Egypt	eg	Kazakhstan	kz	North Korea	kp	Syria	sy
Austria	at	El Salvador	sv	Kenya	ke	Northern Mariana Islands	mp	Tadjikistan	tj
Azerbaijan	az	Equatorial Guinea	gq	Kiribati	ki	Norway	no	Taiwan	tw
Bahamas	bs	Eritrea	er	Kuwait	kw	Oman	om	Tanzania	tz
Bahrain	bh	Estonia	ee	Kyrgyzstan	kg	Pakistan	pk	Thailand	th
Bangladesh	bd	Ethiopia	et	Laos	la	Palau	pw	Togo	tg
Barbados	bb	Falkland Islands	fk	Latvia	lv	Panama	pa	Tokelau	tk
Belarus	by	Faroe Islands	fo	Lebanon	lb	Papua New Guinea	pg	Tonga	to
Belgium	be	Fiji	fj	Lesotho	ls	Paraguay	py	Trinidad and Tobago	tt
Belize	bz	Finland	fi	Liberia	lr	Peru	pe	Tunisia	tn
Benin	bj	Former Czechoslovakia	cs	Libya	ly	Philippines	ph	Turkey	tr
Bermuda	bm	Former USSR	su	Liechtenstein	li	Pitcairn Island	pn	Turkmenistan	tm
Bhutan	bt	France	fr	Lithuania	lt	Poland	pl	Turks and Caicos Islands	tc
Bolivia	bo	France (European Territory)	fx	Luxembourg	lu	Polynesia (French)	pf	Tuvalu	tv
Bosnia-Herzegovina	ba	French Guyana	gf	Macau	mo	Portugal	pt	Uganda	ug
Botswana	bw	French Southern Territories	tf	Macedonia	mk	Puerto Rico	pr	Ukraine	ua
Bouvet Island	bv	Gabon	ga	Madagascar	mg	Qatar	qa	United Arab Emirates	ae
Brazil	br	Gambia	gm	Malawi	mw	Reunion (French)	re	United Kingdom	uk
British Indian Ocean Territory	io	Georgia	ge	Malaysia	my	Romania	ro	United States of America	us
Brunei Darussalam	bn	Germany	de	Maldives	mv	Russian Federation	ru	Uruguay	uy
Bulgaria	bg	Ghana	gh	Mali	ml	Rwanda	rw	USA Minor Outlying Islands	um
Burkina Faso	bf	Gibraltar	gi	Malta	mt	S. Georgia & S. Sandwich Isls.	gs	Uzbekistan	uz
Burundi	bi	Great Britain	gb	Marshall Islands	mh	Saint Helena	sh	Vanuatu	vu
Cambodia	kh	Greece	gr	Martinique (French)	mq	Saint Kitts & Nevis Anguilla	kn	Vatican City State	va

Table 18. Country codes (continued)

Country	Code	Country	Code	Country	Code	Country	Code	Country	Code
Cameroon	cm	Greenland	gl	Mauritania	mr	Saint Lucia	lc	Venezuela	ve
Canada	ca	Grenada	gd	Mauritius	mu	Saint Pierre and Miquelon	pm	Vietnam	vn
Cape Verde	cv	Guadeloupe (French)	gp	Mayotte	yt	Saint Tome (Sao Tome) and Principe	st	Virgin Islands (British)	vg
Cayman Islands	ky	Guam (USA)	gu	Mexico	mx	Saint Vincent & Grenadines	vc	Virgin Islands (USA)	vi
Central African Republic	cf	Guatemala	gt	Micronesia	fm	Samoa	ws	Wallis and Futuna Islands	wf
Chad	td	Guinea	gn	Moldavia	md	San Marino	sm	Western Sahara	eh
Chile	cl	Guinea Bissau	gw	Monaco	mc	Saudi Arabia	sa	Yemen	ye
China	cn	Guyana	gy	Mongolian	mn	Senegal	sn	Yugoslavia	yu
Christmas Island	cx	Haiti	ht	Montserrat	ms	Seychelles	sc	Zaire	zr
Cocos (Keeling) Islands	cc	Heard and McDonald Islands	hm	Morocco	ma	Sierra Leon	sl	Zambia	zm
Colombia	co	Honduras	hn	Mozambique	mz	Singapore	sg	Zimbabwe	zw
Comoros	km	Hong Kong	hk	Myanmar	mm	Slovak Republic	sk		
Congo	cg	Hungary	hy	Namibia	na	Slovenia	si		

Appendix C. IP address worksheet

Use this worksheet to specify the IP addresses assigned to the TS7650G components. IBM service representatives use the information provided to define the IP addresses of components supported by the TSSC and ECC. When Call Home information is sent to IBM through VPN or modem, or sends you notices about serviceable events, these settings will be included in the information to identify and provide important information about the service request.

Table 20 on page 74 and Table 24 on page 76 show the default IP addresses for the TS7650G servers with VTL configurations.

Table 22 on page 75 shows the default IP addresses for the TS7650G servers with FSI configurations.

Table 26 on page 77 shows the IP address, network mask, DNS and VLAN settings for the source and destination servers for replication. This information is needed to configure the individual ports to communicate and transfer data over the replication network. Write this information in the spaces provided for future reference. Table 27 on page 78 shows the host names and other settings needed for replication. Write the appropriate information in the spaces provided for future reference.

Table 29 on page 80 shows the default IP addresses for the Baseboard Management Controller.

Note: TSSC is not supported on 3958 DD6 servers.

Table 30 on page 80 shows the default IP addresses for the Electronic Customer Care.

Attention:

1. All components use subnet mask **255.255.255.0**.
2. Do not configure the replication ports on the same subnet as the external LAN port Eth2. Doing so may cause replication errors.

ProtecTIER exposes virtual interfaces to the host, such as a media server with the plug-in installed. In version 3.4.3, the physical Ethernet ports are assigned to one virtual application interface. Currently, the physical ports are assigned to virtual interface fsi1. This assignment option is used to group several physical interfaces into a single virtual interface, and create a bond configuration of several physical interfaces. Each virtual interface used must be configured with a corresponding IP address.

Attention: Each configured IP address on the same server needs to be on a different subnet, and each subnet needs to be on a different VLAN. If separate subnets and VLAN's are not used, in certain environments and networks, network packets can move to other subnets, which can harm network performance and potentially reduce the network's quality of service.

In addition, each virtual interface containing more than one physical interface (configured as a bond) needs to be configured with a load balancing method. For a

server with 10 Gb interfaces, where bonding is implemented, the recommended load balancing method is LACP with L3L4.

For more information about bonding, the different load balancing methods, and whether to configure bonds at all, refer to the *IBM ProtecTIER Implementation and Best Practices*, Redbooks publication SG24-8025, available at: <http://www.redbooks.ibm.com/Redbooks.nsf/RedpieceAbstracts/sg248025.html?Open>.

Factory-default IP addresses for a stand-alone VTL configuration for a TS7650G 3958 DD6

Table 19. Factory-default server IP addresses for a stand-alone VTL ProtecTIER server (3958 DD6)

Stand-alone TS7650 VTL configuration	Component	Port	Function	Factory Default IP Address
	Server A	eth2	Customer Local LAN	192.168.10.161
	Server A	eth0	Replication Network 1	192.168.20.1
	Server A	eth1	Replication Network 2	192.168.21.1
	Server A	bmc	BMC Network	192.168.10.163

Factory-default IP addresses for a stand-alone VTL configuration for a TS7650G 3958 DD5

Table 20. Factory-default server IP addresses for a stand-alone VTL ProtecTIER server (3958 DD5)

Stand-alone TS7650 VTL configuration	Component	Port	Function	Factory Default IP Address
Node A (the server located in the lower part of the rack)	Server A	eth0	Customer local LAN	192.168.10.161
	Server A	eth1	Cluster network 1	N/A
	Server A	eth2	Replication network 1	192.168.20.1
	Server A	eth3	RAS	172.31.1.xx
	Server A	eth4	Cluster network 2	N/A
	Server A	eth5	Replication network 2	192.168.21.1

Factory-default IP addresses for a single node FSI configuration for a TS7650G 3958 DD6

Table 21. Factory-default server IP addresses for a single node FSI ProtecTIER server (3958 DD6)

Stand-alone TS7650G FSI configuration	Component	Physical Port (virtual port)	Function	Factory IP Address
Node A - 1 Gb/s ethernet card (the control unit on the bottom of the enclosure chassis)	Server A	E1 (eth0)	Replication network 1	192.168.10.161
		E2 (eth1)	Replication network 2	192.169.21.1
		E3 (eth 3)	Customer local LAN	192.168.10.161
			BMC (A 1Gb/s port that you can connect to the x86 subsystem or directly to the baseboard management controller (BMC). Supports the Intelligent Platform Management Interface (IPMI)	192.168.10.163

Factory-default IP addresses for a single node FSI configuration for a TS7650G 3958 DD5

Table 22. Factory-default server IP addresses for a single node FSI ProtecTIER server (3958 DD5)

Stand-alone TS7650 FSI configuration	Component	Port	Function	Factory Default IP Address
Node A (the server located in the lower part of the rack)	Server A	eth0	Customer local LAN	192.168.10.161
	Server A	eth1	Cluster network 1	N/A
	Server A	eth2	Replication network 1 (1 Gb or 10 Gb)	1 Gb : 192.168.20.1 10 Gb : 192.168.153.1 ¹
	Server A	eth3	RAS	172.31.1.xx
	Server A	eth4	FSI	1 Gb or 10 Gb : 192.168.150.1 ¹
	Server A	eth5	FSI	192.168.151.1
	Server A	eth6	FSI	1 Gb or 10 Gb : 192.168.152.1 ¹
	Server A	eth7	FSI	1 Gb or 10 Gb : 192.168.152.1 ¹
	Server A	eth8	FSI	192.168.153.1
	Server A	eth9	Replication network 2 (10 Gb only)	192.168.154.1
	Server A	eth10	FSI	192.168.155.1
	Server A	eth11	FSI	192.168.156.1
	Server A	eth12	Cluster network 2	N/A
	Server A	eth13	Replication network 2 (1 Gb only)	192.168.21.1

Note: ¹ 1 Gb Ethernet adapters use ports eth4-eth7 (Slot 3, Ports 1-4) and eth8-eth11 (Slot 4, Ports 1-4). 10 Gb Ethernet adapters use ports eth4-eth5 (Slot 3, Ports 1-2) and eth6-eth7 (Slot 4, Ports 1-2).

Factory-default server IP addresses for a clustered VTL TS7650G 3958 DD6

Table 23. Factory-default server IP addresses for a clustered VTL ProtecTIER system (3958 DD6)

TS7650 clustered VTL system	Component	Port	Function	Factory Default IP Address	
Node A (the server located in the lower part of the rack)	Server A	eth2	Customer Local LAN	192.168.10.161	
		eth0	Replication Network	192.168.20.1	
		bmc	BMC Network	192.168.10.163	
		eth1	Cluster Network	10.0.0.51	
Node B (the server located in the lower part of the rack)	Server B	eth2	Customer Local LAN	192.168.10.162	
		eth0	Replication Network	192.168.20.2	
		bmc	BMC Network	192.168.10.164	
		Note: The correct IP address for the BMC in Server B is 192.168.10.164.			
		eth1	Cluster Network	10.0.0.52	

Factory-default server IP addresses for a clustered VTL TS7650G 3958 DD5

Table 24. Factory-default server IP addresses for a clustered VTL ProtecTIER system (3958 DD5)

TS7650 clustered VTL system	Component	Port	Function	Factory Default IP Address
Node A (the server located in the lower part of the rack)	Server A	eth0	Customer local LAN	192.168.10.161
	Note: By default, the TS7650 servers use the IP address range 10.0.0.50 through 10.0.0.59 for the power control network. The server IP addresses do not change from frame to frame.			
	Server A	eth1	Cluster network 1	10.0.0.51
	Server A	eth2	Replication network 1	192.168.20.1
	Server A	eth3	RAS	172.31.1.xx
	Server A	eth4	Cluster network 2	10.0.0.51
	Server A	eth5	Replication network 2	192.168.21.1
	Network Power Switch	N/A		10.0.0.50

Table 24. Factory-default server IP addresses for a clustered VTL ProtecTIER system (3958 DD5) (continued)

TS7650 clustered VTL system	Component	Port	Function	Factory Default IP Address
Node B (the server located in the upper part of the rack)	Server B	eth0	Customer local LAN	192.168.10.162
	Note: By default, the TS7650 servers use the IP address range 10.0.0.50 through 10.0.0.59, for the power control network. The server IP addresses do not change from frame to frame.			
	Server B	eth1	Cluster network 1	10.0.0.52
	Server B	eth2	Replication network 1	192.168.20.2
	Server B	eth3	RAS	172.31.1.xx
	Server B	eth4	Cluster network 2	10.0.0.52
	Server B	eth5	Replication network 2	192.168.21.2
	Network Power Switch	N/A		10.0.0.50

Customer IP addresses

Table 25. Customer IP addresses

Node A (the server located in the lower part of the rack)	Port	Host Name	IP Address	Network Mask	Default Gateway
	eth0				
Node B (the server located in the upper part of the rack)	Port		IP Address	Network Mask	Default Gateway
	eth0				

Customer and Replication IP addresses

Table 26. Customer and Replication IP addresses for VTL

Default gateways for eth2 and eth5 for VTL systems, eth2 and eth13 for 1 Gb FSI systems, or eth2 and eth 9 for 10 Gb FSI systems should be different, otherwise the vlans are meaningless.					
For VTL systems, provide a routing path from the IP address on eth2-site1 to the IP address of eth2-site2, and a routing path from the IP address on eth5-site1 to the IP address of eth5-site2. For FSI systems, provide a routing path from the IP address on eth2-site1 to the IP address of eth2-site2, and a routing path from the IP address on eth9-site1 to the IP address of eth9-site2.					
Source Site					
Node A (the server located in the lower part of the rack)	Port	IP Address	Network Mask	Default Gateway	Dedicated VLAN
	eth2 for VTL systems and FSI systems				
	eth5 for VTL systems, eth13 for 1 GB FSI systems, or eth9 for 10 GB FSI systems				

Table 26. Customer and Replication IP addresses for VTL (continued)

Node B (the server located in the upper part of the rack)	Port	IP Address	Network Mask	Default Gateway	Dedicated VLAN
	eth2 for VTL systems and FSI systems				
	eth5 for VTL systems				
Destination or Target Site					
Node A (the server located in the lower part of the rack)	Port	IP Address	Network Mask	Default Gateway	Dedicated VLAN
	eth2 for VTL systems and FSI systems				
	eth5 for VTL systems, eth13 for 1 GB FSI systems, or eth9 for 10 GB FSI systems				
Node B (the server located in the upper part of the rack)	Port	IP Address	Network Mask	Default Gateway	Dedicated VLAN
	eth2 for VTL systems				
	eth5 for VTL systems				

Host names and DNS settings for setting up the TSSC with the TS7650G

Note: TSSC is not supported on 3958 DD6 servers.

Table 27. Host names and DNS settings for setting up the TSSC with the TS7650G

Item or setting	Instructions	eth0	eth1 (if applicable)
Source host name _____	Record the console or host name that you want to assign to the management console workstation (for example, dsve1). The console name and the domain are used to identify the TS7650G to the network.	IP address (client) #1: _____	IP address #1 (client): _____
		IP address #2 (service): _____	IP address #2 (service): _____
Domain name	Provide the domain name that you are assigning to the TSSC (for example, medina.xyz.it).		
Ethernet settings Complete the LAN Adapter Details section when the TSSC connects to your LAN.			

Table 27. Host names and DNS settings for setting up the TSSC with the TS7650G (continued)

Item or setting	Instructions	eth0	eth1 (if applicable)
Media speed (Ethernet)	Check Autodetection or the media speed of the Ethernet adapter.	<ul style="list-style-type: none"> _ Autodetection _ 10Mbps Half Duplex _ 10Mbps Full Duplex _ 100Mbps Half Duplx _ 100Mbps Full Duplx _ 1000Mbps Half Duplx _ 1000Mbps Full Duplx 	<ul style="list-style-type: none"> _ Autodetection _ 10Mbps Half Duplex _ 10Mbps Full Duplex _ 100Mbps Half Duplx _ 100Mbps Full Duplx _ 1000Mbps Half Duplx _ 1000Mbps Full Duplx
TCP/IP interface network mask	Record the dotted decimal network mask that you want to apply to the TCP/IP address (for example, 127.123.546.0).		
DNS settings: Complete this section if you plan to use a domain name server (DNS) to resolve network names.			
Name server (DNS) internet address 1	Provide the dotted decimal address of the name server that the TSSC will access (for example, 5.127.42.250).		
Name server domain name 1	Provide the domain name of the name server (for example, medina.xyz.it).		
Name server (DNS) internet address 2 (Optional)	Provide the dotted decimal address of the second name server that this workstation can access (for example, 5.127.42.252). Although this is optional, you can specify a second name server when you configure a backup or secondary server.		
Name server domain name 2	If you have a second name server, provide the domain name of the second name server (for example, medina2.xyz.it).		
Routing settings: Complete the following section if you want to specify a default gateway for routing.			
Gateway address	Confirm and record the dotted decimal or symbolic name address of the gateway (for example, 8.127.155.254 or londongate).		

BMC IP addresses

Note: BMC is only supported on 3958 DD6 servers.

Table 28. BMC IP addresses

Node	Ethernet Port	Default IP Address	Customer Assigned IP Address
Node A (the server located in the lower part of the rack)	eth2	192.168.10.163	
Node B (the server located in the upper part of the rack)	eth2	192.168.10.64	

TSSC IP addresses

Note: TSSC is not supported on 3958 DD6 servers.

Table 29. TSSC IP addresses

TSSC	Ethernet Port	Default IP Address	Customer Assigned IP Address
TSSC	External	N/A	
TSSC	Internal	172.31.1.1 (fixed, do not change)	N/A

Electronic Customer Care (ECC) IP addresses

Table 30. ECC IP addresses

Host name	IP address	Port	Description
Edge	<ul style="list-style-type: none"> • 129.42.56.189 • 129.42.60.189 • 129.42.54.189 	80	Edge replaces IP addresses needed for Service Providers, Download Servers, Upload Servers and CCF, but not FTP.
esupport.ibm.com	<ul style="list-style-type: none"> • 2620:0:6c0:200:129:42:56:189 • 2620:0:6c2:200:129:42:60:189 • 2620:0:6c4:200:129:42:54:189 	443, 80 (optional)	We recommend customers open 129.42.0.0/18 (EI IPv4 address range) and 2620:0:6c0::/45 (EI IPv6 address range) for the least amount of hassle going forward.

Appendix D. Replication settings worksheet

Use this worksheet to determine and record the information you need to implement replication on your TS7650G.

Replication policy and Grid management information

Table 31. Replication policy information

Replication policy information			
Policy name			
Policy priority level	Low	Medium	High
Policy enabled: Y/N			
Destination repository name			
Destination target	Shelf	Library	
		Library name	
Barcodes for range of cartridges to be replicated			
Replication meta-data reserved space			
Grid Management information			
Replication type	Many to Many	Many to One	

Appendix E. Example cache configuration file

An example configuration file for a TS7650G with a DS4000 disk storage array.

Note: This code is formatted to fit on the page, and is an example only. Consult with Solutions Assurance and your IBM representative to develop a configuration file specific to your needs.

```
// Logical configuration information from Storage Subsystem DS_Cache_Subsystem.
// Saved on May 28, 2009
// Firmware package version for Storage Subsystem DS_Cache_Subsystem = 06.23.05.00
// NVSRAM package version for Storage Subsystem DS_Cache_Subsystem = A1814D470R923V08

//on error stop;

// Uncomment the two lines below to delete the existing configuration.
//show "Deleting the existing configuration.";
//set storagesubsystem resetConfiguration = true;

// Storage Subsystem global logical configuration script commands
show "Setting the Storage Subsystem user label to DS_Cache_Subsystem.";
set storagesubsystem userLabel="DS_Cache_Subsystem";

show "Setting the Storage Subsystem media scan rate to 30.";
set storagesubsystem mediaScanRate=30;

// Uncomment the three lines below to remove default logical drive, if exists, script command.
//NOTE: Default logical drive name is always = "" (blank).
//on error continue;
//show "Deleting the default logical drive created during the removal of the existing configuration.";
//delete logicaldrive[""];
//on error stop;

// Copies the hot spare settings
// NOTE: These statements are wrapped in on-error continue and on-error stop statements to
// account for minor differences in capacity from the drive of the Storage Subsystem on which the
// configuration was saved to that of the drives on which the configuration will be copied.
//on error continue;
show "Creating hot spare at Enclosure 85 Slot 16.";
set drive[85,16] hotSpare=true;
show "Creating hot spare at Enclosure 1 Slot 16.";
set drive[1,16] hotSpare=true;
show "Creating hot spare at Enclosure 0 Slot 16.";
set drive[0,16] hotSpare=true;
show "Creating hot spare at Enclosure 2 Slot 16.";
set drive[2,16] hotSpare=true;
//on error stop;

show "Setting the Storage Subsystem cache block size to 16.";
set storagesubsystem cacheBlockSize=16;

show "Setting the Storage Subsystem to begin cache flush at 80% full.";
set storagesubsystem cacheFlushStart=80;

show "Setting the Storage Subsystem to end cache flush at 80% full.";
set storagesubsystem cacheFlushStop=80;

// Creating Host Topology

show "Creating RAID 1 Logical Drive accessA on new Array 1.";
// This command creates the Array and the initial Logical Drive on that array.
```

```

// NOTE: For Arrays that use all available capacity, the last Logical Drive on this array is
// created using all remaining capacity by omitting the capacity= logical drive creation parameter.
create logicaldrive drives[85,1 85,2 85,3 85,4 85,5 85,6 85,7 85,8 85,9 85,10] raidLevel=1
  userLabel="accessA"
owner=A segmentSize=32 capacity=1073741824 Bytes;
show "Setting additional attributes for Logical Drive accessA.";
// Configuration settings that can not be set during Logical Drive creation.
set logicaldrive["accessA"] cacheFlushModifier=10;
set logicaldrive["accessA"] cacheWithoutBatteryEnabled=false;
set logicaldrive["accessA"] mirrorEnabled=true;
set logicaldrive["accessA"] readCacheEnabled=true;
set logicaldrive["accessA"] writeCacheEnabled=true;
set logicaldrive["accessA"] mediaScanEnabled=true;
set logicaldrive["accessA"] redundancyCheckEnabled=false;
set logicaldrive["accessA"] readAheadMultiplier=1;
set logicaldrive["accessA"] modificationPriority=high;
show "Creating Logical Drive-to-LUN Mapping for Logical Drive accessA to LUN 0.";
set logicaldrive ["accessA"] logicalUnitNumber=0 hostGroup=defaultGroup;

show "Creating RAID 1 Logical Drive metadata0 on existing Array 1.";
// Create Logical Drive on the Array created by the create logical drive drives command.
// NOTE: For Arrays that use all available capacity, the last Logical Drive on this array is
// created using all remaining capacity by omitting the capacity= logical drive creation parameter.
create logicaldrive array[1] raidLevel=1 userLabel="metadata0" owner=A segmentSize=32
  capacity=2186136780800 Bytes;
show "Setting additional attributes for Logical Drive metadata0.";
// Configuration settings that can not be set during Logical Drive creation.
set logicaldrive["metadata0"] cacheFlushModifier=10;
set logicaldrive["metadata0"] cacheWithoutBatteryEnabled=false;
set logicaldrive["metadata0"] mirrorEnabled=true;
set logicaldrive["metadata0"] readCacheEnabled=true;
set logicaldrive["metadata0"] writeCacheEnabled=true;
set logicaldrive["metadata0"] mediaScanEnabled=true;
set logicaldrive["metadata0"] redundancyCheckEnabled=false;
set logicaldrive["metadata0"] readAheadMultiplier=1;
set logicaldrive["metadata0"] modificationPriority=high;
show "Creating Logical Drive-to-LUN Mapping for Logical Drive metadata0 to LUN 7.";
set logicaldrive ["metadata0"] logicalUnitNumber=7 hostGroup=defaultGroup;

show "Creating RAID 5 Logical Drive userdata0 on new Array 2.";
// This command creates the Array and the initial Logical Drive on that array.
// NOTE: For Arrays that use all available capacity, the last Logical Drive on this array is
// created using all remaining capacity by omitting the capacity= logical drive creation parameter.
create logicaldrive drives[85,11 85,12 85,13 85,14 85,15] raidLevel=5 userLabel="userdata0"
  owner=A segmentSize=32;
show "Setting additional attributes for Logical Drive userdata0.";
// Configuration settings that can not be set during Logical Drive creation.
set logicaldrive["userdata0"] cacheFlushModifier=10;
set logicaldrive["userdata0"] cacheWithoutBatteryEnabled=false;
set logicaldrive["userdata0"] mirrorEnabled=true;
set logicaldrive["userdata0"] readCacheEnabled=true;
set logicaldrive["userdata0"] writeCacheEnabled=true;
set logicaldrive["userdata0"] mediaScanEnabled=true;
set logicaldrive["userdata0"] redundancyCheckEnabled=false;
set logicaldrive["userdata0"] readAheadMultiplier=1;
set logicaldrive["userdata0"] modificationPriority=high;
show "Creating Logical Drive-to-LUN Mapping for Logical Drive userdata0 to LUN 8.";
set logicaldrive ["userdata0"] logicalUnitNumber=8 hostGroup=defaultGroup;

show "Creating RAID 5 Logical Drive userdata1 on new Array 3.";
// This command creates the Array and the initial Logical Drive on that array.
// NOTE: For Arrays that use all available capacity, the last Logical Drive on this array is
// created using all remaining capacity by omitting the capacity= logical drive creation parameter.
create logicaldrive drives[0,1 0,2 0,3 0,4 0,5] raidLevel=5 userLabel="userdata1"
  owner=B segmentSize=32;
show "Setting additional attributes for Logical Drive userdata1.";
// Configuration settings that can not be set during Logical Drive creation.

```

```

set logicaldrive["userdata1"] cacheFlushModifier=10;
set logicaldrive["userdata1"] cacheWithoutBatteryEnabled=false;
set logicaldrive["userdata1"] mirrorEnabled=true;
set logicaldrive["userdata1"] readCacheEnabled=true;
set logicaldrive["userdata1"] writeCacheEnabled=true;
set logicaldrive["userdata1"] mediaScanEnabled=true;
set logicaldrive["userdata1"] redundancyCheckEnabled=false;
set logicaldrive["userdata1"] readAheadMultiplier=1;
set logicaldrive["userdata1"] modificationPriority=high;
show "Creating Logical Drive-to-LUN Mapping for Logical Drive userdata1 to LUN 9.";
set logicaldrive ["userdata1"] logicalUnitNumber=9 hostGroup=defaultGroup;

show "Creating RAID 5 Logical Drive userdata2 on new Array 4.";
// This command creates the Array and the initial Logical Drive on that array.
// NOTE: For Arrays that use all available capacity, the last Logical Drive on this array is
// created using all remaining capacity by omitting the capacity= logical drive creation parameter.
create logicaldrive drives[0,6 0,7 0,8 0,9 0,10] raidLevel=5 userLabel="userdata2"
owner=A segmentSize=32;
show "Setting additional attributes for Logical Drive userdata2.";
// Configuration settings that can not be set during Logical Drive creation.
set logicaldrive["userdata2"] cacheFlushModifier=10;
set logicaldrive["userdata2"] cacheWithoutBatteryEnabled=false;
set logicaldrive["userdata2"] mirrorEnabled=true;
set logicaldrive["userdata2"] readCacheEnabled=true;
set logicaldrive["userdata2"] writeCacheEnabled=true;
set logicaldrive["userdata2"] mediaScanEnabled=true;
set logicaldrive["userdata2"] redundancyCheckEnabled=false;
set logicaldrive["userdata2"] readAheadMultiplier=1;
set logicaldrive["userdata2"] modificationPriority=high;
show "Creating Logical Drive-to-LUN Mapping for Logical Drive userdata2 to LUN 10.";
set logicaldrive ["userdata2"] logicalUnitNumber=10 hostGroup=defaultGroup;

show "Creating RAID 5 Logical Drive userdata3 on new Array 5.";
// This command creates the Array and the initial Logical Drive on that array.
// NOTE: For Arrays that use all available capacity, the last Logical Drive on this array is
// created using all remaining capacity by omitting the capacity= logical drive creation parameter.
create logicaldrive drives[0,11 0,12 0,13 0,14 0,15] raidLevel=5 userLabel="userdata3"
owner=B segmentSize=32;
show "Setting additional attributes for Logical Drive userdata3.";
// Configuration settings that can not be set during Logical Drive creation.
set logicaldrive["userdata3"] cacheFlushModifier=10;
set logicaldrive["userdata3"] cacheWithoutBatteryEnabled=false;
set logicaldrive["userdata3"] mirrorEnabled=true;
set logicaldrive["userdata3"] readCacheEnabled=true;
set logicaldrive["userdata3"] writeCacheEnabled=true;
set logicaldrive["userdata3"] mediaScanEnabled=true;
set logicaldrive["userdata3"] redundancyCheckEnabled=false;
set logicaldrive["userdata3"] readAheadMultiplier=1;
set logicaldrive["userdata3"] modificationPriority=high;
show "Creating Logical Drive-to-LUN Mapping for Logical Drive userdata3 to LUN 11.";
set logicaldrive ["userdata3"] logicalUnitNumber=11 hostGroup=defaultGroup;

show "Creating RAID 5 Logical Drive userdata4 on new Array 6.";
// This command creates the Array and the initial Logical Drive on that array.
// NOTE: For Arrays that use all available capacity, the last Logical Drive on this array is
// created using all remaining capacity by omitting the capacity= logical drive creation parameter.
create logicaldrive drives[1,1 1,2 1,3 1,4 1,5] raidLevel=5 userLabel="userdata4"
owner=A segmentSize=32;
show "Setting additional attributes for Logical Drive userdata4.";
// Configuration settings that can not be set during Logical Drive creation.
set logicaldrive["userdata4"] cacheFlushModifier=10;
set logicaldrive["userdata4"] cacheWithoutBatteryEnabled=false;
set logicaldrive["userdata4"] mirrorEnabled=true;
set logicaldrive["userdata4"] readCacheEnabled=true;
set logicaldrive["userdata4"] writeCacheEnabled=true;
set logicaldrive["userdata4"] mediaScanEnabled=true;
set logicaldrive["userdata4"] redundancyCheckEnabled=false;

```

```

set logicaldrive["userdata4"] readAheadMultiplier=1;
set logicaldrive["userdata4"] modificationPriority=high;
show "Creating Logical Drive-to-LUN Mapping for Logical Drive userdata4 to LUN 12.";
set logicaldrive ["userdata4"] logicalUnitNumber=12 hostGroup=defaultGroup;

show "Creating RAID 5 Logical Drive userdata5 on new Array 7.";
// This command creates the Array and the initial Logical Drive on that array.
// NOTE: For Arrays that use all available capacity, the last Logical Drive on this array is
// created using all remaining capacity by omitting the capacity= logical drive creation parameter.
create logicaldrive drives[1,6 1,7 1,8 1,9 1,10] raidLevel=5 userLabel="userdata5"
owner=B segmentSize=32;
show "Setting additional attributes for Logical Drive userdata5.";
// Configuration settings that can not be set during Logical Drive creation.
set logicaldrive["userdata5"] cacheFlushModifier=10;
set logicaldrive["userdata5"] cacheWithoutBatteryEnabled=false;
set logicaldrive["userdata5"] mirrorEnabled=true;
set logicaldrive["userdata5"] readCacheEnabled=true;
set logicaldrive["userdata5"] writeCacheEnabled=true;
set logicaldrive["userdata5"] mediaScanEnabled=true;
set logicaldrive["userdata5"] redundancyCheckEnabled=false;
set logicaldrive["userdata5"] readAheadMultiplier=1;
set logicaldrive["userdata5"] modificationPriority=high;
show "Creating Logical Drive-to-LUN Mapping for Logical Drive userdata5 to LUN 13.";
set logicaldrive ["userdata5"] logicalUnitNumber=13 hostGroup=defaultGroup;

show "Creating RAID 5 Logical Drive userdata6 on new Array 8.";
// This command creates the Array and the initial Logical Drive on that array.
// NOTE: For Arrays that use all available capacity, the last Logical Drive on this array is
// created using all remaining capacity by omitting the capacity= logical drive creation parameter.
create logicaldrive drives[1,11 1,12 1,13 1,14 1,15] raidLevel=5 userLabel="userdata6"
owner=A segmentSize=32;
show "Setting additional attributes for Logical Drive userdata6.";
// Configuration settings that can not be set during Logical Drive creation.
set logicaldrive["userdata6"] cacheFlushModifier=10;
set logicaldrive["userdata6"] cacheWithoutBatteryEnabled=false;
set logicaldrive["userdata6"] mirrorEnabled=true;
set logicaldrive["userdata6"] readCacheEnabled=true;
set logicaldrive["userdata6"] writeCacheEnabled=true;
set logicaldrive["userdata6"] mediaScanEnabled=true;
set logicaldrive["userdata6"] redundancyCheckEnabled=false;
set logicaldrive["userdata6"] readAheadMultiplier=1;
set logicaldrive["userdata6"] modificationPriority=high;
show "Creating Logical Drive-to-LUN Mapping for Logical Drive userdata6 to LUN 14.";
set logicaldrive ["userdata6"] logicalUnitNumber=14 hostGroup=defaultGroup;

show "Creating RAID 5 Logical Drive userdata7 on new Array 9.";
// This command creates the Array and the initial Logical Drive on that array.
// NOTE: For Arrays that use all available capacity, the last Logical Drive on this array is
// created using all remaining capacity by omitting the capacity= logical drive creation parameter.
create logicaldrive drives[2,1 2,2 2,3 2,4 2,5] raidLevel=5 userLabel="userdata7"
owner=B segmentSize=32;
show "Setting additional attributes for Logical Drive userdata7.";
// Configuration settings that can not be set during Logical Drive creation.
set logicaldrive["userdata7"] cacheFlushModifier=10;
set logicaldrive["userdata7"] cacheWithoutBatteryEnabled=false;
set logicaldrive["userdata7"] mirrorEnabled=true;
set logicaldrive["userdata7"] readCacheEnabled=true;
set logicaldrive["userdata7"] writeCacheEnabled=true;
set logicaldrive["userdata7"] mediaScanEnabled=true;
set logicaldrive["userdata7"] redundancyCheckEnabled=false;
set logicaldrive["userdata7"] readAheadMultiplier=1;
set logicaldrive["userdata7"] modificationPriority=high;
show "Creating Logical Drive-to-LUN Mapping for Logical Drive userdata7 to LUN 15.";
set logicaldrive ["userdata7"] logicalUnitNumber=15 hostGroup=defaultGroup;

show "Creating RAID 5 Logical Drive userdata8 on new Array 10.";
// This command creates the Array and the initial Logical Drive on that array.

```

```

// NOTE: For Arrays that use all available capacity, the last Logical Drive on this array is
// created using all remaining capacity by omitting the capacity= logical drive creation parameter.
create logicaldrive drives[2,6 2,7 2,8 2,9 2,10] raidLevel=5 userLabel="userdata8"
  owner=A segmentSize=32;
show "Setting additional attributes for Logical Drive userdata8.";
// Configuration settings that can not be set during Logical Drive creation.
set logicaldrive["userdata8"] cacheFlushModifier=10;
set logicaldrive["userdata8"] cacheWithoutBatteryEnabled=false;
set logicaldrive["userdata8"] mirrorEnabled=true;
set logicaldrive["userdata8"] readCacheEnabled=true;
set logicaldrive["userdata8"] writeCacheEnabled=true;
set logicaldrive["userdata8"] mediaScanEnabled=true;
set logicaldrive["userdata8"] redundancyCheckEnabled=false;
set logicaldrive["userdata8"] readAheadMultiplier=1;
set logicaldrive["userdata8"] modificationPriority=high;
show "Creating Logical Drive-to-LUN Mapping for Logical Drive userdata8 to LUN 16.";
set logicaldrive ["userdata8"] logicalUnitNumber=16 hostGroup=defaultGroup;

show "Creating RAID 5 Logical Drive userdata9 on new Array 11.";
// This command creates the Array and the initial Logical Drive on that array.
// NOTE: For Arrays that use all available capacity, the last Logical Drive on this array is
// created using all remaining capacity by omitting the capacity= logical drive creation parameter.
create logicaldrive drives[2,11 2,12 2,13 2,14 2,15] raidLevel=5 userLabel="userdata9"
  owner=B segmentSize=32;
show "Setting additional attributes for Logical Drive userdata9.";
// Configuration settings that can not be set during Logical Drive creation.
set logicaldrive["userdata9"] cacheFlushModifier=10;
set logicaldrive["userdata9"] cacheWithoutBatteryEnabled=false;
set logicaldrive["userdata9"] mirrorEnabled=true;
set logicaldrive["userdata9"] readCacheEnabled=true;
set logicaldrive["userdata9"] writeCacheEnabled=true;
set logicaldrive["userdata9"] mediaScanEnabled=true;
set logicaldrive["userdata9"] redundancyCheckEnabled=false;
set logicaldrive["userdata9"] readAheadMultiplier=1;
set logicaldrive["userdata9"] modificationPriority=high;
show "Creating Logical Drive-to-LUN Mapping for Logical Drive userdata9 to LUN 17.";
set logicaldrive ["userdata9"] logicalUnitNumber=17 hostGroup=defaultGroup;

```

Accessibility for publications and ProtecTIER Manager

The publications for this product are in Adobe Portable Document Format (PDF) and should be compliant with accessibility standards. Use these procedures to enable screen-reader compatibility, change the Windows contrast setting, and customize the color palette used in ProtecTIER Manager.

About this task

If you experience difficulties when you use the PDF files and want to request a Web-based format for a publication, send your request to the following address:

International Business Machines Corporation
Information Development
Department GZW
9000 South Rita Road
Tucson, Arizona 85744-001 U.S.A

In the request, be sure to include the publication number and title. When you send information to IBM, you grant IBM a nonexclusive right to use or distribute the information in any way it believes appropriate without incurring any obligation to you.

About the Windows-based accessibility features

About this task

The accessibility features in ProtecTIER Manager help persons with limited vision use the ProtecTIER Manager installation wizard and software. After preparing the ProtecTIER Manager workstation for accessibility, you can use Windows-based screen-reader software and a digital voice synthesizer to hear what is displayed on the screen.

The installation, configuration, and instructional screens in the Windows versions of the ProtecTIER Manager installation wizard and the ProtecTIER Manager software have been tested with Job Access with Speech (JAWS). However, the associated diagrams and graphs in ProtecTIER Manager and ProtecTIER Replication Manager, do not currently support keyboard navigation or screen-reader use. You can obtain full system statistics (typically provided in the diagrams and graphs) by going to the ProtecTIER Manager toolbar and clicking: **Reports > Create long term statistics report**, and downloading the results.

To enable screen-reader compatibility, you must prepare the ProtecTIER Manager workstation by completing these tasks. Instructions are provided in the topics that follow:

Before you install ProtecTIER Manager:

- Download and install the Java Runtime Environment (JRE).
- Download and install the Java Access Bridge (JAB).

After you install ProtecTIER Manager:

- Change the ProtecTIER Manager preferences to enable support of the Windows system settings (*required*).
- Select a high-contrast color scheme in Windows (*optional*).
- Customize the color palette used in the ProtecTIER Manager display (*optional*).

About the Java-based tools

About this task

Complete the following procedures to download and install the Java-based tools that are required to enable full screen-reader compatibility on the ProtecTIER Manager workstation.

Install the Java™ Runtime Environment (JRE) first, and then install the Java Access Bridge (JAB). Both of these tools must be installed before you install the ProtecTIER Manager software.



For simplicity, download the Java-based tools by using the ProtecTIER Manager workstation on which you are installing the JRE and JAB. If this is not possible, try to use another computer that is running Windows.

Installing the Java Runtime Environment

About this task

The JRE includes the Java Virtual Machine (JVM). These tools are necessary for your computer to run Java-based applications.

Procedure

1. Go to <http://www.java.com>. The Java website opens.
The java.com website auto-detects the operating system and Internet browser of the computer you use when you access the site.
2. Click **Free Java Download**, and proceed as appropriate:
 - If the **Download Java for Windows** page opens, go on to step 3
 - If the **Download Java for...** page title contains the name of an operating system other than Windows, do the following:
 - a. Click the **See all downloads here** link.
The list of available downloads, categorized by operating system, displays.
 - b. In the Windows section, click **Windows 7/XP/Vista/2000/2003/2008 Online**.
3. Review the information provided, and then click **Agree and Start Free Download**.
The download dialog box opens.
4. Follow the on-screen instructions to save the executable (.exe) installer file to the hard disk drive.
5. After the download is complete, find the installer file on the hard disk drive and write down the full path to the location of the file. For example: `C:\Program Files\Java\jre6\bin\java.exe`. This path is needed during ProtecTIER Manager installation.
6. Proceed as appropriate:

- If you downloaded the installer on the ProtecTIER Manager workstation on which you are installing the JRE, go on to step 7.
 - If you downloaded the installer on a PC other than the applicable ProtecTIER Manager workstation, do the following:
 - a. Copy the installer file onto a CD, flash memory drive, or other form of removable media.
 - b. Copy the installer file from the removable media to the hard disk drive of the ProtecTIER Manager workstation.
 - c. Go on to step 7.
7. Double-click the installer file to start the **Java installation wizard**.
The **Java Setup – Welcome** window opens.
 8. Click **Install** and follow the on-screen instructions to complete the installation process.
 9. When you have successfully installed the JRE, go on to “Installing the Java Access Bridge.”

Installing the Java Access Bridge

About this task

The Java Access Bridge (JAB) makes it possible for you to use Java-based screen readers with the ProtecTIER Manager installation wizard and software.

Procedure

1. Go to: <http://www.oracle.com/technetwork/java/javase/tech/index-jsp-136191.html>.

The **Java SE Desktop Accessibility** page of the Oracle website opens.

2. Read the information provided, then click **Access Bridge**.
3. Scroll down to the **Java Access Bridge for Microsoft Windows Operating System x.x.x** (where *x.x.x* is the most recent version listed) section. Click the **Download Java Access Bridge x.x.x** link.

The **Software License Agreement** page opens.

4. Read the license agreement, and then select the **I agree to the Software License Agreement** check box.

The **Download Java Access Bridge for Windows Operating System x.x.x** page opens.

5. In the **Required Files** list, click the link to download the **Access Bridge x.x.x, accessbridge-x.x.x.exe** file.

The download dialog box opens.

6. Follow the on-screen instructions to save the executable (.exe) installer file to the hard disk drive.
7. When the download is complete, locate the installer file on the hard disk drive and proceed as appropriate:
 - If you downloaded the installer by using the ProtecTIER Manager workstation on which you are installing the JAB, go on to step 8 on page 92.
 - If you downloaded the installer by using a PC other than the applicable ProtecTIER Manager workstation, do the following:
 - a. Copy the installer file onto a CD, flash memory drive, or other removable media device.

- b. Copy the installer file from the removable media device to the hard disk drive of the ProtecTIER Manager workstation.
 - c. Go on to step 8.
8. On the ProtecTIER Manager workstation, double-click the **accessbridge-x.x.x.exe** installer file.
A security warning dialog box displays.
9. Click **Run**.
The **Java Access Bridge – InstallShield Wizard** opens.
10. Read the welcome information, then click **Next** and follow the on-screen instructions to complete the installation.
11. When the installation is complete, restart the workstation as directed.
You now have the necessary Java tools for compatibility between the ProtecTIER Manager installation wizard and screen reader software.
12. Follow the instructions in “Using a screen reader to install ProtecTIER Manager” to start the ProtecTIER Manager installation wizard by using a screen reader.

Using a screen reader to install ProtecTIER Manager

About this task

Install ProtecTIER Manager according to the following command line-based instructions.



When entering the commands, type them exactly as shown, including any spaces or quotation marks. Any deviation in the procedure can cause the installation to start in the non-accessible mode, or fail completely.

Procedure

1. If your workstation is configured to automatically open DVDs, temporarily disable the Windows **AutoPlay** feature for the CD/DVD device. Use the Windows Help or other Windows documentation for instructions, and then go on to step 2.
2. Insert the *IBM ProtecTIER Manager DVD* into the CD/DVD drive of the ProtecTIER Manager workstation.
3. Access the command prompt on the ProtecTIER Manager workstation:
 - a. Click **Start > Run...**
The **Run** dialog box opens.
4. In the **Open** field, type: **cmd** and click **Ok**.
The command window opens.
5. Browse to the ProtecTIER Manager installation directory on the DVD. To do so:
 - a. At the command prompt, type: **D:** (where D: is the letter assigned to the CD/DVD drive of the workstation) and press **<enter>**.
 - b. At the command prompt, list the contents of the DVD. Type: **dir** and press **<enter>**.
 - c. Locate the name of the ProtecTIER Manager directory on the DVD. For example: *PT_Manager_V3.3*.
 - d. At the command prompt, change to the **ProtecTIER Manager** directory. Type: **cd <directory name>** and press **<enter>**. For example:
cd PT_Manager_V3.3 <enter>.

- e. At the command prompt, change to the **Windows** directory. Type:
cd windows and press **<enter>**.
 - f. At the command prompt, type: **Install.exe LAX_VM "C:\Program Files\Java60\jre\bin\java.exe"** and press **<enter>**, where the path contained within the quotation marks is the same as the path that you noted in step 5 on page 90.
The screen-reader-enabled ProtecTIER Manager installation wizard starts.
 - g. Follow the spoken prompts to complete the installation.
6. When the installation completes, proceed as appropriate:
 - If you **do not** want to enable the Windows High Contrast option or customize the color palette, resume your regular use of ProtecTIER Manager.
 - To change the contrast mode for ProtecTIER Manager, go to “Enabling the Windows High Contrast option.” To customize the color palette, go to “Customizing the color palette” on page 97.

Enabling the Windows High Contrast option

About this task

To make it possible for ProtecTIER Manager to display in high contrast, you must first enable the **Use High Contrast** option in Windows.

Procedure

1. On the ProtecTIER Manager workstation, go to **Windows > Control Panel > Accessibility Options**.
The **Accessibility Options** dialog box opens.
2. Select the **Display** tab.
3. In the **High Contrast** area of the **Display** tab, select the **Use High Contrast** check box, as shown in Figure 17 on page 94:

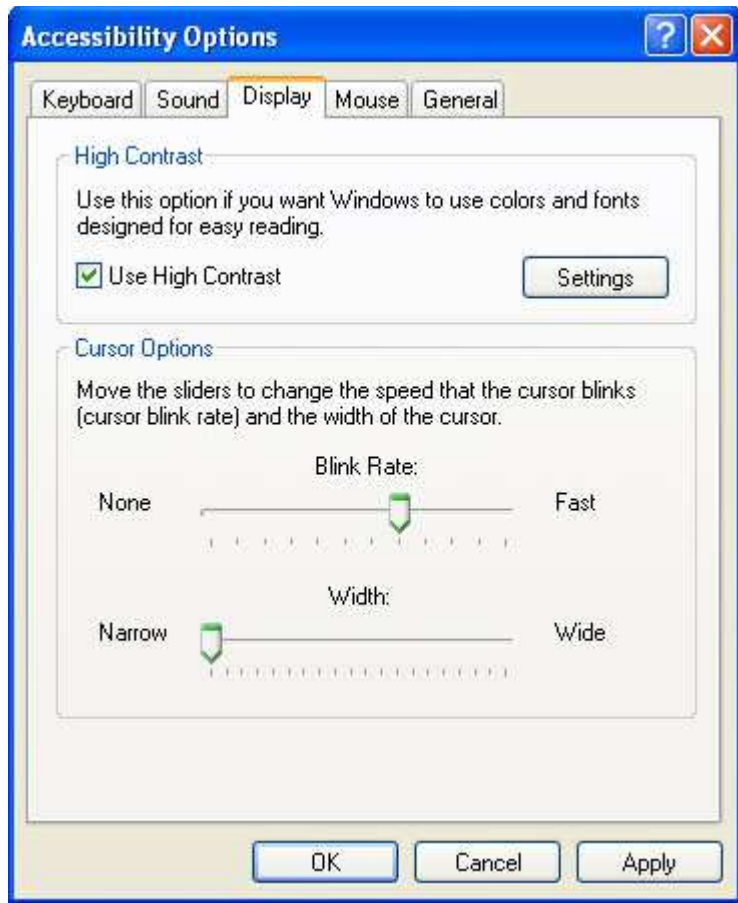


Figure 17. Display tab

4. Click **Settings**.

The **Settings for High Contrast** dialog box displays, as shown in Figure 18 on page 95:



Figure 18. Settings for High Contrast

By default, the **High Contrast Black (large)** scheme is selected.

5. Do one of the following:
 - To use the default, **High Contrast Black (large)**, scheme:
 - a. Click **Ok** to close the **Settings for High Contrast** dialog box.
 - b. Click **Ok** to close the **Accessibility Options** dialog box.
After a few moments, the display changes to the new color scheme.
 - c. Go on to “Using the Windows high contrast scheme with ProtecTIER Manager.”
 - To use a different high contrast scheme:
 - a. Click the arrow to show the list of available color schemes.
 - b. Select the high contrast scheme that you want to use.
 - c. Click **Ok** to close the **Settings for High Contrast** dialog box.
 - d. Click **Ok** to close the **Accessibility Options** dialog box.
After a few moments, the display changes to the new color scheme.
 - e. Go on to “Using the Windows high contrast scheme with ProtecTIER Manager.”

Using the Windows high contrast scheme with ProtecTIER Manager

About this task

Now that you have changed the contrast scheme in Windows, you must enable the **Support system settings** option in ProtecTIER Manager.

Procedure

1. Launch **ProtecTIER Manager**:

- a. Click: **Start > All Programs > IBM > ProtecTIER Manager > IBM ProtecTIER Manager.**

The ProtecTIER Manager window opens, as shown in: Figure 19.

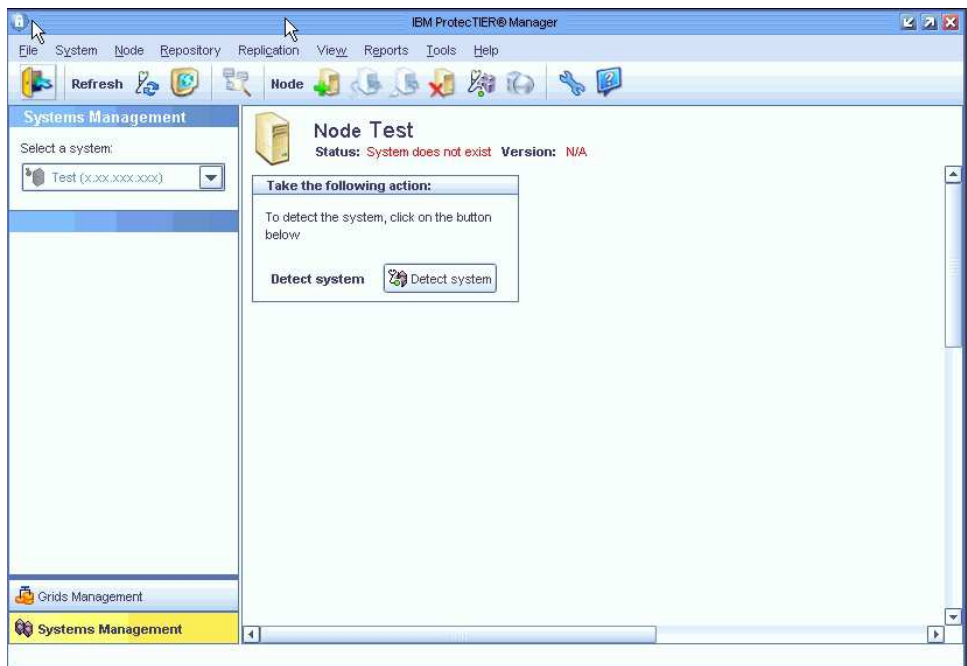


Figure 19. ProtecTIER Manager window

2. On the toolbar, click: **Tools > Preferences.**

The **Preferences** dialog box opens with the **Appearance** tab selected, as shown in Figure 20:

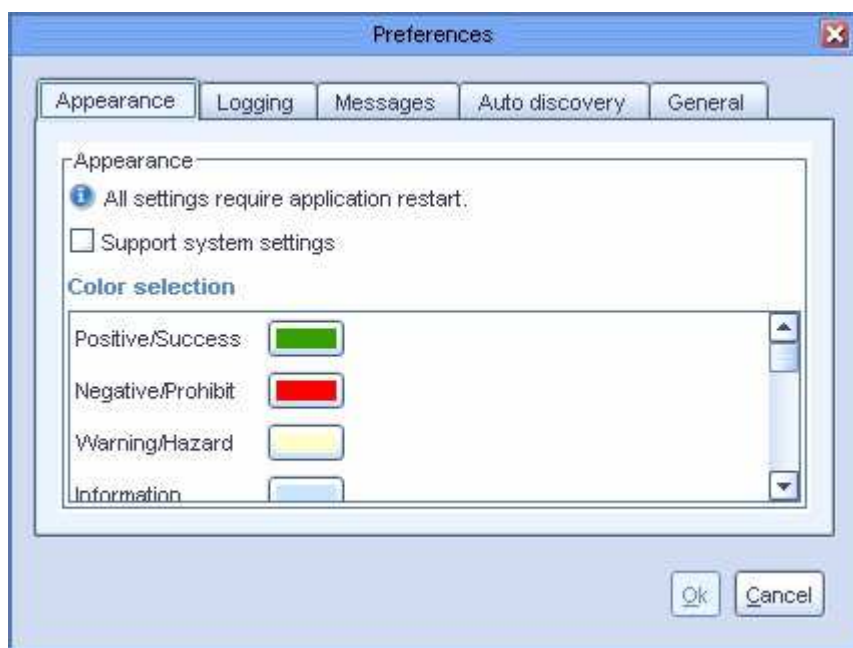


Figure 20. Preferences dialog box

3. On the **Appearance** tab, select the **Support system settings** check box. You are returned to the **ProtectTIER Manager** window.
4. Exit and restart ProtectTIER Manager so the contrast settings take effect:
 - a. On the **ProtectTIER Manager** toolbar, click: **File > Exit**.
The **ProtectTIER Manager** window closes.
 - b. Click: **Start > All Programs > IBM > ProtectTIER Manager > IBM ProtectTIER Manager**.
When the ProtectTIER Manager window opens, the display reflects the contrast change, as shown in: Figure 21.

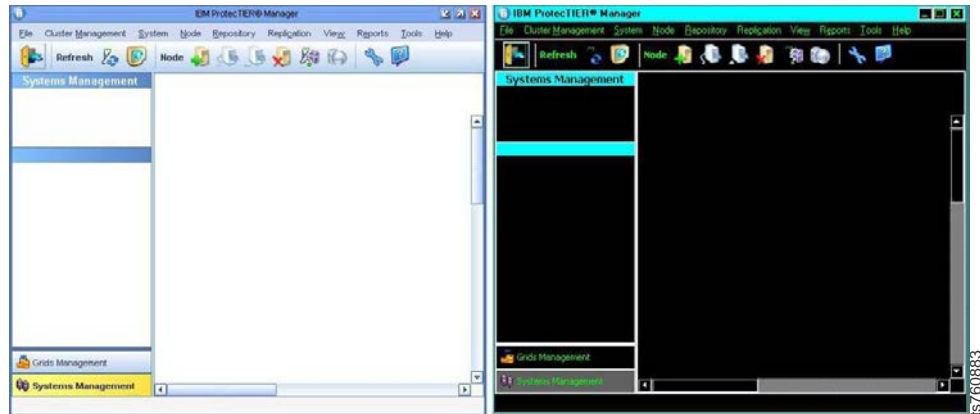


Figure 21. Normal contrast versus high contrast

5. Proceed as appropriate:
 - If you want to change one or more of the colors used in the ProtectTIER Manager display, continue to “Customizing the color palette.”
 - If you **do not** want to customize the color palette, resume your regular use of ProtectTIER Manager.

Customizing the color palette

About this task

Use this procedure to customize the color palette for ProtectTIER Manager to improve visibility in the display, or to suit your personal preferences.

Procedure

1. If necessary, start ProtectTIER Manager as described in step 1 on page 95.
2. Open the **Preferences** dialog box, as described in 2 on page 96.
3. Scroll down (if necessary) to see the entire **Color selection** list, and then select the color you want to change.

The **Color selection** dialog box opens, with the **Swatches** tab selected, as shown in Figure 22 on page 98:

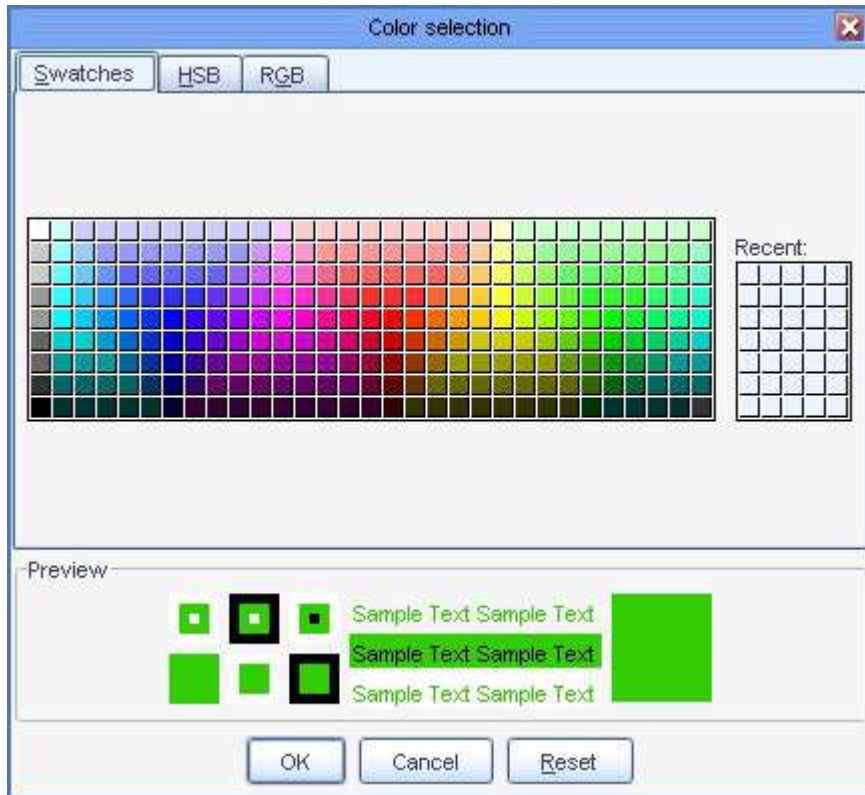



Figure 22. Color selection, Swatches tab

The color that is currently defined for your selection is shown in the **Preview** pane.

4. Select a new color from the color palette.

 You can also specify a new color by using the Hue/Saturation/Brightness (HSB) or Red/Green/Blue (RGB) color models. To do so, click the tab for the model you want to use and enter the required values.

5. When you have finished selecting or specifying the new color, click **Ok**.
You are returned to the **Appearance** tab.
6. To change another color, repeat steps 3 on page 97 through 5.
7. When you are finished making changes in the **Appearance** tab, click **Ok**.
You are returned to the ProtecTIER Manager window.
8. Exit and restart ProtecTIER Manager (as described in step 4 on page 97) so the color palette changes take effect.

After you log in to ProtecTIER Manager and add a node, the display reflects your custom color selections.

An example of the default color versus a custom color for **Allocable** resources, is shown in: Figure 23 on page 99

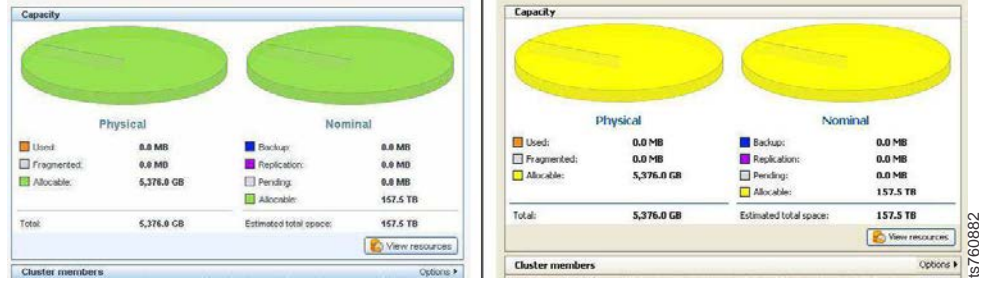


Figure 23. Default color versus custom color

- Proceed as appropriate. Return to the task from which you were sent to these instructions or resume your regular use of ProtecTIER Manager.

Notices

This information was developed for products and services offered in the U.S.A.

IBM may not offer the products, services, or features discussed in this document in other countries. Consult your local IBM representative for information on the products and services currently available in your area. Any reference to an IBM product, program, or service is not intended to state or imply that only that IBM product, program, or service may be used. Any functionally equivalent product, program, or service that does not infringe any IBM intellectual property right may be used instead. However, it is the user's responsibility to evaluate and verify the operation of any non-IBM product, program, or service.

IBM may have patents or pending patent applications covering subject matter described in this document. The furnishing of this document does not give you any license to these patents. You can send license inquiries, in writing, to:

*IBM Director of Licensing
IBM Corporation
North Castle Drive
Armonk, NY 10504-1785
U.S.A.*

The following paragraph does not apply to the United Kingdom or any other country where such provisions are inconsistent with local law:

INTERNATIONAL BUSINESS MACHINES CORPORATION PROVIDES THIS PUBLICATIONS "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Some states do not allow disclaimer of express or implied warranties in certain transactions, therefore, this statement may not apply to you.

This information could include technical inaccuracies or typographical errors. Changes are periodically made to the information herein; these changes will be incorporated in new editions of the publication. IBM may make improvements and/or changes in the product(s) and/or the program(s) described in this publication at any time without notice.

Any references in this information to non-IBM Web sites are provided for convenience only and do not in any manner serve as an endorsement of those Web sites. The materials at those Web sites are not part of the materials for this IBM product and use of those Web sites is at your own risk.

IBM may use or distribute any of the information you supply in any way it believes appropriate without incurring any obligation to you.

Any performance data contained herein was determined in a controlled environment. Therefore, the results obtained in other operating environments may vary significantly. Some measurements may have been made on development-level systems and there is no guarantee that these measurements will be the same on generally available systems. Furthermore, some measurement may have been

estimated through extrapolation. Actual results may vary. Users of this document should verify the applicable data for their specific environment.

Information concerning non-IBM products was obtained from the suppliers of those products, their published announcements or other publicly available sources. IBM has not tested those products and cannot confirm the accuracy of performance, compatibility or any other claims related to non-IBM products. Questions on the capabilities of non-IBM products should be addressed to the suppliers of those products.

All statements regarding IBM's future direction or intent are subject to change or withdrawal without notice, and represent goals and objectives only.

This information is for planning purposes only. The information herein is subject to change before the products described become available.

This information contains examples of data and reports used in daily business operations. To illustrate them as completely as possible, the examples include the names of individuals, companies, brands, and products. All of these names are fictitious and any similarity to the names and addresses used by an actual business enterprise is entirely coincidental.

Red Hat Notice

IBM delivers patches (including security fixes) for Red Hat Enterprise Linux (RHEL) based on the Red Hat Enterprise Linux Life Cycle policy. As stated in the Red Hat policy, fixes are not provided for all vulnerabilities on all RHEL versions, which means that IBM cannot deliver security fixes for some RHEL issues.

When security and other related updates are available from Red Hat, IBM delivers those updates in software packages that can be downloaded and applied to ProtecTIER. IBM may also publish Security Bulletins with additional information for security related updates. Customers should subscribe to My Notifications to be notified of important ProtecTIER support alerts.

Trademarks

The following terms are trademarks of the International Business Machines Corporation in the United States, other countries, or both:

- AIX®
- DS4000
- Enterprise Storage Server®
- ESCON
- FICON
- i5/OS™
- iSeries
- IBM
- ProtecTIER
- pSeries
- S/390®
- ServeRAID
- System x

- System Storage
- TotalStorage
- Wake on LAN
- z/OS®
- zSeries

IBM, the IBM logo, and [ibm.com](http://www.ibm.com)® are trademarks or registered trademarks of International Business Machines Corporation in the United States, other countries, or both. If these and other IBM trademarked terms are marked on their first occurrence in this information with a trademark symbol ((R) or (TM)), these symbols indicate U.S. registered or common law trademarks owned by IBM at the time this information was published. Such trademarks may also be registered or common law trademarks in other countries. A current list of IBM trademarks is available on the Web at "Copyright and trademark information" at <http://www.ibm.com/legal/copytrade.shtml>.

Adobe, the Adobe logo, PostScript, and the PostScript logo are either registered trademarks or trademarks of Adobe Systems Incorporated in the United States, and/or other countries.

Java and all Java-based trademarks are trademarks of Oracle, Inc. in the United States, other countries, or both.

Microsoft, Windows, and Windows NT are trademarks of Microsoft Corporation in the United States, other countries, or both.

Intel, Intel logo, Intel Inside, Intel Inside logo, Intel Centrino, Intel Centrino logo, Celeron, Intel Xeon, Intel SpeedStep, Itanium, and Pentium are trademarks or registered trademarks of Intel Corporation or its subsidiaries in the United States and other countries.

UNIX is a registered trademark of The Open Group in the United States and other countries.

Linux is a registered trademark of Linus Torvalds in the United States, other countries, or both.

Red Hat is a registered trademark of Red Hat, Inc. in the United States, other countries, or both.

Other company, product, and service names may be trademarks or service marks of others.

Electronic emission notices

This section contains the electronic emission notices or statements for the United States and other regions.

Federal Communications Commission statement

This explains the Federal Communications Commission's (FCC) statement.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is

operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, might cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. IBM is not responsible for any radio or television interference caused by using other than recommended cables and connectors, or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device might not cause harmful interference, and (2) this device must accept any interference received, including interference that might cause undesired operation.

Industry Canada compliance statement

This Class A digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe A est conform à la norme NMB-003 du Canada.

European Union Electromagnetic Compatibility Directive

This product is in conformity with the protection requirements of European Union (EU) Council Directive 2004/108/EC on the approximation of the laws of the Member States relating to electromagnetic compatibility. IBM cannot accept responsibility for any failure to satisfy the protection requirements resulting from a non-recommended modification of the product, including the fitting of non-IBM option cards.

Attention: This is an EN 55022 Class A product. In a domestic environment this product might cause radio interference in which case the user might be required to take adequate measures.

Responsible Manufacturer:

International Business Machines Corp.
New Orchard Road
Armonk, New York 10504
914-499-1900

European community contact:

IBM Deutschland GmbH
Technical Regulations, Department M372
IBM-Allee 1, 71139 Ehningen, Germany
Tele: +49 7032 15 2941
e-mail: lugi@de.ibm.com

Australia and New Zealand Class A Statement

Attention: This is a Class A product. In a domestic environment this product might cause radio interference in which case the user might be required to take adequate measures.

Germany Electromagnetic compatibility directive

Deutschsprachiger EU Hinweis: Hinweis für Geräte der Klasse A EU-Richtlinie zur Elektromagnetischen Verträglichkeit

Dieses Produkt entspricht den Schutzanforderungen der EU-Richtlinie 2004/108/EG zur Angleichung der Rechtsvorschriften über die elektromagnetische Verträglichkeit in den EU-Mitgliedsstaaten und hält die Grenzwerte der EN 55022 Klasse A ein.

Um dieses sicherzustellen, sind die Geräte wie in den Handbüchern beschrieben zu installieren und zu betreiben. Des Weiteren dürfen auch nur von der IBM empfohlene Kabel angeschlossen werden. IBM übernimmt keine Verantwortung für die Einhaltung der Schutzanforderungen, wenn das Produkt ohne Zustimmung der IBM verändert bzw. wenn Erweiterungskomponenten von Fremdherstellern ohne Empfehlung der IBM gesteckt/eingebaut werden.

EN 55022 Klasse A Geräte müssen mit folgendem Warnhinweis versehen werden:

"Warnung: Dieses ist eine Einrichtung der Klasse A. Diese Einrichtung kann im Wohnbereich Funk-Störungen verursachen; in diesem Fall kann vom Betreiber verlangt werden, angemessene Maßnahmen zu ergreifen und dafür aufzukommen."

Deutschland: Einhaltung des Gesetzes über die elektromagnetische Verträglichkeit von Geräten

Dieses Produkt entspricht dem "Gesetz über die elektromagnetische Verträglichkeit von Geräten (EMVG)." Dies ist die Umsetzung der EU-Richtlinie 2004/108/EG in der Bundesrepublik Deutschland.

Zulassungsbescheinigung laut dem Deutschen Gesetz über die elektromagnetische Verträglichkeit von Geräten (EMVG) (bzw. der EMC EG Richtlinie 2004/108/EG) für Geräte der Klasse A

Dieses Gerät ist berechtigt, in Übereinstimmung mit dem Deutschen EMVG das EG-Konformitätszeichen - CE - zu führen.

Verantwortlich für die Einhaltung der EMV Vorschriften ist der Hersteller:

International Business Machines Corp.
New Orchard Road
Armonk, New York 10504
914-499-1900

Der verantwortliche Ansprechpartner des Herstellers in der EU ist:

IBM Deutschland GmbH
Technical Regulations, Abteilung M372

IBM-Allee 1, 71139 Ehningen, Germany
Tele: +49 7032 15 2941
e-mail: lugi@de.ibm.com

Generelle Informationen:

Das Gerät erfüllt die Schutzanforderungen nach EN 55024 und EN 55022 Klasse A.

People's Republic of China Class A Electronic Emission statement

中华人民共和国“A类”警告声明

声明

此为A级产品，在生活环境中，该产品可能会造成无线电干扰。在这种情况下，可能需要用户对其干扰采取切实可行的措施。

Taiwan Class A Statement

警告使用者：
這是甲類的資訊產品，在居住的環境中使用時，可能會造成射頻干擾，在這種情況下，使用者會被要求採取某些適當的對策。

taitemi

Taiwan contact information

This topic contains the product service contact information for Taiwan.

IBM Taiwan Product Service Contact Information:
IBM Taiwan Corporation
3F, No 7, Song Ren Rd., Taipei Taiwan
Tel: 0800-016-888

台灣IBM 產品服務聯絡方式：
台灣國際商業機器股份有限公司
台北市松仁路7號3樓
電話：0800-016-888

f2c00790

Japan Voluntary Control Council for Interference (VCCI) Class A Statement

この装置は、クラス A 情報技術装置です。この装置を家庭環境で使用する
と電波妨害を引き起こすことがあります。この場合には使用者が適切な対策
を講ずるよう要求されることがあります。 VCCI-A

Japan Electronics and Information Technology Industries Association (JEITA) Statement (less than or equal to 20 A per phase)

高調波ガイドライン適合品

jeita1

Korean Electromagnetic Interference (EMI) Statement

This explains the Korean Electromagnetic Interference (EMI) statement.

이 기기는 업무용 환경에서 사용할 목적으로 적합성평가를 받은 기기로서
가정용 환경에서 사용하는 경우 전파간섭의 우려가 있습니다.

Russia Electromagnetic Interference (EMI) Class A Statement

ВНИМАНИЕ! Настоящее изделие относится к классу А.
В жилых помещениях оно может создавать
радиопомехи, для снижения которых необходимы
дополнительные меры

rusemi

Index

Numerics

2 node active-active support 24

A

accessibility 89
acoustical noise emission values 36
advanced features 23

B

best practices 60

C

cables, accommodating 34
cabling responsibilities 59
cache 60
 configuration 60
clearances 35
company information worksheet 69
configuration 60
console network settings work sheet 73
customer installation responsibilities 57
customer responsibilities 60

D

data management 23
data migration, planning 65
device drivers, supported 23
devices, supported 21

E

electrical power ratings 36
equipment, IBM-provided 67

F

feature codes 39, 52
fencing 23
 requirements 24
fire-suppression 37
floor requirements 35
 weight distribution 35

G

gateway server
 data migration 65
 feature codes 39
gateway server (3958 DD5) 13
gateway server (3958 DD6) 9

H

hardware components 2
hardware responsibilities 59
height requirements 35
help xiii
 online support xiv
 telephone support xv

I

IBM service installation
 responsibilities 63
information xiii
infrastructure responsibilities 59
installation
 customer responsibilities 57
 IBM service responsibilities 63
interface 18
introduction
 TS7650G 1

L

lighting considerations 33
LUN masking 24
LUN, supported (TS7650G only) 22

M

machine types xi
many-to-one replication 25
migration, data 65
model numbers xi

O

operating systems, supported 22

P

ProtecTIER Enterprise Edition V3.4
 software (TS7650G) 52
ProtecTIER Manager
 requirements
 workstation 59
ProtecTIER Manager workstation
 changing the Windows contrast
 setting for accessibility 89
 customizing the color palette 89
 installation wizard
 enabling screen-reader
 compatibility 89
 preparing for accessibility 89

R

RAID 23
replication 24, 27

replication (*continued*)
 settings 81
replication grid 26
replication settings work sheet 81
responsibilities
 customer installation 57
 IBM service installation 63

S

safety issues 37
 fire-suppression system 37
security 36
security and auditability 62
service xiii
site preparation 33
sizing 55
space requirements, calculating 34
specifications
 acoustical noise emission values 36
 clearances 35
 electrical power ratings 36
 floor requirements 35
 height requirements 35
 physical planning 33
 TS7650G
 dimensions 34
support
 device drivers 23
 devices 21
 operating systems 22
 switches 22
 TS7650G
 LUN 22
support and requirements 21
switches, supported 22
system responsibilities 58

T

telephone support xv
terminology xi
Trademarks 102
TS7650G
 hardware components 2
 introduction 1
 support and requirements 21

U

upgrade considerations 34
usage considerations 55

W

work sheets
 console network settings 73
 replication settings 81

worksheet
company information 69

Readers' Comments — We'd Like to Hear from You

IBM TS7650G Deduplication Gateway for ProtecTIER®
Introduction and Planning Guide
Version 3 Release 4

Publication No. GA32-0918-14

We appreciate your comments about this publication. Please comment on specific errors or omissions, accuracy, organization, subject matter, or completeness of this book. The comments you send should pertain to only the information in this manual or product and the way in which the information is presented.

For technical questions and information about products and prices, please contact your IBM branch office, your IBM business partner, or your authorized remarketer.

When you send comments to IBM, you grant IBM a nonexclusive right to use or distribute your comments in any way it believes appropriate without incurring any obligation to you. IBM or any other organizations will only use the personal information that you supply to contact you about the issues that you state on this form.

Comments:

Thank you for your support.

Submit your comments using one of these channels:

- Send your comments to the address on the reverse side of this form.
- Send your comments via email to: starpubs@us.ibm.com

If you would like a response from IBM, please fill in the following information:

Name

Address

Company or Organization

Phone No.

Email address



Fold and Tape

Please do not staple

Fold and Tape



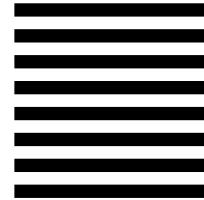
NO POSTAGE
NECESSARY
IF MAILED IN THE
UNITED STATES

BUSINESS REPLY MAIL

FIRST-CLASS MAIL PERMIT NO. 40 ARMONK, NEW YORK

POSTAGE WILL BE PAID BY ADDRESSEE

IBM
Corporation
Information Development, Dept. GZWA
9000 S Rita Road
Tucson, AZ
USA 85744-0001



Fold and Tape

Please do not staple

Fold and Tape



Printed in USA

GA32-0918-14

