

IBM System Storage TS7600 with ProtecTIER



Installation Roadmap Guide

for the TS7650G (3958 DD4 - Gateway)

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for the TS7650G (3958 DD4 - Gateway)

Note:

Before using this information and the product it supports, be sure to read the general information in the "Safety and environmental notices" and "Notices" sections of this publication.

This edition applies to the TS7650G and to all subsequent releases and modifications until otherwise indicated in new editions.

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Safety and Environmental notices

This section contains information about safety notices that are used in this guide and environmental notices for this product.

Safety notices

Observe the safety notices when using this product. These safety notices contain danger and caution notices. These notices are sometimes accompanied by symbols that represent the severity of the safety condition.

Most danger or caution notices contain a reference number (Dxxx or Cxxx). Use the reference number to check the translation in the *IBM Systems Safety Notices*, G229-9054 manual.

The sections that follow define each type of safety notice and give examples.

Danger notice

A danger notice calls attention to a situation that is potentially lethal or extremely hazardous to people. A lightning bolt symbol always accompanies a danger notice to represent a dangerous electrical condition. A sample danger notice follows:



DANGER: An electrical outlet that is not correctly wired could place hazardous voltage on metal parts of the system or the devices that attach to the system. It is the responsibility of the customer to ensure that the outlet is correctly wired and grounded to prevent an electrical shock. (D004)

Caution notice

A caution notice calls attention to a situation that is potentially hazardous to people because of some existing condition, or to a potentially dangerous situation that might develop because of some unsafe practice. A caution notice can be accompanied by one of several symbols:

| If the symbol is... | It means... |
|---|--|
|  | A generally hazardous condition not represented by other safety symbols. |
|  | This product contains a Class II laser. Do not stare into the beam. (C029) Laser symbols are always accompanied by the classification of the laser as defined by the U. S. Department of Health and Human Services (for example, Class I, Class II, and so forth). |
|  | A hazardous condition due to mechanical movement in or around the product. |

| If the symbol is... | It means... |
|---|---|
|  | <p>This part or unit is heavy but has a weight smaller than 18 kg (39.7 lb). Use care when lifting, removing, or installing this part or unit. (C008)</p> |

Sample caution notices follow:

Caution

The battery is a lithium ion battery. To avoid possible explosion, do not burn. Exchange only with the IBM-approved part. Recycle or discard the battery as instructed by local regulations. In the United States, IBM® has a process for the collection of this battery. For information, call 1-800-426-4333. Have the IBM part number for the battery unit available when you call. (C007)

Caution

The system contains circuit cards, assemblies, or both that contain lead solder. To avoid the release of lead (Pb) into the environment, do not burn. Discard the circuit card as instructed by local regulations. (C014)

Caution

When removing the Modular Refrigeration Unit (MRU), immediately remove any oil residue from the MRU support shelf, floor, and any other area to prevent injuries because of slips or falls. Do not use refrigerant lines or connectors to lift, move, or remove the MRU. Use handholds as instructed by service procedures. (C016)

Caution

Do not connect an IBM control unit directly to a public optical network. The customer must use an additional connectivity device between an IBM control unit optical adapter (that is, fibre, ESCON®, FICON®) and an external public network. Use a device such as a patch panel, a router, or a switch. You do not need an additional connectivity device for optical fibre connectivity that does not pass through a public network.

Power cords

For your safety, IBM provides a power cord with a grounded attachment plug to use with this IBM product. To avoid electrical shock, always use the power cord and plug with a properly grounded outlet.

IBM power cords used in the United States and Canada are listed by Underwriter's Laboratories (UL) and certified by the Canadian Standards Association (CSA).

For units intended to be operated at 115 volts: Use a UL-listed and CSA-certified cord set consisting of a minimum 18 AWG, Type SVT or SJT, three-conductor cord, a maximum of 15 feet in length and a parallel blade, grounding-type attachment plug rated 15 amperes, 125 volts.

For units intended to be operated at 230 volts (U.S. use): Use a UL-listed and CSA-certified cord set consisting of a minimum 18 AWG, Type SVT or SJT,

three-conductor cord, a maximum of 15 feet in length and a tandem blade, grounding-type attachment plug rated 15 amperes, 250 volts.

For units intended to be operated at 230 volts (outside the U.S.): Use a cord set with a grounding-type attachment plug. The cord set should have the appropriate safety approvals for the country in which the equipment will be installed.

IBM power cords for a specific country or region are usually available only in that country or region.

Environmental notices

The environmental notices that apply to this product are provided in the *Environmental Notices and User Guide, Z125-5823-xx* manual. A copy of this manual is located on the publications CD.

Safety, danger, caution notices and labels

This section contains safety, danger, caution notices and labels that are used in this guide for this product.

You should read all safety notices in entirety before completing any task.

Homologation Statement

Attention: This product is not intended to be connected directly or indirectly by any means whatsoever to interfaces of public telecommunications networks, neither to be used in a Public Services Network.

D001

DANGER

To prevent a possible shock from touching two surfaces with different protective ground (earth), use one hand, when possible, to connect or disconnect signal cables. (D001)

D002

DANGER

Overloading a branch circuit is potentially a fire hazard and a shock hazard under certain conditions. To avoid these hazards, ensure that your system electrical requirements do not exceed branch circuit protection requirements. Refer to the information that is provided with your device or the power rating label for electrical specifications. (D002)

D003

DANGER

If the receptacle has a metal shell, do not touch the shell until you have completed the voltage and grounding checks. Improper wiring or grounding could place dangerous voltage on the metal shell. If any of the conditions are not as described, *STOP*. Ensure the improper voltage or impedance conditions are corrected before proceeding. (D003)

D004

DANGER

An electrical outlet that is not correctly wired could place hazardous voltage on the metal parts of the system or the devices that attach to the system. It is the responsibility of the customer to ensure that the outlet is correctly wired and grounded to prevent an electrical shock. (D004)

D005

DANGER

When working on or around the system, observe the following precautions:

Electrical voltage and current from power, telephone, and communication cables are hazardous. To avoid a shock hazard:

- Connect power to this unit only with the IBM provided power cord. Do not use the IBM provided power cord for any other product.
- Do not open or service any power supply assembly.
- Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.
- The product might be equipped with multiple power cords. To remove all

hazardous voltages, disconnect all power cords.

- Connect all power cords to a properly wired and grounded electrical outlet. Ensure that the outlet supplies proper voltage and phase rotation according to the system rating plate.
- Connect any equipment that will be attached to this product to properly wired outlets.
- When possible, use one hand only to connect or disconnect signal cables.
- Never turn on any equipment when there is evidence of fire, water, or structural damage.
- Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.
- Connect and disconnect cables as described in the following procedures when installing, moving, or opening covers on this product or attached devices.

To disconnect:

1. Turn off everything (unless instructed otherwise).
2. Remove the power cords from the outlets.
3. Remove the signal cables from the connectors.
4. Remove all cables from the devices.

To connect:

1. Turn off everything (unless instructed otherwise).
 2. Attach all cables to the devices.
 3. Attach the signal cables to the connectors.
 4. Attach the power cords to the outlets.
 5. Turn on the devices.
- Sharp edges, corners and joints may be present in and around the system. Use care when handling equipment to avoid cuts, scrapes and pinching.

(D005)

D006

DANGER

Heavy equipment—personal injury or equipment damage might result if mishandled. (D006)

D008

DANGER

Professional movers are to be used for all relocation activities. Serious injury or death may occur if systems are handled and moved incorrectly. (D008)

C001

CAUTION:

Energy hazard present. Shorting might result in system outage and possible physical injury. Remove all metallic jewelry before servicing. (C001)

C002

CAUTION:

Only trained service personnel may replace this battery. The battery contains lithium. To avoid possible explosion, do not burn or charge the battery.

Do not:

- Throw or immerse into water
- Heat to more than 100°C (212°F)
- Repair or disassemble

Exchange only with the IBM-approved part. Recycle or discard the battery as instructed by local regulations. In the United States, IBM has a process for the collection of this battery. For information, call 1-800-426-4333. Have the IBM part number for the battery unit available when you call. (C002)

C003

CAUTION:

The battery contains lithium. To avoid possible explosion, do not burn or charge the battery. *Do not:*

- Throw or immerse into water
- Heat to more than 100°C (212°F)
- Repair or disassemble

Exchange only with the IBM-approved part. Recycle or discard the battery as instructed by local regulations. In the United States, IBM has a process for the collection of this battery. For information, call 1-800-426-4333. Have the IBM part number for the battery unit available when you call. (C003)

C005

CAUTION:

The battery is a nickel-cadmium battery. To avoid possible explosion, do not burn. Exchange only with the IBM-approved part. Recycle or discard the battery as instructed by local regulations. In the United States, IBM has a process for the collection of this battery. For information, call 1-800-426-4333. Have the IBM part number for the battery unit available when you call. (C005)

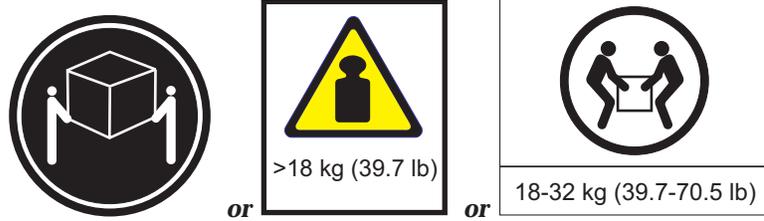
C007

CAUTION:

The battery is a lithium ion battery. To avoid possible explosion, do not burn. Exchange only with the IBM-approved part. Recycle or discard the battery as instructed by local regulations. In the United States, IBM has a process for the collection of this battery. For information, call 1-800-426-4333. Have the IBM part number for the battery unit available when you call. (C007)

C009

CAUTION:



The weight of this part or unit is between 18 and 32 kg (39.7 and 70.5 lb). It takes two persons to safely lift this part or unit. (C009)

C013

CAUTION:

The doors and covers to the product are to be closed at all times except for service by trained service personnel. All covers must be replaced and doors locked at the conclusion of the service operation. (C013)

C014

CAUTION:

The system contains circuit cards, assemblies, or both that contain lead solder. To avoid the release of lead (Pb) into the environment, do not burn. Discard the circuit card as instructed by local regulations. (C014)

C018

CAUTION:

This product is equipped with a 3-wire (two conductors and ground) power cable and plug. Use this power cable with a properly grounded electrical outlet to avoid electrical shock. (C018)

C021

CAUTION:

The power distribution outlets provide 200 to 240 V ac. Use these outlets only for devices that operate within this voltage range. (C021)

C022

CAUTION:

The product might be equipped with a hard-wired power cable. Ensure that a licensed electrician performs the installation per the national electrical code. (C022)

C023

CAUTION:

Ensure the building power circuit breakers are turned off *BEFORE* you connect the power cord or cords to the building power. (C023)

C026

CAUTION:

This product might contain one or more of the following devices: CD-ROM drive, DVD-ROM drive, DVD-RAM drive, or laser module, which are Class 1 laser products. Note the following information:

- Do not remove the covers. Removing the covers of the laser product could result in exposure to hazardous laser radiation. There are no serviceable parts inside the device.
- Use of the controls or adjustments or performance of procedures other than those specified herein might result in hazardous radiation exposure.

(C026)

C027

CAUTION:

Data processing environments can contain equipment transmitting on system links with laser modules that operate at greater than Class 1 power levels. For this reason, never look into the end of an optical fiber cable or open receptacle. (C027)

C028

CAUTION:

This product contains a Class 1M laser. Do not view directly with optical instruments. (C028)

C029

CAUTION:

This product contains a Class 2 laser. Do not stare into the beam. (C029)

C030

CAUTION:

Some laser products contain an embedded Class 3A or Class 3B laser diode. Note the following information:

- Laser radiation when open.
- Do not stare into the beam, do not view directly with optical instruments, and avoid direct exposure to the beam.

(C030)

C031

CAUTION:

The power-control button on the device does not turn off the electrical current supplied to the device. The device might also have more than one connection to dc power. To remove all electrical current from the device, ensure that all connections to dc power are disconnected at the dc power input terminals.
(C031)

C032

CAUTION:

Servicing of this product or unit is to be performed by trained service personnel only. (C032)

C033

CAUTION:

To reduce the risk of electric shock or energy hazards:

- This equipment must be installed by trained service personnel in a restricted-access location, as defined by the NEC and IEC 60950, The Standard for Safety of Information Technology Equipment.
- Connect the equipment to a reliably grounded, safety extra low voltage (SELV) source. An SELV source is a secondary circuit that is designed so that normal and single fault conditions do not cause the voltages to exceed a safe level (60 V direct current).
- The branch circuit overcurrent protection must be rated per the following table.
- Use copper wire conductor only, not exceeding 3 m (9.8 ft.) in length and sized according to the following table.
- Torque the wiring-terminal screws to the values in the following table.
- Incorporate a readily available approved and rated disconnect device in the field wiring.

(C033)

The following table appears in the product documentation with actual values substituted for xxx:

| | |
|------------------------------|--|
| Circuit breaker rating | Minimum: xxx amps Maximum: xxx amps |
| Wire size | xxx AWG xxx mm ² |
| Wiring-terminal screw torque | xxx inch-pounds xxx newton-meters |

R001 Part 1 of 2

Use the following general safety information for all rack-mounted devices:

DANGER

Observe the following precautions when working on or around your IT rack system:

- Heavy equipment—personal injury or equipment damage might result if mishandled.
- Always lower the leveling pads on the rack cabinet.
- Always install stabilizer brackets on the rack cabinet.
- To avoid hazardous conditions due to uneven mechanical loading, always install the heaviest devices in the bottom of the rack cabinet. Always install servers and optional devices starting from the bottom of the rack cabinet.
- Rack-mounted devices are not to be used as shelves or work spaces. Do not



place objects on top of rack-mounted devices.

- Each rack cabinet might have more than one power cord. Be sure to disconnect all power cords in the rack cabinet when directed to disconnect power during servicing.
- Connect all devices installed in a rack cabinet to power devices installed in the same rack cabinet. Do not plug a power cord from a device installed in one rack cabinet into a power device installed in a different rack cabinet.
- An electrical outlet that is not correctly wired could place hazardous voltage on the metal parts of the system or the devices that attach to the system. It is the responsibility of the customer to ensure that the outlet is correctly wired and grounded to prevent an electrical shock.

(R001 part 1 of 2)

R001 Part 2 of 2

CAUTION:

- Do not install a unit in a rack where the internal rack ambient temperatures will exceed the manufacturer's recommended ambient temperature for all your rack-mounted devices.
- Do not install a unit in a rack where the air flow is compromised. Ensure that air flow is not blocked or reduced on any side, front, or back of a unit used for air flow through the unit.
- Consideration should be given to the connection of the equipment to the supply circuit so that overloading of the circuits does not compromise the supply wiring or overcurrent protection. To provide the correct power connection to a rack, refer to the rating labels located on the equipment in the rack to determine the total power requirement of the supply circuit.
- *(For sliding drawers):* Do not pull out or install any drawer or feature if the rack stabilizer brackets are not attached to the rack. Do not pull out more than one drawer at a time. The rack might become unstable if you pull out more than one drawer at a time.
- *(For fixed drawers):* This drawer is a fixed drawer and must not be moved for servicing unless specified by the manufacturer. Attempting to move the

drawer partially or completely out of the rack might cause the rack to become unstable or cause the drawer to fall out of the rack.

(R001 part 2 of 2)

R002

CAUTION:

Removing components from the upper positions in the rack cabinet improves rack stability during relocation. Follow these general guidelines whenever you relocate a populated rack cabinet within a room or building:

- Reduce the weight of the rack cabinet by removing equipment starting at the top of the rack cabinet. When possible, restore the rack cabinet to the configuration of the rack cabinet as you received it. If this configuration is not known, you must observe the following precautions:
 - Remove all devices in the 32U position and above.
 - Ensure that the heaviest devices are installed in the bottom of the rack cabinet.
 - Ensure that there are no empty U-levels between devices installed in the rack cabinet below the 32U level.
- If the rack cabinet you are relocating is part of a suite of rack cabinets, detach the rack cabinet from the suite.
- Inspect the route that you plan to take to eliminate potential hazards.
- Verify that the route that you choose can support the weight of the loaded rack cabinet. Refer to the documentation that comes with your rack cabinet for the weight of a loaded rack cabinet.
- Verify that all door openings are at least 760 x 230 mm (30 x 80 in.).
- Ensure that all devices, shelves, drawers, doors, and cables are secure.
- Ensure that the four leveling pads are raised to their highest position.
- Ensure that there is no stabilizer bracket installed on the rack cabinet during movement.
- Do not use a ramp inclined at more than 10 degrees.
- When the rack cabinet is in the new location, complete the following steps:
 - Lower the four leveling pads.
 - Install stabilizer brackets on the rack cabinet.
 - If you removed any devices from the rack cabinet, repopulate the rack cabinet from the lowest position to the highest position.
- If a long-distance relocation is required, restore the rack cabinet to the configuration of the rack cabinet as you received it. Pack the rack cabinet in the original packaging material, or equivalent. Also lower the leveling pads to raise the casters off of the pallet and bolt the rack cabinet to the pallet.

(R002)

L001

DANGER

Hazardous voltage, current, or energy levels are present inside any component that has this label attached. Do not open any cover or barrier that contains this label. (L001)



L002

DANGER

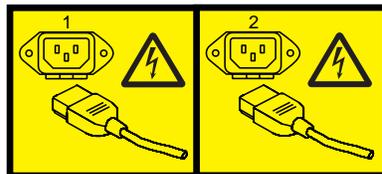
Rack-mounted devices are not to be used as shelves or work spaces. (L002)



L003

DANGER

Multiple power cords. The product might be equipped with multiple power cords. To remove all hazardous voltages, disconnect all power cords. (L003)



or



or



L004

DANGER

Hazardous voltage present. Voltages present constitute a shock hazard, which can cause severe injury or death. (L004)



L005**CAUTION:**

Hazardous energy present. Voltages with hazardous energy might cause heating when shorted with metal, which might result in splattered metal, burns, or both. (L005)



L009**CAUTION:**

System or part is heavy. The label is accompanied by a specific weight range. (L009)



L013**DANGER**

Heavy equipment—personal injury or equipment damage might result if mishandled. (L013)



L015

CAUTION:

Danger! Arc Flash/Arc Blast hazard when disconnected with power on. Turn off power before disconnecting. (L015)



L022

CAUTION:

Class 3R visible and invisible laser radiation when open. Avoid direct eye exposure. (L022)

**CAUTION:
Class 3R visible and invisible laser radiation
when open. Avoid direct eye exposure.**

L023

CAUTION:

Laser Aperture (L023)

**CAUTION:
Laser Aperture**

About this document

This document provides information for initial installation of the IBM System Storage® TS7650G ProtecTIER® De-duplication Gateway.

Note:

- If you are upgrading an existing system to ProtecTIER version 2.5, see the *IBM System Storage ProtecTIER Software Upgrade and Replication Enablement Guide*, IBM form number GC53-1196.
- If you are adding another Gateway server to cluster with an existing stand-alone server, see the *Standalone TS7650G to Clustered TS7650G MES Installation Instructions - Cluster Connection Kit (FC 3447) PN46X6061 EC M11240*

Who should read this document

This publication is intended for IBM service personnel only. The installation procedures described in this document are to be performed by IBM service personnel.

What's new in this edition

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

The following functions and hardware are new for the 2.5 release:

- OpenStorage plug-in support for NetBackup
- 3958 DD4 server model. This server is based on the IBM System x3850 X5 Type 7145 AC1. 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.
- Support for ProtecTIER on Windows 7

The following functions were added in release 2.4:

- Many-to-one replication
- LUN masking
- Red Hat upgrade to version 5.4

Major changes in and additions to this document include the following:

- Chapter 6, “Configuring the RAS package,” on page 83
- Chapter 11, “Using ProtecTIER Manager,” on page 119
- Integrated Management Module

Getting information, help, and service

If you need help, service, technical assistance, or just want more information about IBM products, you will find 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 refer to Table 1.

Table 1. IBM Web sites for help, services, and information

| Description | Web address (URL) |
|--|---|
| IBM home page | http://www.ibm.com |
| 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 : <ol style="list-style-type: none">1. Select Tape systems from the Product family list2. 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 U.S. or Canada. You must choose the software or hardware option when calling for assistance.

Note: This product is equipped with a Software Call Home feature. When enabled, it will notify 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 if the problem involves TS7650G software or TS7650G hardware. Choose the hardware option **only** if you are certain the problem solely involves the TS7650G hardware.

When calling IBM for service regarding the TS7650G

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 to 9999999) assigned by IBM when the PID is purchased and should be located 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, 3958 DD1, 3958 DD3 or 3958 DD4).

Note: Cache modules and cache controllers are supported separately within the TS7650G Gateway. If the problem is known to be in the IBM attached storage component, select the hardware option and enter the appropriate Machine Type and S/N (serial number) for the component. If the attached storage is not IBM branded, contact the appropriate service provider for the component.

Getting help online

Be sure to visit the support page for the IBM System Storage TS7600 with ProtecTIER, complete with FAQs, parts information, technical hints and tips, technical publications, and downloadable files, if applicable. This page is at:

www.ibm.com/storage/support/

For additional Web sites, see “Web sites.”

Before you call for service

Some problems can be solved without outside assistance, by using the online help, by looking in the online or printed documentation that comes with the TS7650G, or by consulting the support Web page for the latest fixpack and service alerts. Be sure to also read the information in any README files and release notes that come with the TS7650G.

Getting help by telephone

With the original purchase of the IBM System Storage TS7600 with ProtecTIER, you have access to extensive support coverage. During the product warranty period, you may call the IBM Support Center (1 800 426-7378 in the U.S.) for product assistance covered under the terms of the hardware IBM warranty or the software maintenance contract that comes with product purchase.

Please have the following information ready when you call:

- Either machine type and model or software identifier. The software identifier can be either the product name (TS7650G) or the Product Identification (PID) number.
- Either the serial numbers of the components or your proof of purchase.
- 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 U.S. 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.

Web sites

The most up-to-date information about your product, including documentation and the most recent downloads, can be found at the following Web sites:

- The translated publications for this product are included with the product. These documents and product specification sheets are also available from the following Web site:

<http://www-947.ibm.com/systems/support/supportsite.wss/brandmain?brandind=5345868>

- You can order publications through the IBM Publications Ordering System at the following web site:

<http://www.elink.ibm.com/publications/servlet/pbi.wss>

- Access installation and technical support information via the Web at:

www.ibm.com/support

- For DS4000 information, go to the following Web site:
www.ibm.com/servers/storage/support/disk/
- For DS5000 series information, go to the following:
<http://www-03.ibm.com/systems/storage/disk/ds5000/>
- For DS8000 series information, go to the following
<http://www-03.ibm.com/systems/storage/disk/ds8000/>
- For XIV information, go to the following:
<http://publib.boulder.ibm.com/infocenter/ibmxiv/r2/index.jsp>
- The IBM Web site for Independent Software Vendor (ISV) support is:
<http://www-304.ibm.com/jct01005c/isv/index.html>
- The IBM System Storage TS7600 with ProtecTIER Interoperability Matrix Web site can be found at:
http://www-03.ibm.com/systems/support/storage/config/ssic/displayesssearchwithoutjs.wss?start_over=yes
- For the latest information about SAN switches and directors, go to the following Web site:
www.ibm.com/servers/storage/san
- For the latest information about IBM xSeries products, services, and support, go to the following Web site:
www.ibm.com/eserver/xseries/
- For the latest information about operating system and HBA support, clustering support, SAN fabric support, and Storage Manager feature support, see the DS4000 Interoperability Matrix at the following Web site:
www.ibm.com/servers/storage/disk/ds4000/interop-matrix.html
- For product firmware and software downloads, as well as associated driver code, go to the following Web site:
<http://www-947.ibm.com/systems/support/supportsite.wss/selectproduct?brandind=5000034&familyind=0&oldbrand=0&oldfamily=0&oldtype=0&taskind=1&psid=bm>
- For accessibility information, go to the following Web site:
http://www-03.ibm.com/able/product_accessibility/index.html
- For the latest information about product recycling programs, go to the following Web site:
www.ibm.com/ibm/environment/products/prp.shtml

Related IBM publications

The following documents provide information about the IBM System Storage TS7600 with ProtecTIER gateway server and recommended additional hardware components.

IBM System Storage TS7600 with ProtecTIER publications

- *IBM System Storage TS7600 with ProtecTIER Introduction and Planning Guide for the TS7650G (3958 DD4)*, IBM form number GC53-1152
- *IBM System Storage ProtecTIER User's Guide for Enterprise Edition and Appliance Edition*, IBM form number GC53-1156

- *IBM System Storage TS7600 with ProtecTIER Problem Determination Guide for the TS7650 Appliance and TS7650G (Gateway)*, IBM form number GC53-1157
- *IBM System Storage ProtecTIER Software Upgrade and Replication Enablement Guide*, IBM form number GC53-1196
- *IBM System Storage TS7600 with ProtecTIER Labeling Instructions for the TS7650/TS7650G (3958 DD4 and 3958 AP1)*, IBM part number 46X6059
- *IBM System Storage TS7650 Best Practices Guide for ProtecTIER v 2.5 and TS7650G (Gateway) Attached Storage*, IBM form number GA32-0646

TS7650G server publications

The following publications provide additional documentation about the gateway server:

3958 DD4 server publications

The following publications provide additional documentation about the 3958 DD4 gateway server:

- *IBM System x3850 X5 and x3950 X5 Types 7145 and 7146 Installation and User's Guide*
- *IBM System x3850 X5 and x3950 X5 Types 7145 and 7146 Problem Determination and Service Guide*

The server might have features that are not described in the documentation that you received with the server. The documentation might be updated occasionally to include information about those features, or technical updates might be available to provide additional information that is not included in the server documentation. These updates are available from the IBM Web site. Complete the following steps to check for updated documentation and technical updates in the product information center:

1. In a Web browser, navigate to <http://www.ibm.com/support/publications/us/library/>.
2. Click the **Information Sets and Libraries** tab.
3. Scroll down to the **Servers** section and click **xSeries**.
4. In the search box, type **7145**.
5. Select **System x3850 X5 7145**.
6. Under **Choose your task** select **Documentation**.
7. Under **See your results** click **View your page**
8. Click the link for the document you want to view.

DS4700 Express Disk Controller (1814 70H) publications

The following publications provide additional documentation about the DS4700 Express Disk Controller (1814 70H):

- *IBM System Storage DS4700 Express Storage™ Subsystem Installation, User's and Maintenance Guide*
- *IBM TotalStorage DS4000 Storage Manager Version 10 Installation and Host Support Guide for Windows 2000/Server 2003, NetWare, ESX Server, and Linux*

IBM System Storage DS5000 series storage publication

The following publication provides additional documentation about the IBM System Storage DS5000 Storage Subsystems.

IBM DS8000 Storage System publications

The following publications provide additional documentation about the IBM DS8000 Storage System:

- *IBM DS8000 Storage System Introduction and Planning Guide for Customer Configuration*
- *IBM DS8000 Storage System User Manual*
-
-

IBM XIV Storage System publications

The following publications provide additional documentation about the IBM XIV Storage System:

- *IBM XIV Storage System (Types 2810 and 2812) Model A14 (Gen2) Introduction and Planning Guide for Customer Configuration*
- *IBM XIV Storage System User Manual*
- *IBM XIV Storage System Pre-Installation and Network Planning Guide for Customer Configuration*
- *IBM XIV Storage System Theory of Operation*

DS4000 EXP810 Storage Expansion Unit (1812 81H) publications

The following publications provide additional documentation about the IBM System Storage DS4000 EXP810 Storage Expansion Unit (1812 81H):

- *IBM TotalStorage DS4000 EXP810 Storage Expansion Unit Installation, User's and Maintenance Guide*
- *IBM TotalStorage DS4000 Storage Manager Version 10 Installation and Host Support Guide for Windows 2000/Server 2003, NetWare, ESX Server, and Linux*

Integrated Management Module(IMM) publications

The following publications provide additional documentation about the Integrated Management Module(IMM) for DD4 servers.

- *Integrated Management Module User's Guide*

Note: The Integrated Management Module functions were handled by the RSA in the DD3 and DD1 servers.

System console publications

The following publication provides information about the IBM System Storage TS3000 System Console (TSSC):

- *IBM System Storage TS3000 System Console (TSSC) Maintenance Information*

WTI network switch publications

Publications for the Western Telematic network power switch can be found on the manufacturer's Web site. Refer to www.wti.com.

How to send your comments

Your feedback is important in helping to provide the most accurate and highest quality information.

To submit any comments about this book or any other IBM System Storage TS7600 with ProtecTIER documentation:

- Send your comments by e-mail to starpubs@us.ibm.com. Be sure to include the following information:
 - Exact publication title and version
 - Publication form number (for example, GC53-1196-03)
 - Page, table, or illustration numbers that you are commenting on with a detailed description of any information that should be changed

Chapter 1. Overview

The IBM System Storage TS7650G ProtecTIER De-duplication Gateway (TS7650G) is available in two configurations — stand-alone and clustered.

Note: A 3958 DD4 may be clustered with a 3958 DD3. IBM does not support clustering a 3958 DD4 with a 3958 DD1.

Note: IBM does support installing two clustered pairs of TS7650 Gateway servers in a single frame via the RPQ process. This document does not address that configuration.

The purchase of the stand-alone gateway includes:

- One gateway server (IBM machine type and model 3958 DD4).
- One licensed, preinstalled copy of Red Hat® Enterprise Linux® Advanced Platform (version x86_64 or EM64T)
- One licensed, preinstalled copy of IBM ProtecTIER

Purchase of the clustered gateway includes:

- Two gateway servers, (IBM machine type and model 3958 DD4)
- One Cluster Connection Kit (Feature Code 3447) consisting of:
 - One Western Telematic IPS-800E-D20 remote network power switch and accompanying cables
 - Two 1 Gb Ethernet switches and accompanying cables
- Two licensed, preinstalled copies of Red Hat® Enterprise Linux® Advanced Platform (version x86_64 or EM64T)
- Two licensed, preinstalled copies of IBM ProtecTIER

In order for either configuration of the TS7650G to be fully functional, additional hardware components are required. These components are purchased separately and, with the exception of the IBM TS3000 System Console (TSSC) and TSSC Ethernet switch, must be installed and configured at the customer site before TS7650G installation begins.

Note: If the customer is using a TSSC that already exists at their location, the TSSC must include Feature Code 2719, and be at software level 5.5.22 or higher. See the *IBM System Storage TS7600 with ProtecTIER Introduction and Planning Guide for the TS7650G (3958 DD4)*, IBM form number GC53-1152 for additional information.

The lists below outline the additional recommended hardware components, based on IBM best practices, for each configuration. IBM recommends using the hardware components specified below to ensure optimal TS7650G functionality. However, the actual components purchased and used are at the customer's discretion, and may differ from those recommended.

Important:

This document references IBM 4.8 TB Fibre Channel Disk Controllers and IBM 7.2 TB Fibre Channel Disk Expansion Units in many of the hardware installation figures, examples, and procedures.

In addition to the IBM DS4700 disk controller, the TS7650G also supports the DS5000 disk controller, the DS8000 disk controller and the XIV disk controller, as well as various non-IBM storage solutions. If the customer has elected to use disk storage components other than the IBM disk controllers mentioned above, the figures, examples, and procedures in this document will not apply to the configuration on which you are working. Therefore, it is suggested that you determine the make and model of the disk storage components in use and, if necessary, obtain the related product documentation before you begin installation of the gateway.

The RAS code no longer sends call home packages for problems with any of the disk storage products attached to the gateway including DS4700, DS5000, DS8000 and XIV.

Stand-alone gateway

- One IBM DS4700, DS5000, DS8000 or XIV disk controller
- Six IBM EXP810 disk expansion modules or equivalents
- One TSSC and Ethernet switch (Feature Code 2732)
- Two or more 25m LC/LC fibre channel cables (Feature Code 6025)
- Two 36u frames

Clustered Gateway

- Two IBM DS4700, DS5000, DS8000 or XIV disk controllers
- Twelve IBM EXP810 disk expansion modules or equivalents
- One TSSC and Ethernet switch (Feature Code 2732)
- Two or more 25m LC/LC fibre channel cables (Feature Code 6025)
- Two 36u frames

For more detailed information about the stand-alone and clustered gateways, see Chapter 3, “Recommended TS7650G configurations,” on page 9.

Terminology used in this document

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. IBM does not support more than one clustered pair of TS7650 Gateway servers in a single frame. The TS7650G consists of the following:

Server There are three types of server that have been used in the Gateway:

3958 DD4

This is a newer, higher performance server available in December 2010. This server is based on the IBM System x3850 X5 Type 7145-AC1. 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.

3958 DD3

This is a higher performance server available in March 2009. This server is based on the IBM System x3850 M2 Type 7233. When used as a server in the TS7650G, its machine type and model are 3958 DD3. Use this machine type and model for service purposes.

3958 DD1

This is the original server available in August 2008. This server is based on the IBM System x3850 M2 Type 7141. When used as a server in the TS7650G, its machine type and model are 3958 DD1. 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.

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 compatible controllers is located at the IBM Tape Systems Resource Library website: <http://www-03.ibm.com/systems/storage/tape/library.html#compatibility> in the *TS7650/TS7650G ISV and interoperability matrix* document.

Disk expansion unit

The customer must choose the disk expansion unit for use with the TS7650G. A list of compatible expansion units is located at the IBM Tape Systems Resource Library website: <http://www-03.ibm.com/systems/storage/tape/library.html#compatibility> in the *TS7650/TS7650G ISV and interoperability matrix* document.

OpenStorage

OpenStorage allows ProtecTIER to be integrated with NetBackup to provide the means for backup-to-disk without using a virtual tape library (VTL) emulation. Using a plug-in that is installed on an OpenStorage-enabled media server, ProtecTIER can implement a communication protocol that supports data transfer and control between the backup server and the ProtecTIER server. Therefore, to support the plug-in, ProtecTIER implements a storage server emulation.

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 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 and is configured using the ProtecTIER Replication Manager. The ProtecTIER Replication Manager is a software component that is installed on a ProtecTIER server or a dedicated host. The ProtecTIER Replication Manager should be able to recognize all the members of the entire network the ProtecTIER Replication Manager handles on both replication subnets. The ProtecTIER Replication Manager is deployed separately from the ProtecTIER Manager on the customer's ProtecTIER server. 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.

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 enables you 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. 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.

Server and Node

This document uses the terms server and node interchangeably.

Target and Destination

This document uses the terms target and destination interchangeably.

What is covered in this document

This document provides instructions for installing, cabling, and configuring the gateway server(s) and any hardware components included in the purchase of the TS7650G; installing the ProtecTIER, ProtecTIER Manager, and ProtecTIER Replication Manager applications; and configuring the ProtecTIER software for use with the TS7650G.

What is not covered in this document

This document does not address the following topics:

- Installation of the second dual-port Ethernet adapter in a legacy 3958 DD1 server, to prepare the server for use in replication. Refer to the *IBM(r) System Storage(tm) TS7600 with ProtecTIER Second Dual-Port Ethernet Card (Feature Code 3448) Installation Instructions*, IBM part number 45E6768.
- Upgrades of the software on legacy 3958 DD1, 3958 DD3, or 3958 AP1 servers. Refer to *IBM System Storage ProtecTIER Software Upgrade and Replication Enablement Guide*, IBM form number GC53-1196.
- Physical installation of the disk controllers or disk expansion modules. Disk components must be installed prior to the installation of the TS7650G.
- Configuration and setup of any recommended hardware components that were not included in the purchase of the TS7650G.
Components such as the disk controller and disk expansion modules must be configured and operational prior to the installation of the TS7650G.
- Creation and configuration of replication grids. Refer to the *IBM System Storage ProtecTIER User's Guide for Enterprise Edition and Appliance Edition*, IBM form number GC53-1156
- Daily use and ongoing maintenance of the ProtecTIER, ProtecTIER Manager, and ProtecTIER Replication Manager, software. Refer to the *IBM System Storage ProtecTIER User's Guide for Enterprise Edition and Appliance Edition*, IBM form number GC53-1156.
- Hardware or software troubleshooting. Refer to the *IBM System Storage TS7600 with ProtecTIER Problem Determination Guide for the TS7650 Appliance and TS7650G (Gateway)*, IBM form number GC53-1157.

Chapter 2. TS7650G ship group

Hardware ship group

The hardware ship group includes the following:

IBM System Storage TS7650 with ProtecTIER Publications CD

The TS7650G documentation CD contains the following service and customer documentation for the TS7650G:

- *IBM System Storage TS7600 with ProtecTIER Installation Roadmap Guide for the TS7650G (3958 DD4)*, IBM form number GC53-1154
- *IBM System Storage TS7600 with ProtecTIER Introduction and Planning Guide for the TS7650G (3958 DD4)*, IBM form number GC53-1152
- *IBM System Storage ProtecTIER User's Guide for Enterprise Edition and Appliance Edition*, IBM form number GC53-1156
- *IBM System Storage TS7600 with ProtecTIER Problem Determination Guide for the TS7650 Appliance and TS7650G (Gateway)*, IBM form number GC53-1157
- *IBM System Storage TS7600 with ProtecTIER Labeling Instructions for the TS7650/TS7650G (3958 DD4 and 3958 AP1)*, IBM part number 46X6059
- *IBM System Storage TS3000 System Console (TSSC) Maintenance Information*
- *Statement of Limited Warranty*

Software ship group

The software ship group includes the following:

IBM System Storage ProtecTIER Enterprise Edition V2.5 DVD

This DVD contains the software for the gateway server that runs on the Red Hat Linux operating system installed on the server. The server uses the software to present the attached disk storage to host systems as "virtual tape" and to perform other functions such as data deduplication.

IBM System Storage ProtecTIER Manager V2.5 DVD

This DVD contains the files required to install the ProtecTIER Manager graphical user interface on workstations connected to the TS7650G through a customer's Ethernet network. ProtecTIER Manager allows the user to manage the virtual tape presented to host systems by the server.

IBM System Storage ProtecTIER Maintenance and Recovery Disk

This disk contains the Red Hat Enterprise Linux Advanced Platform (version x86_64 or EM64T) operating system software, with the ProtecTIER Kickstart configuration file (ks.cfg). In the event that system recovery becomes necessary, use this DVD to reinstall Red Hat Linux on the affected TS7650G servers.

Chapter 3. Recommended TS7650G configurations

This chapter describes the recommended configurations for the TS7650G stand-alone and clustered gateways.

For easier installation and maintenance, it is recommended that the components included in the purchase of the TS7650G and the TSSC occupy one frame (the server frame). There should be only one clustered pair of TS7650G servers per frame, while the disk components occupy a second frame (the disk storage frame). Figure 1 on page 11 and Figure 2 on page 12 show only the TS7650G components installed in the server frame.

Important:

- IBM does support two clustered pairs of TS7650 Gateway servers in a single frame via the RPQ process. This document does not address that configuration.
- Hardware components included in the purchase of the gateway are listed in **bold type** below. Additional components used with the TS7650G are purchased separately by the customer and may differ from the recommendations. A new TSSC is ordered under FC 2732. If an existing TSSC is being used, it must include Feature Code 2719. This feature provides a memory upgrade to 2 GB total RAM and a second Ethernet card for the Service Console to allow redundant connections into the service network. This feature only applies to consoles shipped with features #2718, #2720, #2721 and #2730. See the *IBM System Storage TS7600 with ProtecTIER Introduction and Planning Guide for the TS7650G (3958 DD4)*, IBM form number GC53-1152 for additional information.
- This document references IBM 4.8 TB Fibre Channel Disk Controllers and IBM 7.2 TB Fibre Channel Disk Expansion Units in many of the hardware installation figures, examples, and procedures.

In addition to the IBM DS4700 disk controller, the TS7650G also supports the DS5000 disk controller, the DS8000 disk controller and the XIV disk controller, as well as various non-IBM storage solutions. If the customer has elected to use disk storage components other than the IBM disk controllers mentioned above, the figures, examples, and procedures in this document will not apply to the configuration on which you are working. Therefore, it is suggested that you determine the make and model of the disk storage components in use and, if necessary, obtain the related product documentation before you begin installation of the gateway.

- The RAS code no longer sends call home packages for problems with any of the disk storage products attached to the gateway including DS4700, DS5000, DS8000 and XIV.

Stand-alone gateway

- **One TS7650G server**
- One IBM DS4700, IBM DS5000, DS8000 or IBM XIV disk controller or equivalent
- Six IBM EXP810 disk expansion modules or equivalents
- One IBM TS3000 System Console (TSSC) and TSSC Ethernet switch
- Two 36u frames

Clustered gateway

- Two TS7650G servers
- One Cluster Connection Kit, consisting of:
 - One Western Telematic IPS-800E-D20 (WTI) remote network power switch and accompanying cables
 - Two 1Gb Ethernet switches and accompanying cables
- Two IBM DS4700, IBM DS5000, DS8000, or IBM XIV disk controllers or equivalents
- Twelve IBM EXP810 disk expansion modules or equivalents
- One IBM TS3000 System Console (TSSC) and TSSC Ethernet switch
- Two 36u frames

Note: For convenience, the Windows version of the DS4000[®] Storage Manager application is provided on the *IBM System Storage ProtecTIER Manager V2.5* DVD. Storage Manager is used to monitor the health and connectivity status of the recommended disk components, and to perform service and disk rebuilding tasks.

When extracting the .zip file, be sure to specify a target directory (such as C:\StorageManager...) as a destination. Accepting the default destination will result in an attempt to extract files to the CD-ROM drive (E:\) instead of to a location on the hard drive, which will cause an error.

| 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 | TSSC (1u) | 18 | 52 |
| 49 | 17 | KVM Tray + TSSC sw (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 | 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 (PDU) | 3 | 7 |
| 4 | 2 | Power Distribution Unit (PDU) | 2 | 4 |
| 1 | 1 | Empty (1u) | 1 | 1 |

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Figure 1. Recommended stand-alone gateway server frame layout

| EIA Holes | EIA Unit | | EIA Unit Holes | 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 | TSSC (1u) | 18 | 52 |
| 49 | 17 | KVM Tray + TSSC sw (1u) | 17 | 49 |
| 46 | 16 | Empty (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 (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 (4u) | 8 | 22 |
| 19 | 7 | | 7 | 19 |
| 16 | 6 | | 6 | 16 |
| 13 | 5 | | 5 | 13 |
| 10 | 4 | WTI Power Switch (1u) | 4 | 10 |
| 7 | 3 | Power Distribution Unit (PDU) | 3 | 7 |
| 4 | 2 | Power Distribution Unit (PDU) | 2 | 4 |
| 1 | 1 | Empty (1u) | 1 | 1 |

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Figure 2. Recommended clustered gateway server frame layout

Note:

- In a clustered configuration, the bottom server in the frame is Server A, and the top server in the frame is Server B.

- Numbers in parentheses following components indicate the number of units (u) the component occupies in the recommended 36u frame.

About the TS7650G server

This section describes the 3958 DD4 gateway server.

The TS7650G stand-alone and clustered gateways come with one or two servers, respectively. The servers for VTL installation are equipped with

- Two Emulex fibre channel host bus adapters
- Two Qlogic QLE2562 dual port 8 Gb FC PCIe adapters
- One Intel Pro/1000 PT Quad Port Gb Ethernet PCIe adapter

The servers for OpenStorage installation are equipped with

- Two Qlogic QLE2562 dual port 8 Gb FC PCIe adapters
- Three Intel Pro/1000 PT Quad Port Gb Ethernet PCIe adapters

See Figure 3 and Table 2.

In addition, the Red Hat Enterprise Linux, ProtecTIER, and RAS package software is factory-installed on the TS7650G servers.

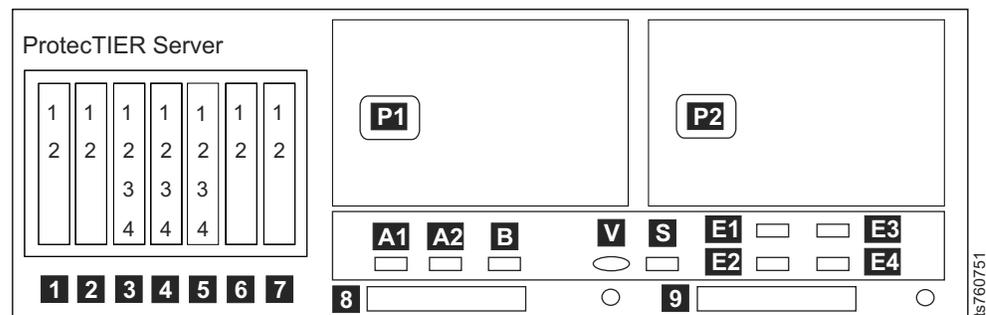


Figure 3. DD4 Server rear view - generic

Table 2. Server rear view: Slot assignments, ports, and connections

| Slot, Port or Connection | VTL use | OpenStorage use |
|--------------------------|---|---|
| 1 Slot 1: | Emulex fibre channel Host Bus Adapter (HBA) | Blank |
| 2 Slot 2: | Emulex fibre channel HBA | Blank |
| 3 Slot 3: | Blank | Intel Pro Quad-port gigabit Ethernet adapter (Port 1 = Eth8, Port 2 = Eth9, Port 3 = Eth10, Port 4 = Eth11) |
| 4 Slot 4: | Blank | Intel Pro Quad-port gigabit Ethernet adapter (Port 1 = Eth4, Port 2 = Eth5, Port 3 = Eth6, Port 4 = Eth7) |
| 5 Slot 5: | Intel Pro Quad-port gigabit Ethernet adapter (Port 1 = Eth0, Port 2 = Eth1, Port 3 = Eth2, Port 4 = Eth3) | Quad-port gigabit Ethernet adapter (Port 1 = Eth0, Port 2 = Eth1, Port 3 = Eth2, Port 4 = Eth3) |

Table 2. Server rear view: Slot assignments, ports, and connections (continued)

| | | |
|---|------------|------------|
| 6 Slot 6: | Qlogic HBA | Qlogic HBA |
| 7 Slot 7: | Qlogic HBA | Qlogic HBA |
| 8 QPI Slot 1 | Not used | Not used |
| 9 QPI Slot 2 | Not used | Not used |
| A1 Integrated Ethernet 1 port | (Eth4) | (Eth12) |
| A2 Integrated Ethernet 2 port | (Eth5) | (Eth13) |
| B Integrated Ethernet 3 port | SYS MGMT | SYS MGMT |
| V RSA Video port | | |
| S Serial Attached SCSI (SAS) port | | |
| E1 Universal Serial Bus (USB) port 1 | | |
| E2 Universal Serial Bus (USB) port 2 | | |
| E3 Universal Serial Bus (USB) port 3 | | |
| E4 Universal Serial Bus (USB) port 4 | | |
| P1 Power connection | | |
| P2 Power connection | | |

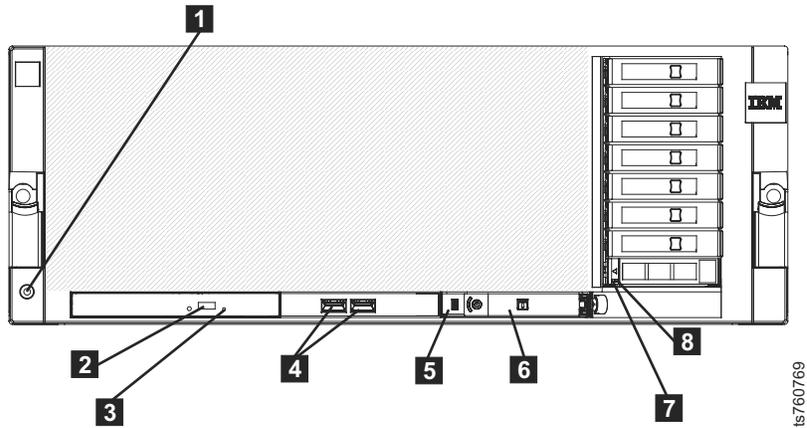


Figure 4. DD4 Server front view

Table 3. DD4 Server front view

| Callout | Description |
|----------|-----------------------------------|
| 1 | Electrostatic discharge connector |
| 2 | DVD-eject button |
| 3 | DVD drive activity LED |
| 4 | USB connectors |

Table 3. DD4 Server front view (continued)

| | |
|----------|------------------------------|
| 5 | Scalability LED |
| 6 | Operator information panel |
| 7 | Hard disk drive activity LED |
| 8 | Hard disk drive status LED |

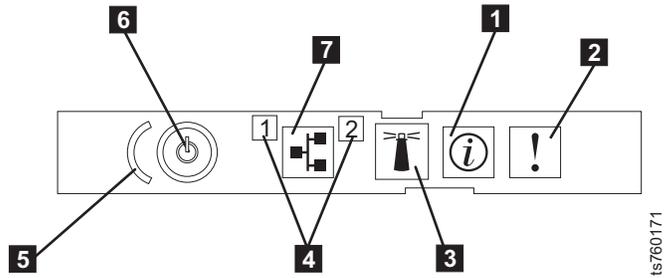


Figure 5. Operator information panel

Table 4. Operator information panel

| Callout | Description |
|----------|-----------------------------------|
| 1 | Information LED |
| 2 | System-error LED |
| 3 | Locator button/locator LED |
| 4 | Ethernet port activity LEDs |
| 5 | Power control button cover |
| 6 | Power control button/power-on LED |
| 7 | Ethernet icon LED |

Chapter 4. Installing the TS7650G hardware

This chapter provides instructions for installing the TS7650G servers into the recommended, customer-supplied 36u frame, and making all required power and cable connections from the server to the hardware components recommended under IBM best practices. To simplify installation and maintenance, it is recommended that the components included in the purchase of the TS7650G, including the TSSC and TSSC Ethernet switch, occupy one frame (the server frame), while the disk components occupy a second frame (the disk storage frame).

Attention: Any unused EIA units in the frame should be baffled, in order to avoid recirculating air and overheating the system.

Read this first

Read the notes below carefully. They provide important details regarding installation of the gateway hardware components.

Important:

- This document references IBM 4.8 TB Fibre Channel Disk Controllers and IBM 7.2 TB Fibre Channel Disk Expansion Units in many of the hardware installation figures, examples, and procedures.

In addition to the IBM DS4700 disk controller, the TS7650G also supports the DS5000 disk controller, the DS8000 disk controller and the XIV disk controller, as well as various non-IBM storage solutions. If the customer has elected to use disk storage components other than the IBM disk controllers mentioned above, the figures, examples, and procedures in this document will not apply to the configuration on which you are working. Therefore, it is suggested that you determine the make and model of the disk storage components in use and, if necessary, obtain the related product documentation before you begin installation of the gateway.

- The RAS code no longer sends call home packages for problems with any of the disk storage products attached to the gateway including DS4700, DS5000, DS8000 and XIV.
- The customer is responsible for ensuring that all hardware components other than those included in the purchase of the TS7650G and the TSSC and the TSSC Ethernet switch, are installed and configured **before** TS7650G installation begins.
- A USB keyboard and graphics-capable monitor are required to complete the installation. These items are not provided in the TS7650G ship group; they must be provided by the customer. The recommended screen resolution for the ProtecTIER GUI is 1280 x 1024.
- Be sure to complete the installation of the TS7650G before installing any miscellaneous equipment specification (MES) features. The installation instructions for an MES feature assume that you are adding the feature to an *installed* TS7650G.

Disk storage configuration guidelines

The Account/Sales team, Business Partner, and ultimately the customer, is responsible for ensuring that the disk storage is installed and configured before you start the TS7650G installation process. The installation also depends on having a customer-provided frame available at the customer site.

Gateway servers can attach to a variety of disk storage technologies, which may have different installation and support terms depending upon machine type. Warranty service upgrades (WSUs) or an installation service contract may be required to cover storage devices that are considered to be customer setup (CSU), or not considered to be IBM setup such as third-party disk storage subsystems.

Refer to the *IBM System Storage TS7650 Best Practices Guide for ProtecTIER v 2.5 and TS7650G (Gateway) Attached Storage*, IBM form number GA32-0646 for more detailed information on how to set up IBM DS4700, DS5000, DS8000 and XIV storage systems.

TS7650G sales agreements may include a frame and disk storage as part of the order. However, installation of frames and disk storage are not included in the gateway installation process, and will require additional planning and coordination.

If the disk storage is not operational when you arrive at the customer site, take the following steps:

- Assess the situation to determine whether you are capable of performing the task yourself, or if additional IBM resources are required:
 - You may perform physical disk storage installation if the machine types are properly entitled. Note that advanced setup tasks, including LUN configuration and/or mirroring, are outside the scope of normal installation support and may warrant additional charges.
 - If additional installation resources are required, contact your Service Delivery Manager (SDM) or your next level of support for advice on how you should proceed.
- In the event that IBM disk storage was purchased without IBM installation services, inform the customer that a Service Contract 44 (SC44) is required for disk storage and/or frame installation, and additional charges will apply.

Before you begin

The TS7650G installation requires participation from the customer, as well as the coordinated efforts IBM System Services Representative (SSR), Lab-based Services (LBS), and trained ProtecTIER specialist. The table below outlines the division of responsibilities:

Table 5. Responsibilities matrix

| Task | Customer | Trained ProtecTIER specialist and/or LBS | SSRs |
|--|----------|--|------|
| Complete the planning, preparation, and installation tasks described in the <i>IBM System Storage TS7600 with ProtecTIER Introduction and Planning Guide for the TS7650G (3958 DD4)</i> , IBM form number GC53-1152. | ■ | | |

Table 5. Responsibilities matrix (continued)

| Task | Customer | Trained ProtecTIER specialist and/or LBS | SSRs |
|--|----------|--|------|
| Meet the preinstallation requirements outlined in the <i>IBM System Storage TS7600 with ProtecTIER Introduction and Planning Guide for the TS7650G (3958 DD4)</i> , IBM form number GC53-1152 | ■ | | |
| Complete the worksheets provided in the <i>IBM System Storage TS7600 with ProtecTIER Introduction and Planning Guide for the TS7650G (3958 DD4)</i> , IBM form number GC53-1152. For convenience, blank copies of the worksheets are included as appendices in this document. | ■ | | |
| Purchase, install, and configure (if necessary), all hardware components not included in the purchase of the gateway. Use the <i>IBM System Storage TS7650 - Best Practices Guide for ProtecTIER v. 2.5 and TS7650G (Gateway) Attached Storage</i> for reference. | ■ | | |
| Confirm that an existing TSSC that is being used with the TS7650G has Feature Code 2719. Note: Unless an existing TSSC resides in the server frame and is used in conjunction with a KVM switch, the customer must provide a USB keyboard and graphics-capable monitor for server configuration. | ■ | | |
| Ensure that a separate USB keyboard and graphics-capable monitor are available for use during installation. | ■ | | |
| Oversee project management for the installation and integration of the engagement. | | ■ | |
| Oversee change management and process control for the installation. | | ■ | |
| Coordinate and schedule IBM resources for customer installations, and act as a focal point of contact for coordination of installation services. | | ■ | |
| Schedule and facilitate planning and solution assurance conference calls. | | ■ | |
| Create and document the installation service process. | | ■ | |
| Install the TS7650G hardware components purchased with the gateway, into the server and disk storage frames. | | | ■ |
| Label and connect power, Ethernet, and fibre channel cables, including OST front-end cables , as necessary and applicable. | | | ■ |
| Connect the TS7650G to the customer's local area network and replication network, if applicable. | | | ■ |
| Power-up the system. | | | ■ |
| Verify accuracy of hardware installation and cabling. Perform visual check of fault indicator LEDs. | | | ■ |
| Configure the TSSC for use with the TS7650G. | | | ■ |
| Configure the RAS package on the servers. | | | ■ |
| Test Call Home on the servers. | | | ■ |
| Configure ProtecTIER on the stand-alone server or Server A in a cluster, including OST if applicable , and create the file system. | | ■ | |
| Install ProtecTIER Replication Manager on one of the ProtecTIER servers being used for replication, if applicable. | | ■ | |
| Install ProtecTIER Manager on the TSSC or ProtecTIER Manager workstation, register each server as a new ProtecTIER node, and create the repository. | | ■ | |
| Add the second server (Server B) to the ProtecTIER cluster, if applicable. | | ■ | |

Table 5. Responsibilities matrix (continued)

| Task | Customer | Trained ProtecTIER specialist and/or LBS | SSRs |
|--|----------|--|------|
| Verify cluster operation, if applicable. | | ■ | |
| Perform RAS verification tasks. | | ■ | |
| Release the system to the customer. Advise the customer that it is their responsibility to create and configure the replication grid, if applicable. | | ■ | |
| Document and report installation results. | | ■ | |

Finding the instructions you need

The flowcharts that follow show which documents, and in what order, you (or the customer) will need when installing new 3958 DD4 servers. All of the documents shown are available in the ship group, in hardcopy or electronic format. The flowcharts for upgrading legacy 3958 DD1, 3958 DD3, or 3958 AP1, servers are located in the *IBM System Storage ProtecTIER Software Upgrade and Replication Enablement Guide*, IBM form number GC53-1196.

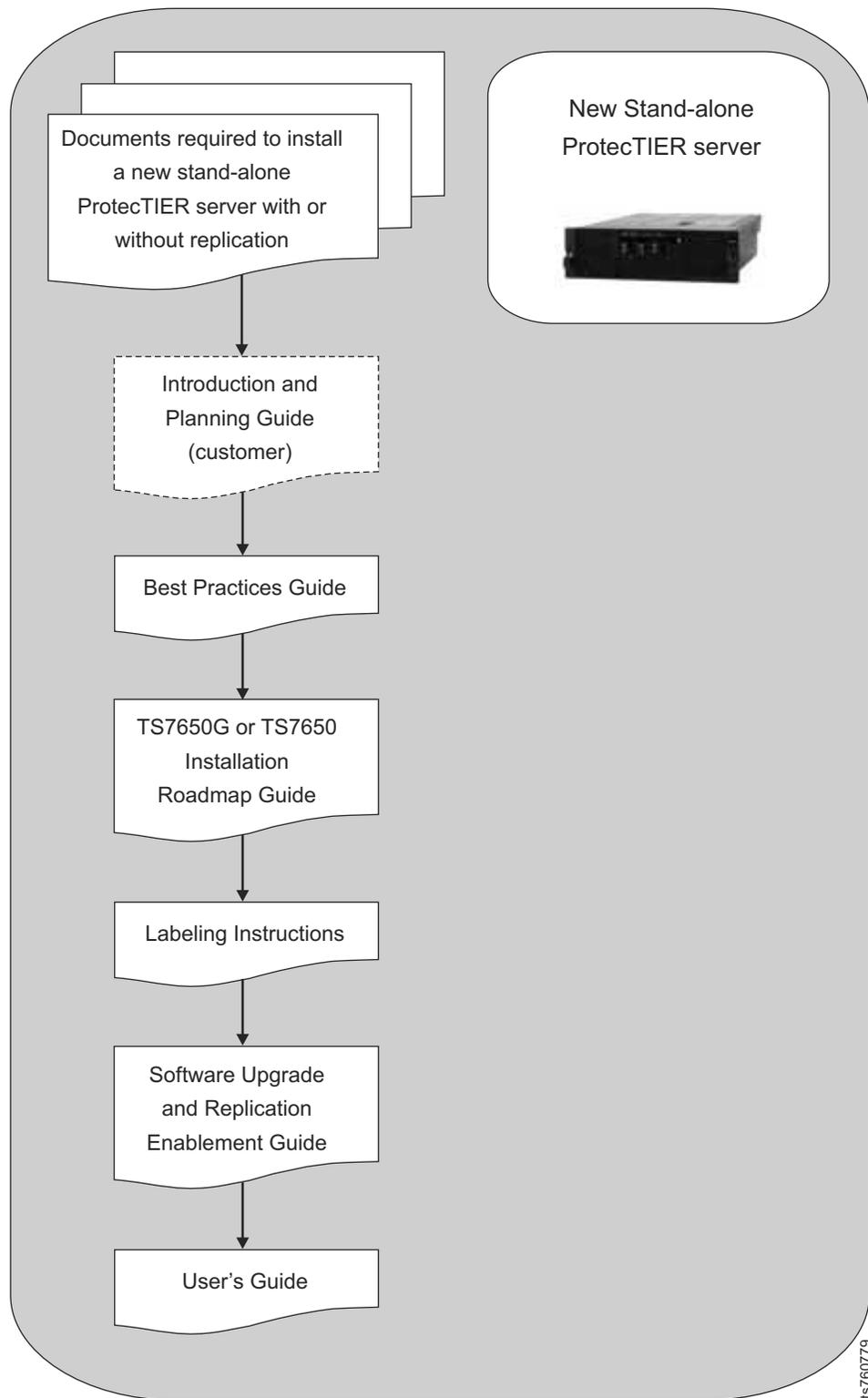
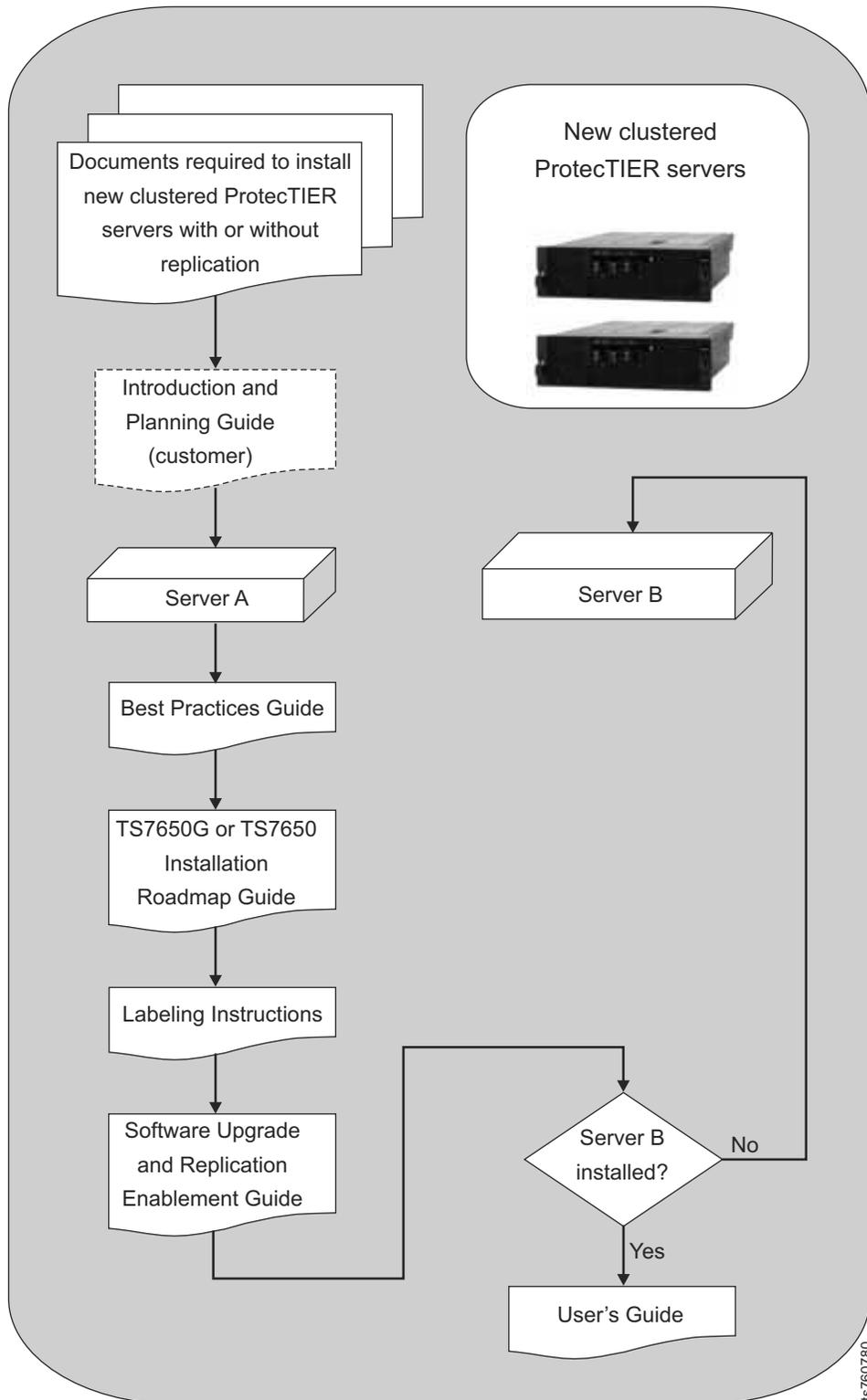


Figure 6. Documents required to install a new stand-alone 3958 DD4 server



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Figure 7. Documents required to install new clustered 3958 DD4 servers

Stand-alone gateway installation checklist

About this task

The checklist below outlines the tasks required to successfully install the hardware in a **stand-alone** gateway configuration. If you are installing a **clustered** gateway, use the “Clustered gateway installation checklist” on page 26.

Important:

This document references IBM 4.8 TB Fibre Channel Disk Controllers and IBM 7.2 TB Fibre Channel Disk Expansion Units in many of the hardware installation figures, examples, and procedures.

In addition to the IBM DS4700 disk controller, the TS7650G also supports the DS5000 disk controller, the DS8000 disk controller and the XIV disk controller, as well as various non-IBM storage solutions. If the customer has elected to use disk storage components other than the IBM disk controllers mentioned above, the figures, examples, and procedures in this document will not apply to the configuration on which you are working. Therefore, it is suggested that you determine the make and model of the disk storage components in use and, if necessary, obtain the related product documentation before you begin installation of the gateway.

The RAS code no longer sends call home packages for problems with any of the disk storage products attached to the gateway including DS4700, DS5000, DS8000 and XIV.

Table 6. Stand-alone gateway installation checklist

| ✓ | Task | Description | Where to find information |
|--|-------------|--|--|
| Section 1: Perform preinstallation verification | | | |
| <input type="checkbox"/> | 1-1 | The disk components are installed in suitable frames. | If this task was not completed prior to your arrival, refer to “Read this first” on page 17 and “Disk storage configuration guidelines” on page 18. |
| <input type="checkbox"/> | 1-2 | The frames are in a suitable location. | N/A |
| <input type="checkbox"/> | 1-3 | The disk controllers are located within 25m (82 ft.) cable length of the server(s). | N/A |
| <input type="checkbox"/> | 1-4 | All RAID, logical drive, and LUN configuration is completed. | Customer If these tasks were not completed prior to your arrival, refer to “Read this first” on page 17 and “Disk storage configuration guidelines” on page 18. |
| <input type="checkbox"/> | 1-5a | For VTL, two IP addresses were assigned for use: One for the 3958-DD4 server and one for the TSSC. | Customer |
| <input type="checkbox"/> | 1-5b | For OST, three to eight IP addresses were assigned for use: One for the 3958-DD4 server, one for the TSSC, and up to six for the host network. | Customer |
| <input type="checkbox"/> | 1-6 | One or more PCs on the customer's local area network (LAN) have been designated as ProtecTIER Manager workstations. | Customer |

Table 6. Stand-alone gateway installation checklist (continued)

| ✓ | Task | Description | Where to find information |
|---|-------|--|---|
| <input type="checkbox"/> | 1-7 | A separate USB keyboard and graphics-capable monitor have been provided for use during installation. | Customer |
| <input type="checkbox"/> | 1-8 | If applicable, ensure that replication configuration efforts are being coordinated between the source and destination sites. | Customer, LBS, and or trained ProtecTIER specialist. |
| Section 2: Install the gateway components | | | |
| <input type="checkbox"/> | 2-1 | Have the customer suspend all I/O activity. Power-off any components that are powered-on, and shut down power to the frames. | Refer to the component-specific documentation for power-off instructions. |
| <input type="checkbox"/> | 2-2 | Install the server. | "Installing the server" on page 30. |
| <input type="checkbox"/> | 2-3a | If the customer purchased a new TSSC and TSSC Ethernet switch and has not yet installed them, do so now then go to task 3-1. | The TSSC Maintenance Information (MI), provided on the <i>IBM System Storage TS7650 with ProtecTIER Publications CD</i> . |
| <input type="checkbox"/> | 2-3b | If the customer has an existing TSSC (with FC 2719) and TSSC Ethernet switch, that can be used with the gateway, go to task 3-1. | N/A |
| Section 3: Apply cable labels and make cable connections | | | |
| <input type="checkbox"/> | 3-1 | Label and connect the power cords on the server to the PDU. | "Cabling a stand-alone gateway" on page 35. |
| <input type="checkbox"/> | 3-2 | If you installed a TSSC, label and connect the power cable on the TSSC to the PDU. | "Cabling a stand-alone gateway" on page 35. |
| <input type="checkbox"/> | 3-3 | If you installed a TSSC Ethernet switch, label and connect the power cable on the switch to the PDU. | "Cabling a stand-alone gateway" on page 35. |
| <input type="checkbox"/> | 3-4 | Label and connect an Ethernet cable from the server to the TSSC's Ethernet switch. | "Cabling a stand-alone gateway" on page 35. |
| <input type="checkbox"/> | 3-5 | Label and connect an Ethernet cable from the server to the customer's LAN. | "Cabling a stand-alone gateway" on page 35. |
| <input type="checkbox"/> | 3-6 | Label and connect Ethernet cables from the server to the customer's replication network, if applicable. | "Cabling a stand-alone gateway" on page 35. |
| <input type="checkbox"/> | 3-7 | Label and connect an Ethernet cable from the RSA on the server to the TSSC's Ethernet switch. | "Cabling a stand-alone gateway" on page 35. |
| <input type="checkbox"/> | 3-8 | Label and connect an Ethernet cable from disk controllers A and B to the TSSC's Ethernet switch. | "Cabling a stand-alone gateway" on page 35. |
| <input type="checkbox"/> | 3-9 | Label and connect an Ethernet cable from the TSSC's external port (Eth2) to the customer's LAN. | "Cabling a stand-alone gateway" on page 35. |
| <input type="checkbox"/> | 3-10 | Label and connect fibre channel cables from the server to disk controllers A and B. | "Cabling a stand-alone gateway" on page 35. |
| <input type="checkbox"/> | 3-11a | For VTL, label and connect fibre channel cables from the server to the customer's host network. | "Cabling a stand-alone gateway" on page 35. |
| <input type="checkbox"/> | 3-11b | For OST, label and Ethernet cables from the server to the customer's host network. | "Cabling a stand-alone gateway" on page 35. |

Table 6. Stand-alone gateway installation checklist (continued)

| ✓ | Task | Description | Where to find information |
|--|------|---|--|
| Section 4: Power-up all components | | | |
| <input type="checkbox"/> | 4-1 | Turn on the breaker(s) to power the PDUs. | N/A |
| <input type="checkbox"/> | 4-2 | Power-up the disk expansion module(s). | “Disk expansion modules” on page 70. |
| <input type="checkbox"/> | 4-3 | Power-up the disk controller. | “Disk controllers” on page 70. |
| <input type="checkbox"/> | 4-4 | Power-up the server. | “Servers” on page 70. |
| <input type="checkbox"/> | 4-5 | Power-up the TSSC, display panel, and TSSC Ethernet switch | “TSSC and KVM kit” on page 71. |
| Section 5: Perform post-installation validation checks | | | |
| <input type="checkbox"/> | 5-1 | Check power indicators for all components. | “Visually inspecting indicator and fault LEDs” on page 71. |
| <input type="checkbox"/> | 5-2 | Validate Ethernet link-up indicators on the TSSC. | “Visually inspecting indicator and fault LEDs” on page 71. |
| <input type="checkbox"/> | 5-3 | Validate Ethernet link-up indicators on the customer's local area network (LAN) to the server and the TSSC. | “Visually inspecting indicator and fault LEDs” on page 71. |
| <input type="checkbox"/> | 5-4 | Validate fibre channel link-up indicators from the disk controller to the server. | “Visually inspecting indicator and fault LEDs” on page 71. |
| <input type="checkbox"/> | 5-5 | Validate fibre channel (VTL) or Ethernet (OST) link-up indicators from the customer host to the server. | “Visually inspecting indicator and fault LEDs” on page 71. |
| Section 6: Prepare the TSSC for use with the TS7650G | | | |
| <input type="checkbox"/> | 6-1 | Configure the TSSC's communication settings. | “Setting up the TSSC for use with the TS7650G” on page 77. |
| Section 7: Perform RAS package configuration and verification | | | |
| <input type="checkbox"/> | 7-1 | Configure the RAS package on the server. | Chapter 6, “Configuring the RAS package,” on page 83. |
| <input type="checkbox"/> | 7-2 | Perform RAS verification. Includes verifying attached systems and testing Call Home. | Chapter 7, “RAS verification,” on page 91. |
| Section 8: SSR releases the system to trained ProtecTIER specialist or LBS representative | | | |
| <input type="checkbox"/> | 8-1 | Configure ProtecTIER, including configuring OST if applicable, and create the file system. | Chapter 8, “Configuring ProtecTIER using ptconfig,” on page 95. |
| <input type="checkbox"/> | 8-2 | Install the ProtecTIER Replication Manager application, if applicable. | Chapter 9, “Enabling the ProtecTIER Replication Manager,” on page 111. |
| <input type="checkbox"/> | 8-3 | Install ProtecTIER Manager and create the repository. | Chapter 10, “Installing ProtecTIER Manager,” on page 113. |
| <input type="checkbox"/> | 8-4 | Turn the system over to the customer. If replication is being used, advise the customer that it is their responsibility to create and configure the replication grid. | N/A |

Clustered gateway installation checklist

About this task

The checklist below provides a high-level overview of the tasks required to successfully install the TS7650G in a **clustered** gateway configuration. If you are installing a **stand-alone** gateway, use the “Stand-alone gateway installation checklist” on page 23.

Important:

This document references IBM 4.8 TB Fibre Channel Disk Controllers and IBM 7.2 TB Fibre Channel Disk Expansion Units in many of the hardware installation figures, examples, and procedures.

In addition to the IBM DS4700 disk controller, the TS7650G also supports the DS5000 disk controller, the DS8000 disk controller and the XIV disk controller, as well as various non-IBM storage solutions. If the customer has elected to use disk storage components other than the IBM disk controllers mentioned above, the figures, examples, and procedures in this document will not apply to the configuration on which you are working. Therefore, it is suggested that you determine the make and model of the disk storage components in use and, if necessary, obtain the related product documentation before you begin installation of the gateway.

The RAS code no longer sends call home packages for problems with any of the disk storage products attached to the gateway including DS4700, DS5000, DS8000 and XIV.

Table 7. Clustered gateway installation checklist

| ✓ | Task | Description | Where to find information |
|---|-------------|---|--|
| Section 1: Perform pre-installation verification | | | |
| <input type="checkbox"/> | 1-1 | The disk components are installed in suitable frames. | If this task was not completed prior to your arrival, refer to “Read this first” on page 17 and “Disk storage configuration guidelines” on page 18. |
| <input type="checkbox"/> | 1-2 | The frames are in a suitable location. | N/A |
| <input type="checkbox"/> | 1-3 | The disk controllers are located within 25m (82 ft.) cable length of the server(s). | N/A |
| <input type="checkbox"/> | 1-4 | All RAID, logical drive, and LUN configuration is completed. | Customer If these tasks were not completed prior to your arrival, refer to “Read this first” on page 17 and “Disk storage configuration guidelines” on page 18. |
| <input type="checkbox"/> | 1-5a | For VTL, three IP addresses were assigned for use: <ul style="list-style-type: none"> • One for 3958-DD4 Server A • One for 3958-DD4 Server B • One for the TSSC | Customer |

Table 7. Clustered gateway installation checklist (continued)

| ✓ | Task | Description | Where to find information |
|---|-------------|--|--|
| <input type="checkbox"/> | 1-5b | For OST, up to fifteen IP addresses were assigned for use: <ul style="list-style-type: none"> • One for 3958-DD4 Server A • One for 3958-DD4 Server B • One for the TSSC • Up to twelve for the OST host network | Customer |
| <input type="checkbox"/> | 1-6 | One or more PCs on the customer's local area network (LAN) are designated as ProtecTIER Manager workstations. | Customer |
| <input type="checkbox"/> | 1-7 | A separate USB keyboard and graphics-capable monitor have been provided for use during installation. | Customer |
| <input type="checkbox"/> | 1-8 | If applicable, ensure that replication configuration efforts are being coordinated between the source and destination sites. | Customer, LBS, and or trained ProtecTIER specialist. |
| Section 2: Install the gateway components | | | |
| <input type="checkbox"/> | 2-1 | Have the customer suspend all I/O activity. Power-off any components that are powered-on, and shut down power to the frames. | Refer to the component-specific documentation for power-off instructions. |
| <input type="checkbox"/> | 2-2 | Install the WTI network power switch. | "Installing the WTI network power switch" on page 31. |
| <input type="checkbox"/> | 2-3 | Install the 1 GB Ethernet switches. | "Installing the 1 Gb Ethernet switches" on page 33. |
| <input type="checkbox"/> | 2-4 | Install Server A (the bottom server). | "Installing the server" on page 30 |
| <input type="checkbox"/> | 2-5 | Install Server B (the top server). | "Installing the server" on page 30 |
| <input type="checkbox"/> | 2-6a | If the customer purchased a new TSSC and TSSC Ethernet switch, and has not yet installed them, do so now, and then go to task 3-1. | The TSSC Maintenance Information (MI), provided on the <i>IBM System Storage TS7650 with ProtecTIER Publications</i> CD. |
| <input type="checkbox"/> | 2-6b | If the customer has an existing TSSC (with FC 2719) and Ethernet switch that can be used with the gateway, go on to task 3-1. | N/A |
| Section 3: Apply cable labels and make cable connections | | | |
| <input type="checkbox"/> | 3-1 | Label and connect one of the power cords on the WTI network power switch to the PDU. | "Cabling a clustered gateway" on page 49. |
| <input type="checkbox"/> | 3-2 | Label and connect the power cord on each 1 GB switch to the PDU. | "Cabling a clustered gateway" on page 49. |
| <input type="checkbox"/> | 3-3 | Label and connect the remaining power cords on the WTI network power switch to the servers. | "Cabling a clustered gateway" on page 49. |
| <input type="checkbox"/> | 3-4 | If you installed a TSSC, label and connect the power cord on the TSSC to the PDU. | "Cabling a clustered gateway" on page 49. |
| <input type="checkbox"/> | 3-5 | If you installed a TSSC Ethernet switch, label and connect the power cord on the switch to the PDU. | "Cabling a clustered gateway" on page 49. |

Table 7. Clustered gateway installation checklist (continued)

| ✓ | Task | Description | Where to find information |
|--------------------------|--------------|--|---|
| <input type="checkbox"/> | 3-6 | Label and connect an Ethernet cable from the WTI network power switch to the top 1 GB Ethernet switch. | "Cabling a clustered gateway" on page 49. |
| <input type="checkbox"/> | 3-7 | Label and connect an Ethernet cable from the bottom 1 GB switch to the top 1 GB Ethernet switch. | "Cabling a clustered gateway" on page 49. |
| <input type="checkbox"/> | 3-8 | Label and connect an Ethernet cable from Server A to the bottom 1GB Ethernet switch. | "Cabling a clustered gateway" on page 49. |
| <input type="checkbox"/> | 3-9 | Label and connect an Ethernet cable from Server B to the bottom 1GB Ethernet switch. | "Cabling a clustered gateway" on page 49. |
| <input type="checkbox"/> | 3-10 | Label and connect an Ethernet cable from Server A to the TSSC's Ethernet switch. | "Cabling a clustered gateway" on page 49. |
| <input type="checkbox"/> | 3-11a | Label and connect an Ethernet cable from Server A to the customer's LAN. | "Cabling a clustered gateway" on page 49. |
| <input type="checkbox"/> | 3-12 | Label and connect Ethernet cables from Server A to the customer's replication network, if applicable. | "Cabling a clustered gateway" on page 49. |
| <input type="checkbox"/> | 3-13 | Label and connect Ethernet cables from Server B to the customer's replication network, if applicable. | "Cabling a clustered gateway" on page 49. |
| <input type="checkbox"/> | 3-14 | Label and connect an Ethernet cable from the RSA on Server A to the TSSC's Ethernet switch. | "Cabling a clustered gateway" on page 49. |
| <input type="checkbox"/> | 3-15 | Label and connect an Ethernet cable from Server B to the TSSC's Ethernet switch. | "Cabling a clustered gateway" on page 49. |
| <input type="checkbox"/> | 3-16a | Label and connect an Ethernet cable from Server B to the customer's LAN. | "Cabling a clustered gateway" on page 49. |
| <input type="checkbox"/> | 3-17 | Label and connect an Ethernet cable from the RSA on Server B to the TSSC's Ethernet switch. | "Cabling a clustered gateway" on page 49. |
| <input type="checkbox"/> | 3-18 | Label and connect an Ethernet cable from controllers A and B of attached storage disk controller-1, to the TSSC Ethernet switch. | "Cabling a clustered gateway" on page 49. |
| <input type="checkbox"/> | 3-19 | Label and connect an Ethernet cable from the TSSC's external port (Eth2) to the customer network. | "Cabling a clustered gateway" on page 49. |
| <input type="checkbox"/> | 3-20 | Label and connect fibre channel cables from Server A to controllers A and B of the first storage controller. | "Cabling a clustered gateway" on page 49. |
| <input type="checkbox"/> | 3-21 | Label and connect fibre channel cables from Server B to controllers A and B of the second storage controller. | "Cabling a clustered gateway" on page 49. |
| <input type="checkbox"/> | 3-22a | For VTL, label and connect fibre channel cables from Server A to the customer host network. | "Cabling a clustered gateway" on page 49. |
| <input type="checkbox"/> | 3-22a | For OST, label and connect Ethernet cables from Server A to the customer host network. | "Cabling a clustered gateway" on page 49. |
| <input type="checkbox"/> | 3-23a | For VTL, label and connect fibre channel cables from Server B to the customer host network. | "Cabling a clustered gateway" on page 49. |
| <input type="checkbox"/> | 3-23a | For OST, label and connect Ethernet cables from Server B to the customer host network. | "Cabling a clustered gateway" on page 49. |

Table 7. Clustered gateway installation checklist (continued)

| ✓ | Task | Description | Where to find information |
|--|-------------|---|--|
| Section 4: Power-up all components | | | |
| Note: Tasks 4-4 and 4-5 can be performed in parallel. | | | |
| <input type="checkbox"/> | 4-1 | Turn on the breaker(s) to power the PDUs. | N/A |
| <input type="checkbox"/> | 4-2 | Power-up the disk expansion modules. | “Disk expansion modules” on page 70. |
| <input type="checkbox"/> | 4-3 | Power-up the disk controllers. | “Disk controllers” on page 70. |
| <input type="checkbox"/> | 4-4 | Power-up Server A. | “Servers” on page 70. |
| <input type="checkbox"/> | 4-5 | Power-up Server B. | “Servers” on page 70. |
| <input type="checkbox"/> | 4-6 | Power-up the TSSC, display panel, and TSSC Ethernet switch. | “TSSC and KVM kit” on page 71. |
| Section 5: Perform post-installation validation checks | | | |
| <input type="checkbox"/> | 5-1 | Check power indicators for all components. | “Visually inspecting indicator and fault LEDs” on page 71. |
| <input type="checkbox"/> | 5-2 | Validate Ethernet link-up indicators on TSSC. | “Visually inspecting indicator and fault LEDs” on page 71. |
| <input type="checkbox"/> | 5-3 | Validate Ethernet link-up indicators on the customer network to the server and the TSSC. | “Visually inspecting indicator and fault LEDs” on page 71. |
| <input type="checkbox"/> | 5-4 | Validate that all links on the internal Ethernet network indicate 1000 Mbps, except for the Ethernet connection to the WTI network power switch, which indicates 100 Mbps. All connections, except the connection to the WTI network power switch, must be at 1000 Mbps for the cluster configuration to work. | “Visually inspecting indicator and fault LEDs” on page 71. |
| <input type="checkbox"/> | 5-5 | Validate fibre channel link-up indicators from the disk controller to the server. | “Visually inspecting indicator and fault LEDs” on page 71. |
| <input type="checkbox"/> | 5-6a | For VTL, validate fibre channel link-up indicators from customer host to the server. | “Visually inspecting indicator and fault LEDs” on page 71. |
| <input type="checkbox"/> | 5-6b | For OST, validate Ethernet link-up indicators from customer host to the server. | “Visually inspecting indicator and fault LEDs” on page 71. |
| Section 6: Prepare the TSSC for use with the TS7650G | | | |
| <input type="checkbox"/> | 6-1 | Configure the TSSC's communication settings. | “Setting up the TSSC for use with the TS7650G” on page 77. |
| Section 7: Perform RAS package configuration and verification | | | |
| <input type="checkbox"/> | 7-1 | Configure the RAS package on the server. | Chapter 6, “Configuring the RAS package,” on page 83. |
| <input type="checkbox"/> | 7-3 | Perform RAS verification. Includes verifying attached systems and testing Call Home. | Chapter 7, “RAS verification,” on page 91. |
| Section 8: SSR releases the system to trained ProtecTIER specialist or LBS representative | | | |
| <input type="checkbox"/> | 8-1 | Configure ProtecTIER, including configuring OST if applicable, and create the file system. | Chapter 8, “Configuring ProtecTIER using ptconfig,” on page 95. |
| <input type="checkbox"/> | 8-2 | Install the ProtecTIER Replication Manager application, if applicable. | Chapter 9, “Enabling the ProtecTIER Replication Manager,” on page 111. |
| <input type="checkbox"/> | 8-3 | Install ProtecTIER Manager and create the repository. | Chapter 10, “Installing ProtecTIER Manager,” on page 113. |
| <input type="checkbox"/> | 8-4 | Test the clustered system. | Chapter 14, “Testing a clustered system,” on page 139. |

Table 7. Clustered gateway installation checklist (continued)

| ✓ | Task | Description | Where to find information |
|---|------|---|---------------------------|
| ☐ | 8-5 | Turn the system over to the customer. If replication is being used, advise the customer that it is their responsibility to create and configure the replication grid. | N/A |

Installing the server

Use this procedure to install the server.

About this task

Important: The customer is responsible for ensuring that any recommended hardware components that were not included in the purchase of the TS7650G, such as disk controllers and disk expansion module, are installed in a frame, cabled, and fully configured; before server installation begins.

Procedure

1. If any components installed in the server and/or disk storage frames are powered-on, have the customer suspend all I/O activity, and then power-off the components.
2. Physically install the server (or both servers, in a clustered gateway configuration) into the server frame.
3. Once physical installation and labeling is complete, go to “Installing the TSSC and Ethernet switch.”

Installing the TSSC and Ethernet switch

Use this procedure to install the TSSC and any related components.

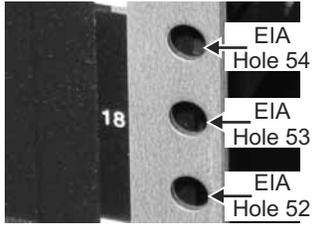
Before you begin

Important: If the customer purchased a TSSC, you are required to install it and its related components, along with the other gateway hardware. Failure to do so will prevent the use of Call Home or IBM remote support.

Procedure

1. Physically install the TSSC and its related components into the server frame. Use the documentation provided with the TSSC for installation instructions.
Attention: The recommended location for installing the TSSC is in EIA Unit 18. Use EIA holes 52, 53, and 54 for the installation of the rail assembly for the TSSC. The rail pins should extend through holes 52 and 53 at the front and rear of the frame. See Figure 8 on page 31 for the recommended mounting locations for the TSSC.

The KVM and TSSC switch should be mounted directly under the TSSC in EIA Unit 17. Use EIA holes 49, 50, and 51 for the installation of the KVM rail assembly. Mounting clips should be placed in holes 49 and 51 (EIA Unit 17) in the front and rear of the frame. Use the rail assembly mounting position at the rear of the frame to secure the TSSC network switch when added after the KVM assembly is installed.



| 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 | TSSC (1u) | 18 | 52 |
| 49 | 17 | KVM Tray + TSSC sw (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 | ProtectTIER 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 (PDU) | 3 | 7 |
| 4 | 2 | Power Distribution Unit (PDU) | 2 | 4 |
| 1 | 1 | Empty (1u) | 1 | 1 |

Figure 8. TSSC mounting location

2. When the physical installation is complete, do one of the following as appropriate:
 - a. For a stand-alone gateway configuration, go to “Applying cable labels” on page 35.
 - b. For a clustered gateway configuration, go to “Installing the WTI network power switch.”

Installing the WTI network power switch

Use this procedure to install the WTI network power switch.

About this task

This procedure applies only to a clustered gateway configuration. If you are installing a stand-alone gateway, go to “Applying cable labels” on page 35.

Important: The WTI network power switch (if included, or if clustering) should be positioned within one meter or closer to the TS7650G servers. The cables for the WTI network power switch must be able to reach the power distribution units (PDUs), and the cables from the TS7650G servers must be able to reach the WTI network power switch. The ability for one server to power-off the other server in a clustered environment is a design requirement. For this to occur, both servers must be plugged into the WTI network power switch at all times. In addition, locating the servers within one meter of the WTI network power switch will allow the servers to remain connected to the network power switch if the servers are placed in a service position.

Procedure

1. Physically install the WTI network power switch into the rear of the server frame. To do so:
 - a. Align the supplied threaded nut clips with the center holes at the top and bottom of the vertical, rectangular opening in the upper-left corner of the server frame.
 - b. Place the WTI switch into the opening with the power outlets at the top, and secure the mounting brackets to the frame using the mounting screws.

Note: You may need to rotate the WTI switch's mounting brackets to facilitate mounting the switch so that the power receptacles face outward, toward the back of the frame. This is required so that the power receptacles are easily accessible for power connections.

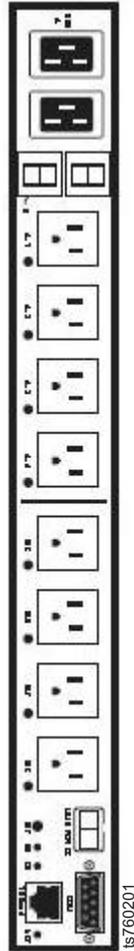


Figure 9. WTI network power switch

Also refer to Figure 2 on page 12 for the recommended location of the WTI network power switch in the server frame.

2. When physical installation is complete, go to “Installing the 1 Gb Ethernet switches.”

Installing the 1 Gb Ethernet switches

Use this procedure to install the 1 Gb Ethernet switches.

About this task

IBM best practices recommends installing the 1 Gb Ethernet switches near the middle of the clustered gateway server frame. See Figure 2 on page 12.

When performing the installation, use caution to avoid dislodging or damaging the cabling within the frame.

Procedure

1. Attach the mounting brackets and power cords to the Ethernet switches. To do so:

- a. Attach the mounting brackets to the short-sides of the Ethernet switch, making sure to align the perforated fan vents on the switch with the cut-out areas on the brackets. See Figure 10.
- b. Thread the power cord through the holes in the mounting bracket, making sure that the tab extensions on the power cord are positioned on the outside of the bracket.
- c. Attach a protective grommet to the power cord, and fit the grommeted part of the cord into the retention slot on the top of mounting bracket.
- d. Plug the power cord into the power receptacle on the Ethernet switch.
- e. Insert screws through the tab extensions on the power cord and into the mounting bracket. Tighten the screws to attach the power cord to the bracket.

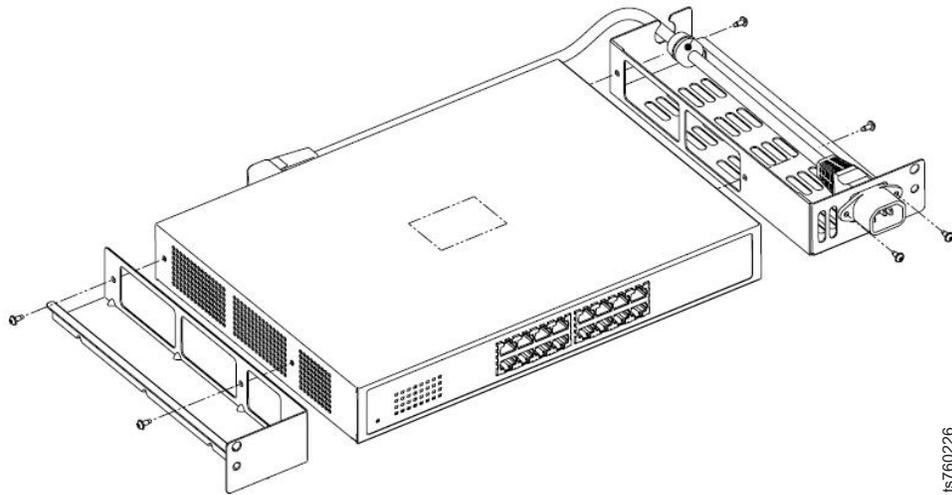


Figure 10. Attaching the mounting brackets and power cord

- f. Place the air baffle on top of the mounting bracket without the power cord (the left side bracket in the above illustration). Do not screw the air baffle to the mounting bracket.
 - g. Repeat the above steps for the other Ethernet switch.
2. Attach the side rails to the server frame. To do so, working from the **front** side of the frame:
 - a. Align the holes in the left side rail with the holes at positions 3 and 4 of the frame. The guide pins on the side rail should point toward the back of the server frame.
 - b. Insert one flanged screw into the hole at position 4 of the frame, tightening the screw just enough to hold the rail in place.
 - c. Insert a second screw into the hole at position 3 of the frame, but do not screw it in. Temporarily inserting this screw allows you to make sure that both holes in the rail are properly aligned with both holes in the frame.
 - d. Tighten the screw in position 4, and then remove the temporary screw from position 3.
 - e. Repeat the above steps for the right side rail and ensure that both side rails are secure.
 3. Install the air duct housing in the frame. To do so, working from the **front** side of the frame:

- a. Partially insert the large air duct housing into the frame by sliding it along the side rails.
 - b. Insert long screws into the holes located near the bottom of each side of the air duct housing.
 - c. Slide the plastic spacers over the backs of the screws.
 - d. Slowly slide the air duct housing into the frame, taking care to align the screws with the holes in the frame.
 - e. Tighten the screws to secure the air duct housing to the frame.
4. Install the Ethernet switches into the air duct housing. To do so, working from the **back** side of the frame:
 - a. Carefully slide one of the Ethernet switches into the air duct housing at position 3 on the frame, with the Ethernet ports facing outward.
 - b. Aligning the top hole in the mounting bracket on the Ethernet switch with the guide pins on the rails.
 - c. Insert a short flanged screw into the bottom holes on each side of the mounting bracket, and tighten the screws to secure the Ethernet switch to the rails.
 - d. Repeat the steps above for the other Ethernet switch.
 5. When installation of the 1 Gb Ethernet switches is complete, go to “Cabling a clustered gateway” on page 49.

Applying cable labels

Apply cable labels to the power, Ethernet and fibre channel cables.

About this task

Use the *IBM System Storage TS7600 with ProtecTIER Labeling Instructions for the TS7650/TS7650G (3958 DD4 and 3958 AP1)*, IBM part number 46X6059 for label placement guidelines and instructions. When applying labels, align the center reference lines on the label with the axis of the cable.

Cabling a stand-alone gateway

This procedure provides steps for cabling the components included in the purchase of the TS7650G stand-alone gateway to each other, as well as to the power distribution units (PDUs), the recommended disk controllers, and the customer network.

About this task

For other supported components, review this information for general guidelines, then refer to the manufacturers' documentation for details. More information, see the *IBM System Storage TS7650 Best Practices Guide for ProtecTIER v 2.5 and TS7650G (Gateway) Attached Storage*, IBM form number GA32-0646.

Tip: For simplicity and ease of use, the instructions for each type of cable connection (power, Ethernet, and fibre channel) start on a new page.

Notes:

- Cat 5e or higher cable is required for all Ethernet connections.
- Route all cables through the cable management arms and secure with straps.

- In the following diagrams, the letters **TJ** followed by a number (for example: *TJ5*) indicate which outlet the associated component plugs into on the **top** PDU. The letters **BJ** followed by a number (for example: *BJ8*) indicate which outlet the associated component plugs into on the **bottom** PDU.

Stand-alone power connections

Use this section to cable the power connections of a stand-alone TS7650G.

About this task

Note: The power distribution units (PDUs) may have been preinstalled in the recommended frame in a location different from that shown in the illustration. For consistency and ease when troubleshooting, you may want to relocate the PDUs to match Figure 11 on page 37.

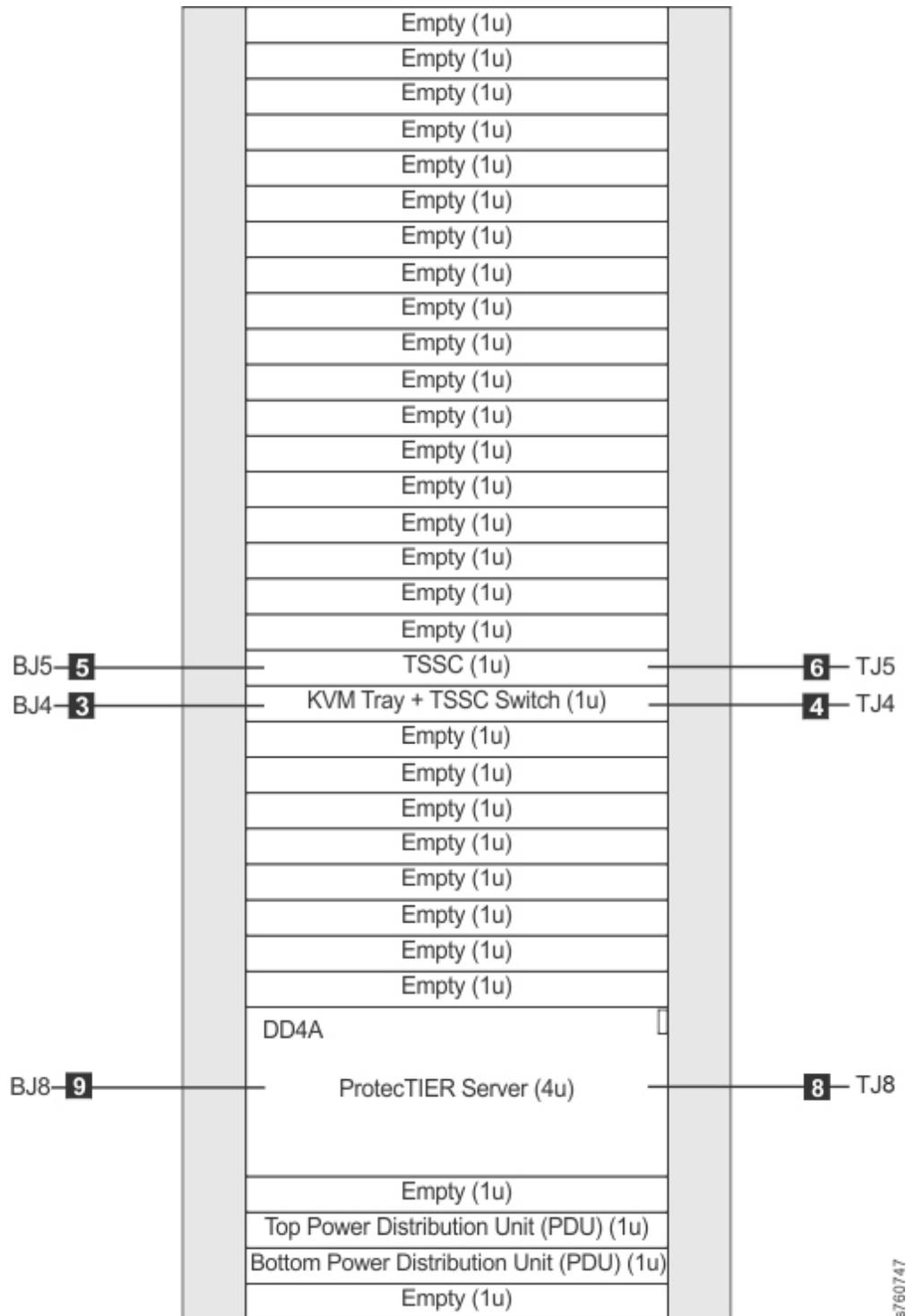


Figure 11. Stand-alone power connections

Table 8. Stand-alone power connections

| Callout | From | On Device | To | On Device/Location |
|----------|--------------|---|-----|--------------------|
| 3 | Power outlet | TSSC Ethernet switch (if you installed one) (SC SW) | BJ4 | Bottom PDU |

Table 8. Stand-alone power connections (continued)

| Callout | From | On Device | To | On Device/Location |
|---------|----------------|---|-----|--------------------|
| 4 | Power outlet | TSSC KVM switch (if you installed one) (SC TSSC) | TJ4 | Top PDU |
| 5 | Power outlet 1 | TSSC (if you installed one) (SC) | BJ5 | Bottom PDU |
| 6 | Power outlet 2 | TSSC (if you installed one with a second power outlet) (SC) | TJ5 | Top PDU |
| 8 | Power outlet 1 | DD4A | TJ8 | Top PDU |
| 9 | Power outlet 2 | DD4A | BJ8 | Bottom PDU |

Procedure

1. Label and connect the power cords according to Figure 11 on page 37 and Table 8 on page 37.

Note: Depending on the TSSC's configuration, the TSSC may have one or two power supplies. If only one power supply is present, connect the power cord to the specified location (BJ4 or TJ4) on either of the PDUs.

2. Go to “Stand-alone fibre channel connections” on page 42.

Stand-alone TSSC and customer network Ethernet connections

The tasks in this section describe the network Ethernet connections for the TS7650G server in a stand-alone configuration.

Ethernet connections for stand-alone VTL configuration

The tasks in this section describe the network Ethernet connections used with the TS7650G server in a stand-alone configuration for OpenStorage.

About this task

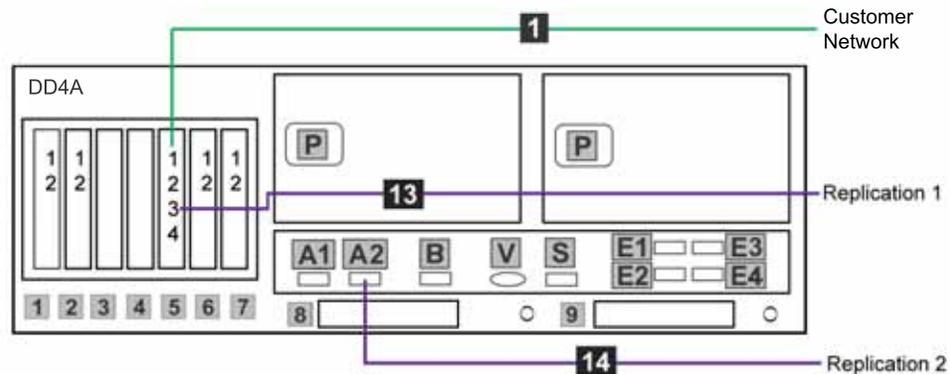


Figure 12. Customer and replication Ethernet connections for stand-alone VTL configuration

Table 9. Customer and replication Ethernet connections for stand-alone VTL configuration

| Callout | From | On Device | To | On Device/Location |
|-----------|----------------|-----------|--------------------------------|---------------------------|
| 1 | Port 1, slot 5 | Server A | Customer Network | Customer specified device |
| 19 | Port 3, slot 5 | Server A | Customer's replication network | Customer specified device |
| 20 | Port A2 | Server A | Customer's replication network | Customer specified device |

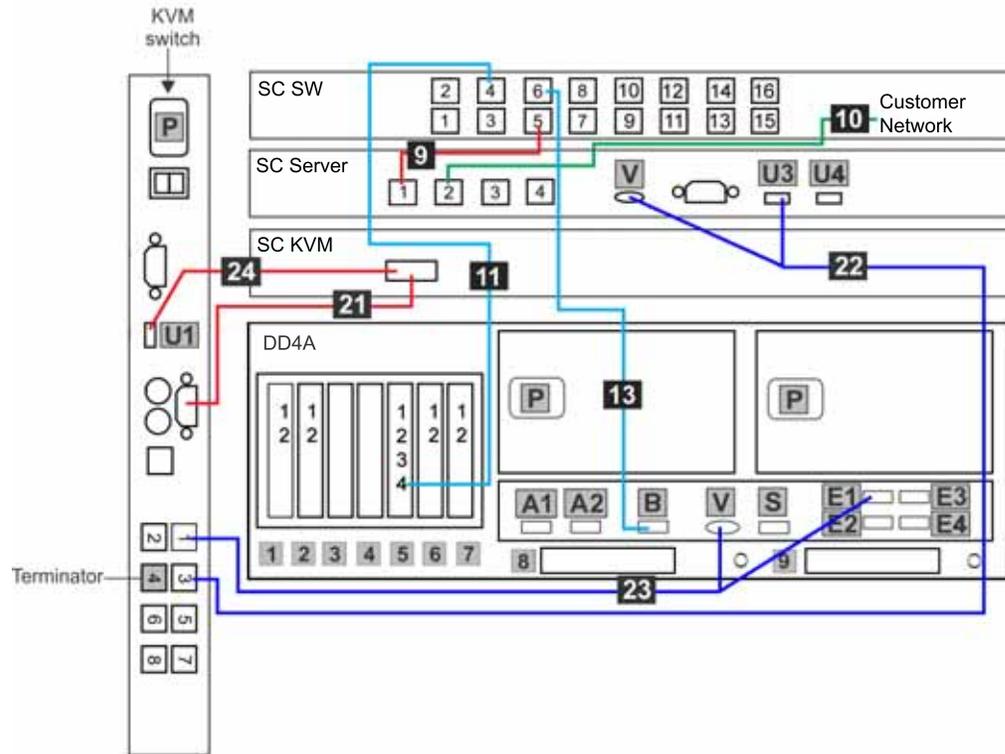


Figure 13. TSSC, KVM and customer network Ethernet connections for stand-alone VTL configuration

Table 10. TSSC, KVM and customer network Ethernet connections for stand-alone VTL configuration

| Callout | From | On Device | To | On Device/Location |
|-----------|------------|----------------------|-------------------------------|---------------------------|
| 9 | Port 5 | TSSC Ethernet switch | Port 1 | TSSC |
| 10 | Port 2 | TSSC | Customer's local area network | Customer specified device |
| 11 | Port 4 | TSSC Ethernet switch | Port 4, slot 5 | Server A |
| 13 | Port 6 | TSSC Ethernet switch | Port B | Server A |
| 21 | Video port | KVM Switch | Video port | SC KVM |
| 22 | Port 3 | KVM Switch | Video port, Port U3 | SC Server |
| 23 | Port 1 | KVM Switch | Video port, Port E1 | Server A |
| 24 | Port U1 | KVM Switch | Video Port | SC KVM |

Procedure

1. Label and connect Ethernet cables (Cat 5e or higher) according to Table 9 on page 39 and Table 10 on page 39.

Notes:

- Depending upon the model of the TSSC and TSSC network switch being used, the port layout may differ from what is shown in Figure 13 on page 39. If so, make the cable connections according to the port number assignments specified in Table 10 on page 39, regardless of the position of the ports on the TSSC or the switch. Refer to the *IBM System Storage TS3000 System Console (TSSC) Maintenance Information* for detailed port information.
 - Connection of the replication network cables is required only if the customer is enabling the data replication feature.
2. Go to “Stand-alone fibre channel connections” on page 42.

Ethernet connections for stand-alone OpenStorage configuration

The tasks in this section describe the network Ethernet connections used with the TS7650G server in a stand-alone configuration for OpenStorage.

About this task

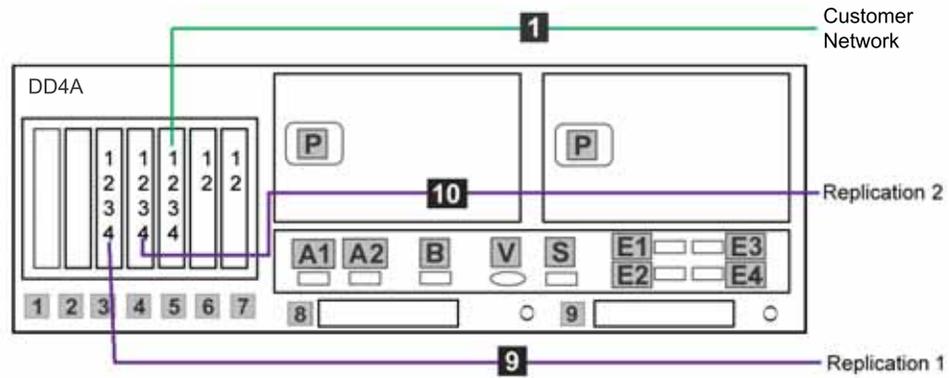


Figure 14. Customer and replication Ethernet connections for stand-alone OpenStorage configuration

Table 11. Customer and replication Ethernet connections for stand-alone OpenStorage configuration

| Callout | From | On Device | To | On Device/Location |
|-----------|----------------|-----------|--------------------------------|---------------------------|
| 1 | Port 1, slot 5 | Server A | Customer Network | Customer specified device |
| 15 | Port 4, slot 3 | Server A | Customer's replication network | Customer specified device |
| 16 | Port 4, slot 4 | Server A | Customer's replication network | Customer specified device |

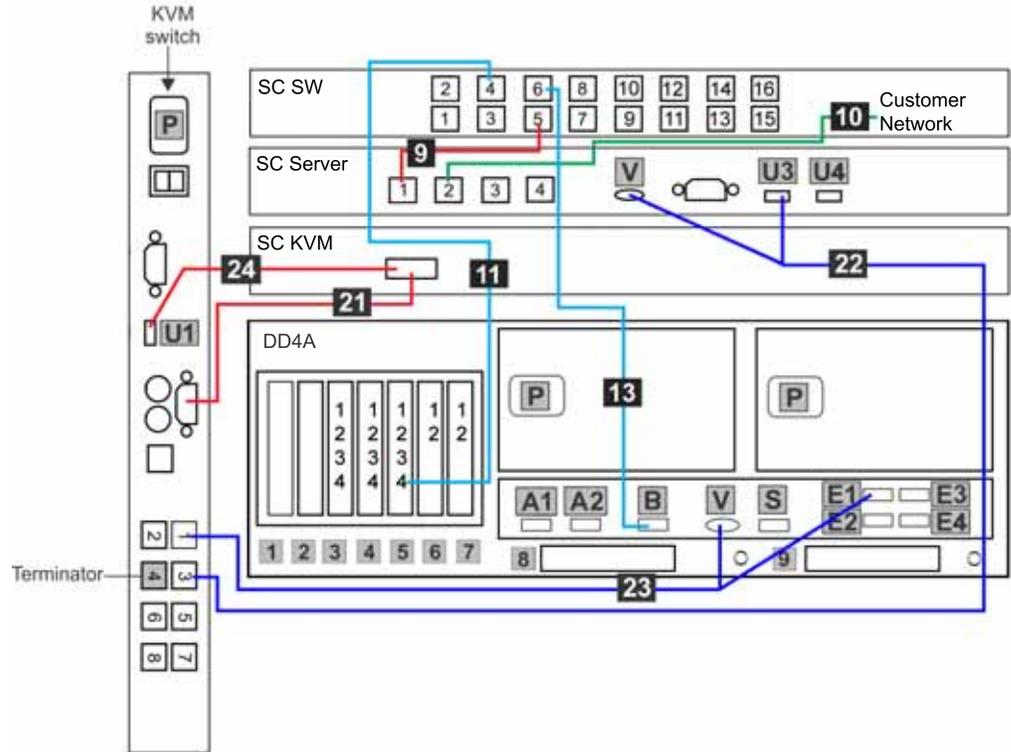


Figure 15. TSSC, KVM and customer network Ethernet connections for stand-alone OpenStorage configuration

Table 12. TSSC, KVM and customer network Ethernet connections for stand-alone OpenStorage configuration

| Callout | From | On Device | To | On Device/Location |
|---------|------------|----------------------|-------------------------------|---------------------------|
| 9 | Port 5 | TSSC Ethernet switch | Port 1 | TSSC |
| 10 | Port 2 | TSSC | Customer's local area network | Customer specified device |
| 11 | Port 4 | TSSC Ethernet switch | Port 4, slot 5 | Server A |
| 13 | Port 6 | TSSC Ethernet switch | Port B | Server A |
| 21 | Video port | KVM Switch | Video port | SC KVM |
| 22 | Port 3 | KVM Switch | Video port, Port U3 | SC Server |
| 23 | Port 1 | KVM Switch | Video port, Port E1 | Server A |
| 24 | Port U1 | KVM Switch | Video Port | SC KVM |

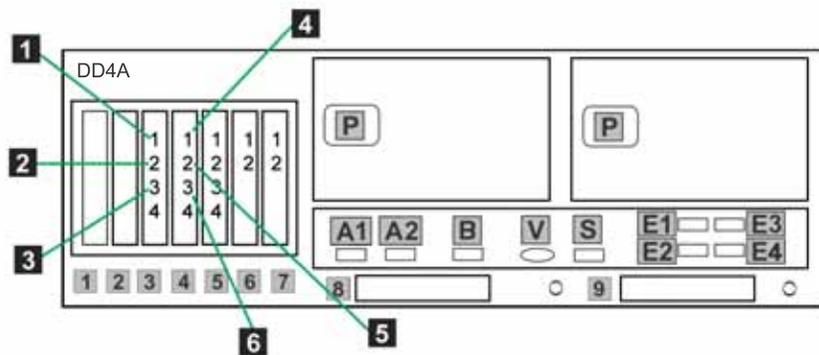


Figure 16. Customer host network Ethernet connections for stand-alone OpenStorage configuration

Table 13. Customer host network Ethernet connections for stand-alone OpenStorage configuration

| Callout | From | On Device | To | On Device/Location |
|---------|----------------|-----------|-------------------|-------------------------|
| 1 | Port 1, slot 3 | Server A | Designated device | Customer's host network |
| 2 | Port 2, slot 3 | Server A | Designated device | Customer's host network |
| 3 | Port 3, slot 3 | Server A | Designated device | Customer's host network |
| 4 | Port 1, slot 4 | Server A | Designated device | Customer's host network |
| 5 | Port 2, slot 4 | Server A | Designated device | Customer's host network |
| 6 | Port 3, slot 4 | Server A | Designated device | Customer's host network |

Procedure

1. Label and connect Ethernet cables (Cat 5e or higher) according to Table 11 on page 40, Table 12 on page 41 and Table 13.

Notes:

- Depending upon the model of the TSSC and TSSC network switch being used, the port layout may differ from what is shown in Figure 15 on page 41. If so, make the cable connections according to the port number assignments specified in Table 12 on page 41, regardless of the position of the ports on the TSSC or the switch. Refer to the *IBM System Storage TS3000 System Console (TSSC) Maintenance Information* for detailed port information.
- Connection of the replication network cables is required only if the customer is enabling the data replication feature.

2. Go to “Stand-alone fibre channel connections.”

Stand-alone fibre channel connections

The tasks in this section describe the fibre channel connections for the TS7650G server in a stand-alone configuration.

About this task

Important:

This document references IBM 4.8 TB Fibre Channel Disk Controllers and IBM 7.2 TB Fibre Channel Disk Expansion Units in many of the hardware installation figures, examples, and procedures.

In addition to the IBM DS4700 disk controller, the TS7650G also supports the DS5000 disk controller, the DS8000 disk controller and the XIV disk controller, as well as various non-IBM storage solutions. If the customer has elected to use disk storage components other than the IBM disk controllers mentioned above, the figures, examples, and procedures in this document will not apply to the configuration on which you are working. Therefore, it is suggested that you determine the make and model of the disk storage components in use and, if necessary, obtain the related product documentation before you begin installation of the gateway.

The RAS code no longer sends call home packages for problems with any of the disk storage products attached to the gateway including DS4700, DS5000, DS8000 and XIV.

However, if the IP address of an SMTP server is provided during RAS package configuration, the disk storage subsystems that communicate with the RAS package (which includes DS4700 and DS5000 if they have firmware levels supported by RAS) will send problem reports to the customer via email.

Fibre channel connections for a stand-alone VTL configuration

About this task

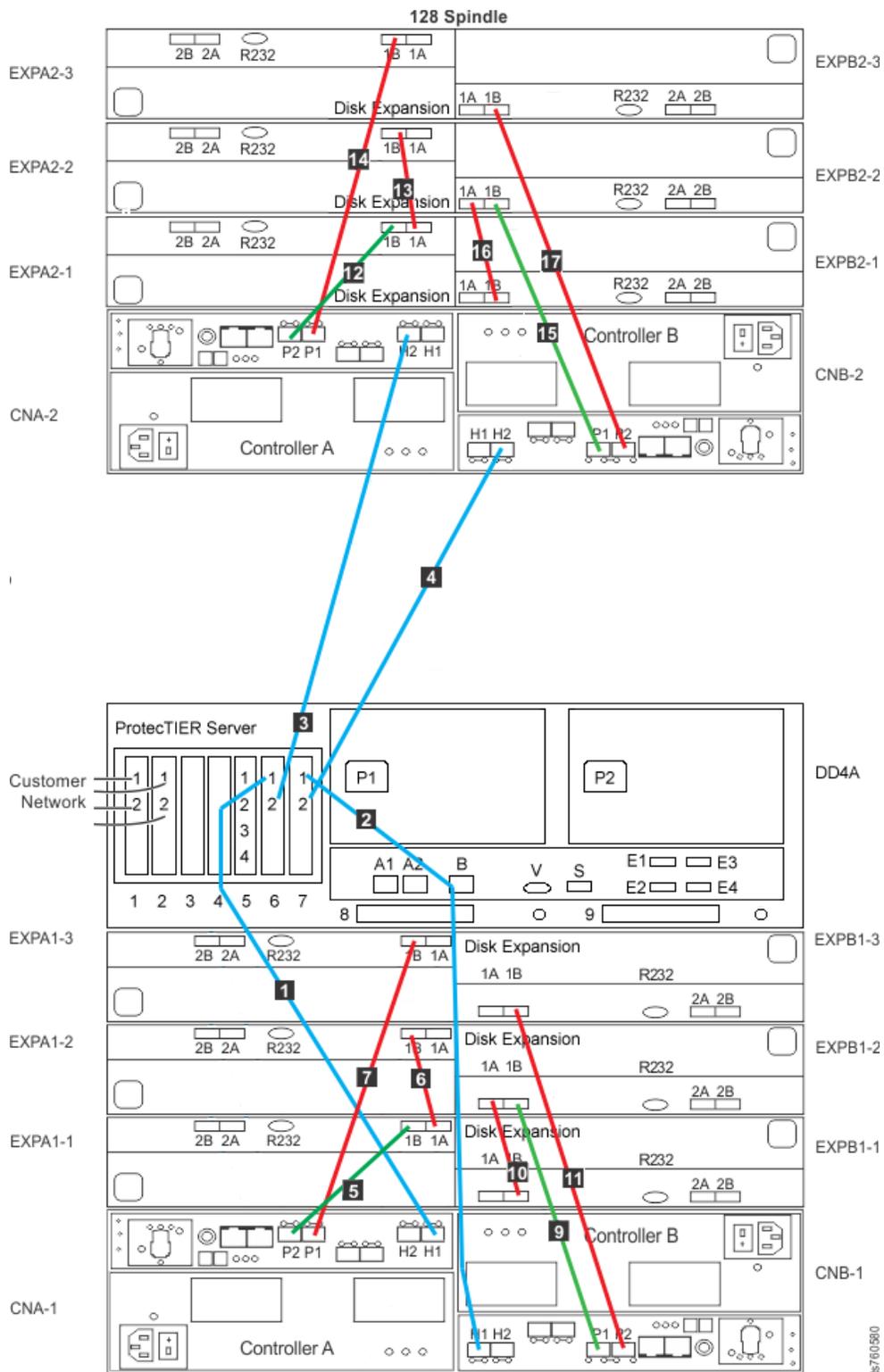


Table 14. Fibre channel connections for stand-alone VTL and OpenStorage

| Label | From | To | Remarks |
|-----------|------------|------------------------------------|---|
| 1 | DD4A S6 1 | Disk Array, Disk Controller A-1 H1 | |
| 2 | DD4A S7 1 | Disk Array, Disk Controller B-1 H1 | |
| 3 | DD4A S6 2 | Disk Array, Disk Controller A-2 H2 | |
| 4 | DD4A S7 2 | Disk Array, Disk Controller B-2 H2 | |
| 5 | CNA-1 P2 | Disk Array, Disk Expansion A1-1 1B | |
| 6 | EXPA1-1 1A | Disk Array, Disk Expansion A1-2 1B | |
| 7 | CNA-1 P1 | Disk Array, Disk Expansion A1-3 1B | |
| 8 | CNB-1 P1 | Disk Array, Disk Expansion B1-1 1B | This cable is used only in a minimum storage configuration, when only one expansion unit is attached. |
| 9 | CNB-1 P1 | Disk Array, Disk Expansion A1-2 1B | |
| 10 | EXPB1-1 1B | Disk Array, Disk Expansion B1-2 1A | |
| 11 | CNB-1 P2 | Disk Array, Disk Expansion B1-3 1B | |
| 12 | CNA-2 P2 | Disk Array, Disk Expansion A2-1 1B | |
| 13 | EXPA2-1 1A | Disk Array, Disk Expansion A2-2 1B | |
| 14 | CNA-2 P1 | Disk Array, Disk Expansion A2-3 1B | |
| 15 | CNB-2 P1 | Disk Array, Disk Expansion B2-2 1B | |
| 16 | EXPB2-1 1B | Disk Array, Disk Expansion B2-2 1A | |
| 17 | CNB-2 P2 | Disk Array, Disk Expansion B2-3 1B | |
| 22 | CNB-2 P1 | Disk Array, Disk Expansion B2-1 1B | This cable is used only in a minimum storage configuration, when only one expansion unit is attached. |

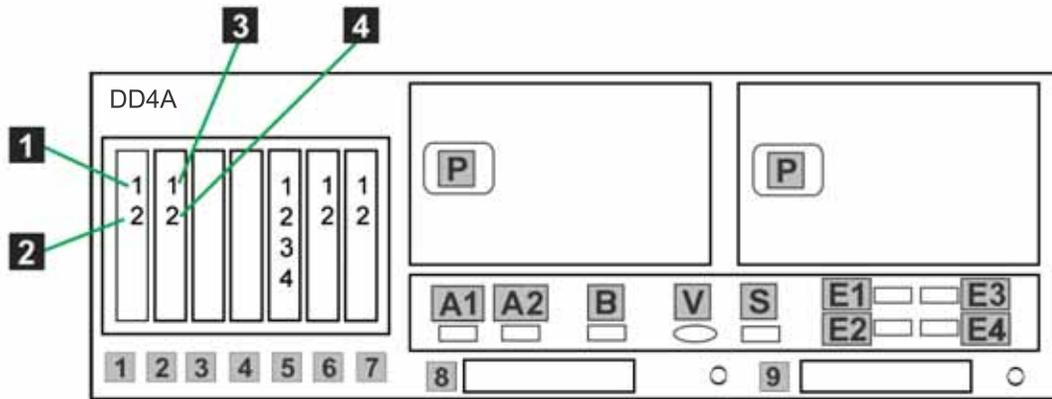


Figure 18. Host fibre channel connections for stand-alone VTL

Table 15. Host fibre channel connections for stand-alone VTL configuration

| Label | From | To | Remarks |
|----------|-----------|--------|---------|
| 1 | DD4A S1 1 | HOST 1 | |
| 2 | DD4A S1 2 | HOST 2 | |
| 3 | DD4A S2 1 | HOST 3 | |
| 4 | DD4A S2 2 | HOST 4 | |

Procedure

1. Connect fibre channel cables according to Table 14 on page 45 and Table 15.

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.

2. Use Figure 17 on page 44 to verify that the recommended disk components are cabled correctly. (Connections to the customer's host network not shown in this figure).
3. Make any necessary adjustments to cable labeling or placement, then go to "Powering-up the components" on page 69.

Fibre channel connections for a stand-alone OpenStorage configuration

About this task

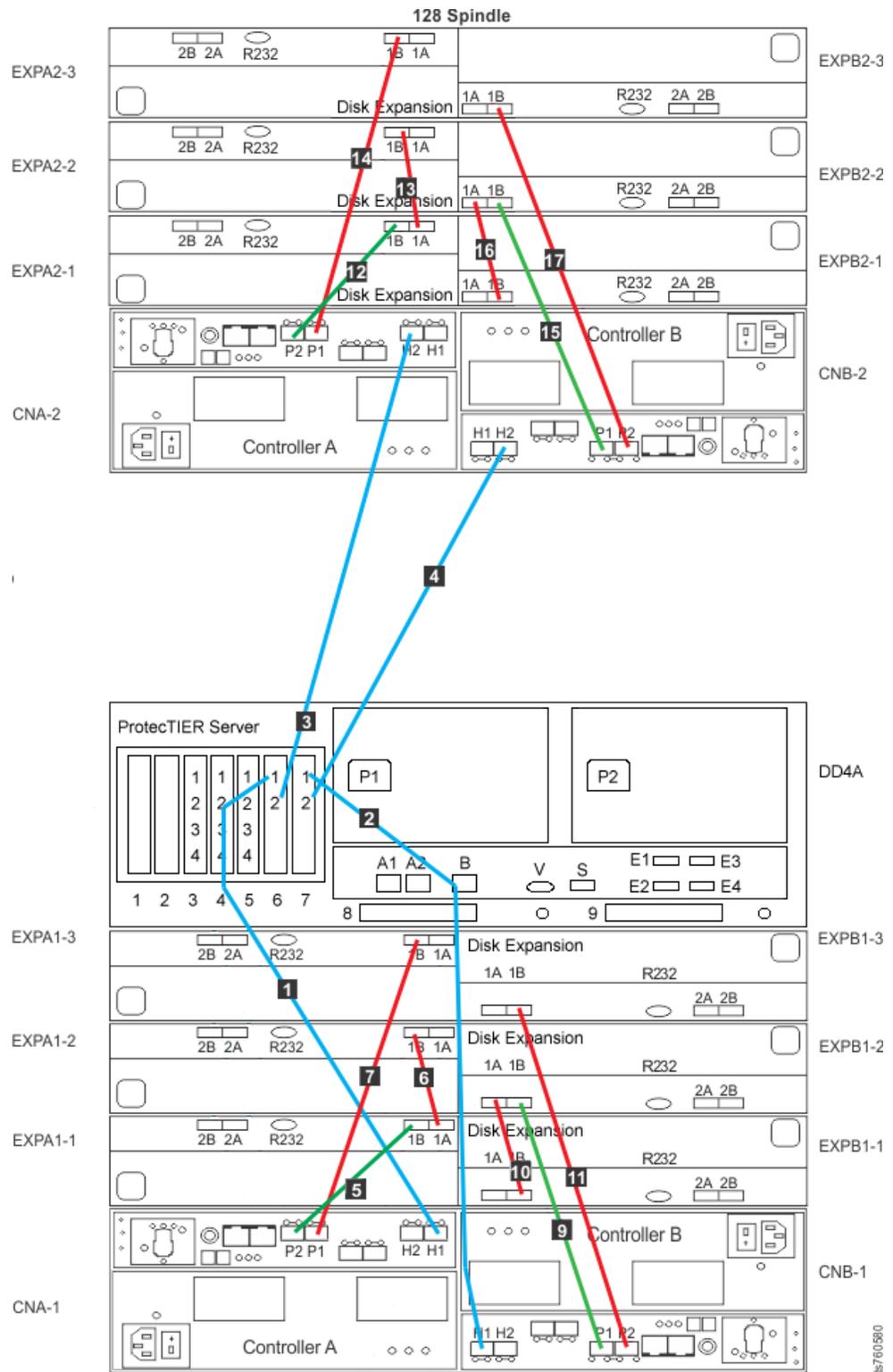


Figure 19. Fibre channel connections for stand-alone OpenStorage configuration

Table 16. Fibre channel connections for stand-alone OpenStorage configuration

| Label | From | To | Remarks |
|-------|------------|------------------------------------|---|
| 1 | DD4A S6 1 | Disk Array, Disk Controller A-1 H1 | |
| 2 | DD4A S7 1 | Disk Array, Disk Controller B-1 H1 | |
| 3 | DD4A S6 2 | Disk Array, Disk Controller A-2 H2 | |
| 4 | DD4A S7 2 | Disk Array, Disk Controller B-2 H2 | |
| 5 | CNA-1 P2 | Disk Array, Disk Expansion A1-1 1B | |
| 6 | EXPA1-1 1A | Disk Array, Disk Expansion A1-2 1B | |
| 7 | CNA-1 P1 | Disk Array, Disk Expansion A1-3 1B | |
| 8 | CNB-1 P1 | Disk Array, Disk Expansion B1-1 1B | This cable is used only in a minimum storage configuration, when only one expansion unit is attached. |
| 9 | CNB-1 P1 | Disk Array, Disk Expansion A1-2 1B | |
| 10 | EXPB1-1 1B | Disk Array, Disk Expansion B1-2 1A | |
| 11 | CNB-1 P2 | Disk Array, Disk Expansion B1-3 1B | |
| 12 | CNA-2 P2 | Disk Array, Disk Expansion A2-1 1B | |
| 13 | EXPA2-1 1A | Disk Array, Disk Expansion A2-2 1B | |
| 14 | CNA-2 P1 | Disk Array, Disk Expansion A2-3 1B | |
| 15 | CNB-2 P1 | Disk Array, Disk Expansion B2-2 1B | |
| 16 | EXPB2-1 1B | Disk Array, Disk Expansion B2-2 1A | |
| 17 | CNB-2 P2 | Disk Array, Disk Expansion B2-3 1B | |
| 22 | CNB-2 P1 | Disk Array, Disk Expansion B2-1 1B | This cable is used only in a minimum storage configuration, when only one expansion unit is attached. |

Procedure

1. Connect fibre channel cables according to Table 16.

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.
2. Use Figure 19 on page 47 to verify that the recommended disk components are cabled correctly. (Connections to the customer's host network not shown in this figure).
 3. Make any necessary adjustments to cable labeling or placement, then go to “Powering-up the components” on page 69.

Cabling a clustered gateway

This section provides steps for cabling the components included in the purchase of the TS7650G clustered gateway to each other, as well as to the power distribution units (PDUs), to the recommended disk controllers, and to the customer network. If any other components are being used, review this information for general guidelines, then refer to the manufacturers' documentation for cabling details.

Tip: For simplicity and ease of use, the instructions for each type of cable connection (power, Ethernet, and fibre channel) start on a new page. Within the Ethernet and fibre channel sections there are separate VTL and OpenStorage subsections.

Notes:

- Cat 5e or higher cable is required for all Ethernet connections.
- Route all cables through the cable management arms and secure with straps.
- When attaching power cords, do so in a way that they will not interfere with future FRU replacement.
- In clustered configurations, the server in the lower position in the frame is Server A (or Node A), and the server in the upper position in the frame is server B (or Node B).
- In the following diagrams, the letters **TJ** followed by a number (for example: *TJ5*) indicate which outlet the associated component plugs into on the **top** PDU. The letters **BJ** followed by a number (for example: *BJ8*) indicate which outlet the associated component plugs into on the **bottom** PDU.
- When connecting power for the WTI network power switch, use the product-specific cables designed for the switch. Other types of power cables will not work.
- If non-recommended components are being used, review this chapter for general guidelines, then refer to the manufacturer's documentation for details.
- When applying cable labels, align the center reference lines on the label with the axis of the cable. Refer to the *IBM System Storage TS7600 with ProtecTIER Labeling Instructions for the TS7650/TS7650G (3958 DD4 and 3958 AP1)*, IBM part number 46X6059, located on the *IBM System Storage TS7650 with ProtecTIER Publications* CD provided in the MES ship group, for detailed label placement guidelines and instructions.

Clustered power connections

This task describes cabling the power connections for a clustered TS7650G.

About this task

Note: The power distribution units (PDUs) may have been preinstalled in the recommended frame in a location different from that shown in the illustration. For consistency and ease when troubleshooting, you may want to relocate the PDUs to match Figure 20 on page 51.

|
|
|
Note: The WTI network power switch is shown in color to the side in Figure 20 on page 51. This is for clarity in showing the connections. Within the frame itself, the WTI switch is also shown in the recommended placement at EIA unit 4.

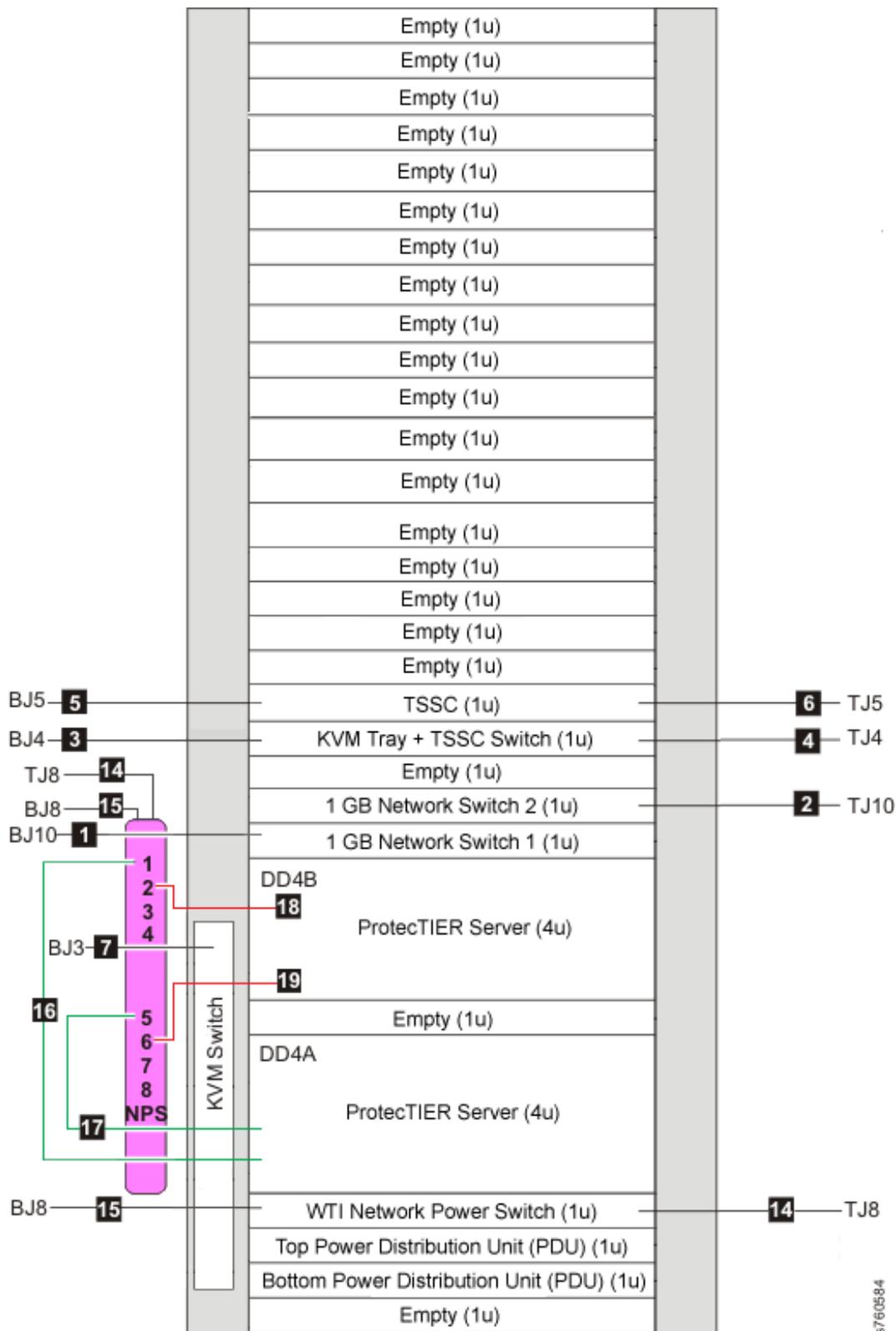


Figure 20. Clustered TS7650G power cabling

Table 17. Clustered TS7650G power cabling

| Callout | From | On Device | To | On Device/Location |
|-----------|---------------------|---|----------------|--------------------------|
| 1 | Power outlet | Ethernet switch 1 (bottom) (E SW-1) | BJ10 | Bottom PDU |
| 2 | Power outlet | Ethernet switch 2 (top) (E SW-2) | TJ10 | Top PDU |
| 3 | Power outlet | TSSC Ethernet switch (if you installed one) (SC SW) | BJ4 | Bottom PDU |
| 4 | Power outlet | TSSC KVM switch (if you installed one) (SC TSSC) | TJ4 | Top PDU |
| 5 | Power outlet 1 | TSSC (if you installed one) (SC) | BJ5 | Bottom PDU |
| 6 | Power outlet 2 | TSSC (if you installed one with a second power outlet) (SC) | TJ5 | Top PDU |
| 7 | Power outlet | KVM Switch | BJ3 | Bottom PDU |
| 14 | Top power outlet | WTI network power switch | TJ8 | Top PDU |
| 15 | Bottom power outlet | WTI network power switch | BJ8 | Bottom PDU |
| 16 | Power outlet 1 | Server A | Power outlet 1 | WTI network power switch |
| 17 | Power outlet 2 | Server A | Power outlet 5 | WTI network power switch |
| 18 | Power outlet 1 | Server B | Power outlet 2 | WTI network power switch |
| 19 | Power outlet 2 | Server B | Power outlet 6 | WTI network power switch |

Procedure

1. Label and connect the power cords according to Figure 20 on page 51 and Table 17.
2. Go to “Clustered 1 Gb Ethernet switch Ethernet connections.”

Clustered Ethernet connections

The tasks in this section describe the network Ethernet connections to the 1Gb Ethernet switches, the TSSC, and the customer network for both VTL and OpenStorage with the TS7650G server in a clustered configuration.

Clustered 1 Gb Ethernet switch Ethernet connections

This task describes the 1Gb Ethernet switch connections for the TS7650G server in a clustered configuration.

Before you begin

Notes:

- Depending upon the model of the TSSC and TSSC network switch being used, the port layout may differ from what is shown in Figure 21 on page 53 or Figure 22 on page 55. If so, make the cable connections according to the port number assignments specified in Table 18 on page 54 or Table 19 on page 55,

regardless of the position of the ports on the switch. Refer to the *IBM System Storage TS3000 System Console (TSSC) Maintenance Information* for detailed port information.

- Connection of the replication network cables is required only if the customer is enabling the data replication feature.

Clustered 1 GB Ethernet switch Ethernet connections for VTL configuration:

This task shows the Ethernet cabling for the 1 GB Ethernet switches in a clustered TS7650G for VTL configuration.

About this task

Note:

Depending upon the model of the network switch being used, the port layout may differ from what is shown in Figure 21. If so, label the cables according to the port number assignments specified in Table 18 on page 54, regardless of the position of the ports on the TSSC or the switch.

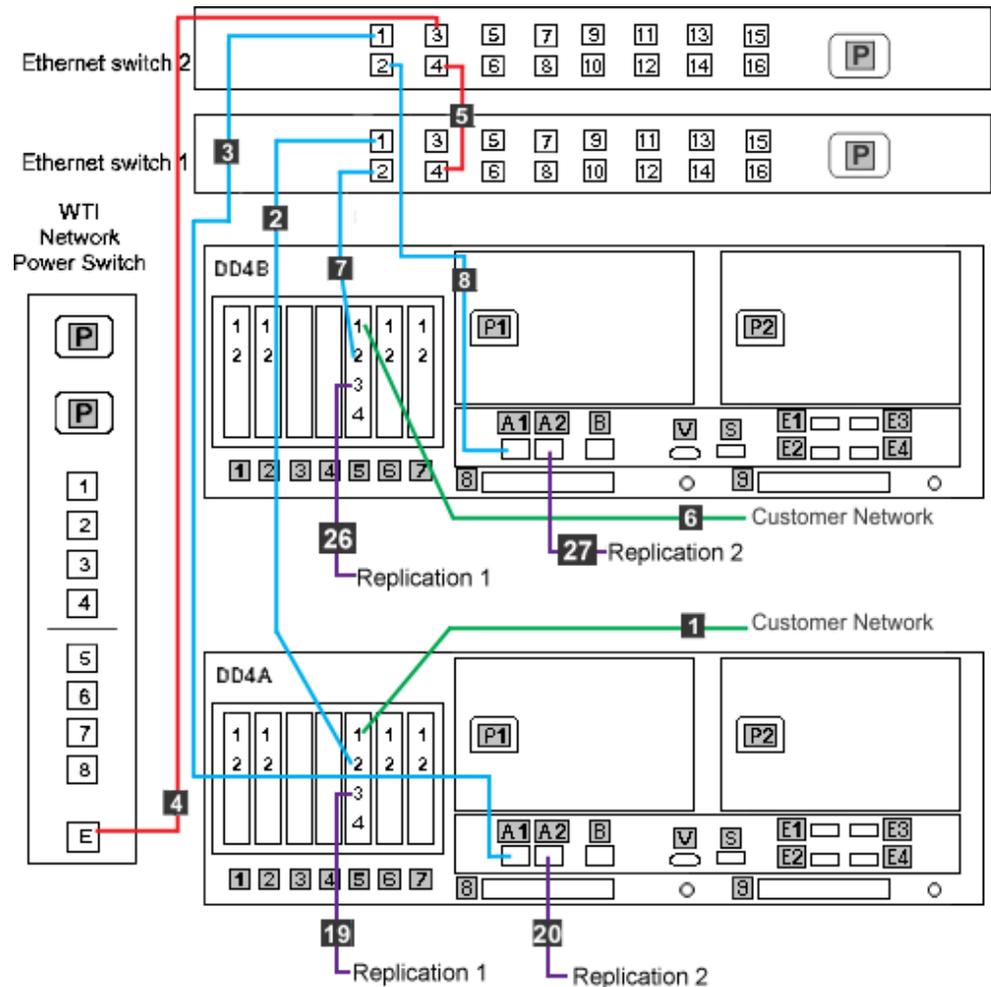


Figure 21. Clustered 1Gb Ethernet switch connections for VTL configuration

Table 18. Clustered 1 Gb Ethernet switch Ethernet connections for VTL configuration

| Callout | From | On Device | To | On Device/Location |
|-----------|----------------|-------------------|--------------------------------|----------------------------|
| 1 | Port 1, slot 5 | Server A | Customer network | Customer designated device |
| 2 | Port 1 | Ethernet switch 1 | Port 2, slot 5 | Server A |
| 3 | Port 1 | Ethernet switch 2 | Port A1 | Server A |
| 4 | Port 3 | Ethernet switch 2 | Ethernet port, E | WTI network power switch |
| 5 | Port 4 | Ethernet switch 2 | Port 4 | Ethernet switch 1 |
| 6 | Port 1, slot 5 | Server B | Customer network | Customer designated device |
| 7 | Port 2 | Ethernet switch 1 | Port 2, slot 5 | Server B |
| 8 | Port 2 | Ethernet switch 2 | Port A1 | Server B |
| 19 | Port 3, slot 5 | Server A | Customer's replication network | Customer specified device |
| 20 | Port A2 | Server A | Customer's replication network | Customer specified device |
| 26 | Port 3, slot 5 | Server B | Customer's replication network | Customer specified device |
| 27 | Port A2 | Server B | Customer's replication network | Customer specified device |

Procedure

1. Label and connect Ethernet cables (Cat 5e or higher) according to Figure 21 on page 53 and Table 18.
2. Go to “Clustered Ethernet connections” on page 52 to complete the Ethernet cabling.

Clustered 1 Gb Ethernet switch Ethernet connections for OpenStorage configuration:

This task shows the Ethernet cabling for the 1 Gb Ethernet switches in a clustered TS7650G for OpenStorage configuration.

About this task

Note:

Depending upon the model of the network switch being used, the port layout may differ from what is shown in Figure 22 on page 55. If so, label the cables according to the port number assignments specified in Table 19 on page 55, regardless of the position of the ports on the TSSC or the switch.

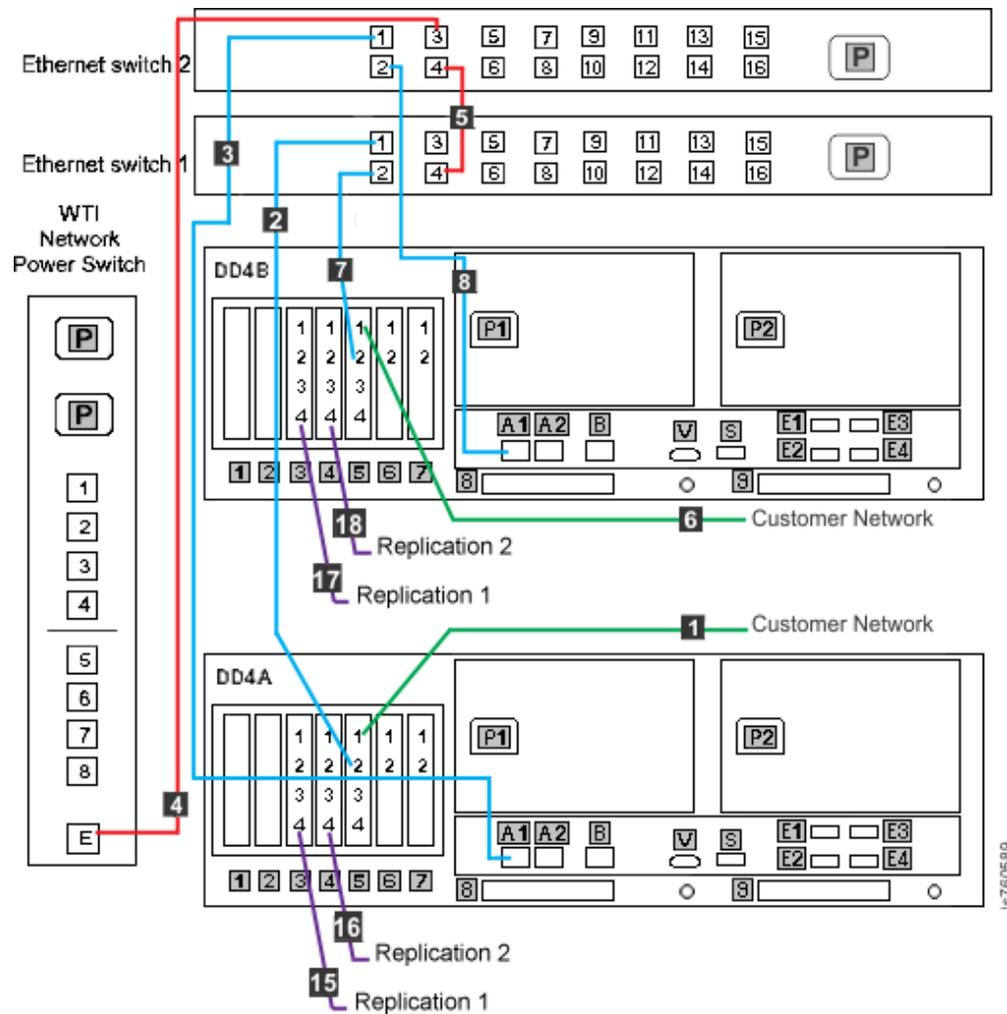


Figure 22. Clustered 1Gb Ethernet switch connections for OpenStorage configuration

Table 19. Clustered 1 Gb Ethernet switch Ethernet connections for OpenStorage configuration

| Callout | From | On Device | To | On Device/Location |
|-----------|----------------|-------------------|--------------------------------|----------------------------|
| 1 | Port 1, slot 5 | Server A | Customer network | Customer designated device |
| 2 | Port 1 | Ethernet switch 1 | Port 2, slot 5 | Server A |
| 3 | Port 1 | Ethernet switch 2 | Port A1 | Server A |
| 4 | Port 3 | Ethernet switch 2 | Ethernet port, E | WTI network power switch |
| 5 | Port 4 | Ethernet switch 2 | Port 4 | Ethernet switch 1 |
| 6 | Port 1, slot 5 | Server B | Customer network | Customer designated device |
| 7 | Port 2 | Ethernet switch 1 | Port 2, slot 5 | Server B |
| 8 | Port 2 | Ethernet switch 2 | Port A1 | Server B |
| 15 | Port 4, slot 3 | Server A | Customer's replication network | Customer specified device |
| 16 | Port 4, slot 4 | Server A | Customer's replication network | Customer specified device |
| 17 | Port 4, slot 3 | Server B | Customer's replication network | Customer specified device |

Table 19. Clustered 1 Gb Ethernet switch Ethernet connections for OpenStorage configuration (continued)

| Callout | From | On Device | To | On Device/Location |
|-----------|----------------|-----------|--------------------------------|---------------------------|
| 18 | Port 4, slot 4 | Server B | Customer's replication network | Customer specified device |

Procedure

1. Label and connect Ethernet cables (Cat 5e or higher) according to Figure 22 on page 55 and Table 19 on page 55.
2. Go to “Clustered Ethernet connections” on page 52 to complete the Ethernet cabling.

Clustered TSSC and customer network Ethernet connections

This task describes the TSSC and customer network Ethernet connections for the TS7650G server in a clustered configuration.

Before you begin

Notes:

- Depending upon the model of the TSSC and TSSC network switch being used, the port layout may differ from what is shown in the following figures. If so, make the cable connections according to the port number assignments specified in the associated tables, regardless of the position of the ports on the switch. Refer to the *IBM System Storage TS3000 System Console (TSSC) Maintenance Information* for detailed port information.
- Connection of the replication network cables is required only if the customer is enabling the data replication feature.

Clustered TSSC, KVM and customer network Ethernet connections for VTL configuration:

This task describes the TSSC, KVM and customer network Ethernet connections for the TS7650G server in a clustered configuration with VTL.

About this task

Note:

Depending upon the model of the TSSC and TSSC network switch being used, the port layout may differ from what is shown in Figure 23 on page 57. If so, label the cables according to the port number assignments specified in Table 20 on page 57, regardless of the position of the ports on the TSSC or the switch.

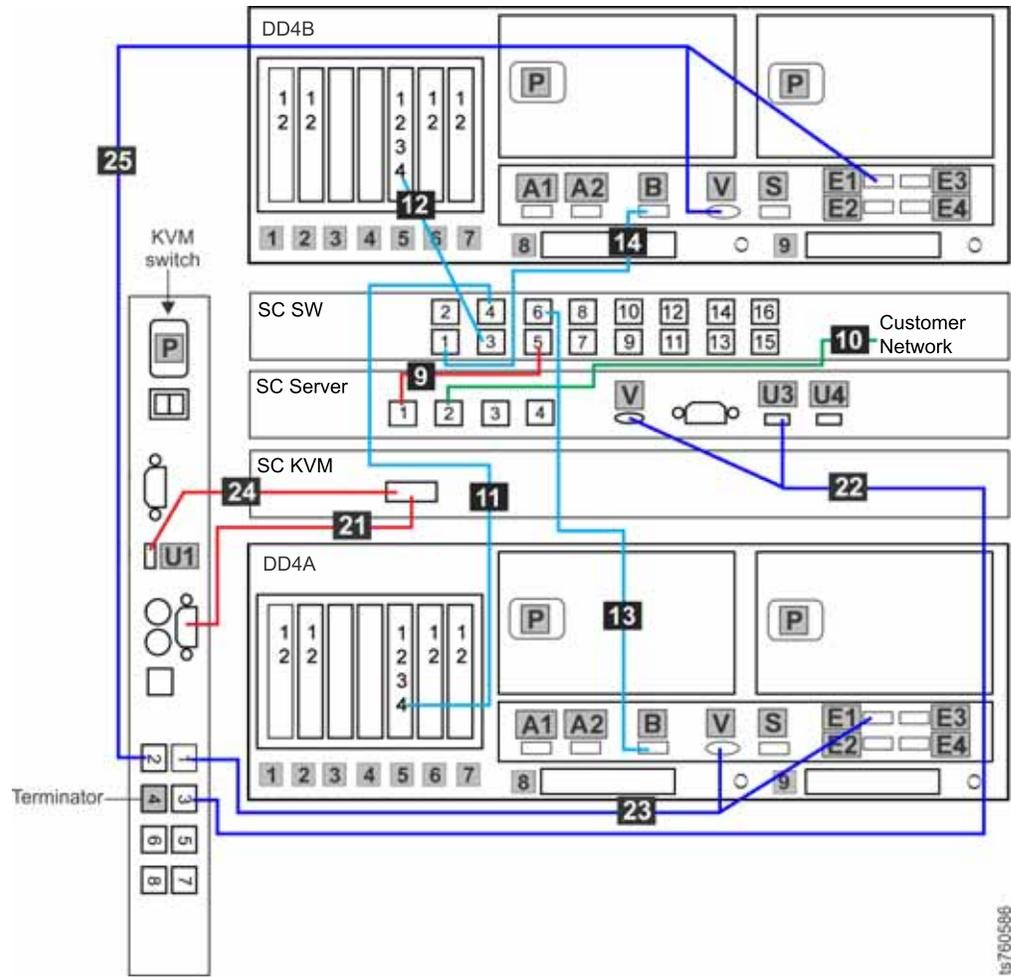


Figure 23. Clustered TSSC, KVM and customer network Ethernet connections for VTL configuration

Table 20. Clustered TSSC, KVM and customer network Ethernet connections for VTL configuration

| Callout | From | On Device | To | On Device/Location |
|-----------|------------|----------------------|-------------------------------|---------------------------|
| 9 | Port 5 | TSSC Ethernet switch | Port 1 | TSSC |
| 10 | Port 2 | TSSC | Customer's local area network | Customer specified device |
| 11 | Port 4 | TSSC Ethernet switch | Port 4, slot 5 | Server A |
| 12 | Port 3 | TSSC Ethernet switch | Port 4, slot 5 | Server B |
| 13 | Port 6 | TSSC Ethernet switch | Port B | Server A |
| 14 | Port 1 | TSSC Ethernet switch | Port B | Server B |
| 21 | Video port | KVM Switch | Video port | SC KVM |
| 22 | Port 3 | KVM Switch | Video port, Port U3 | SC Server |
| 23 | Port 1 | KVM Switch | Video port, Port E1 | Server A |
| 24 | Port U1 | KVM Switch | Video Port | SC KVM |

Table 20. Clustered TSSC, KVM and customer network Ethernet connections for VTL configuration (continued)

| Callout | From | On Device | To | On Device/Location |
|-----------|--------|------------|------------------------|--------------------|
| 25 | Port 2 | KVM Switch | Video port, Port E1 | Server B |

Procedure

1. Label and connect Ethernet cables (Cat 5e or higher) according to Table 20 on page 57 and Figure 23 on page 57.

Notes:

Connection of the replication network cables is required only if the customer is enabling the data replication feature.

2. Go to “Clustered fibre channel connections” on page 61.

Clustered TSSC, KVM and customer network Ethernet connections for OpenStorage configuration:

The tasks in this section describe the TSSC, KVM and customer network Ethernet connections for the TS7650G server in a clustered configuration with OpenStorage.

About this task

Note:

Depending upon the model of the TSSC and TSSC network switch being used, the port layout may differ from what is shown in Figure 24 on page 59. If so, label the cables according to the port number assignments specified in Table 21 on page 59, regardless of the position of the ports on the TSSC or the switch.

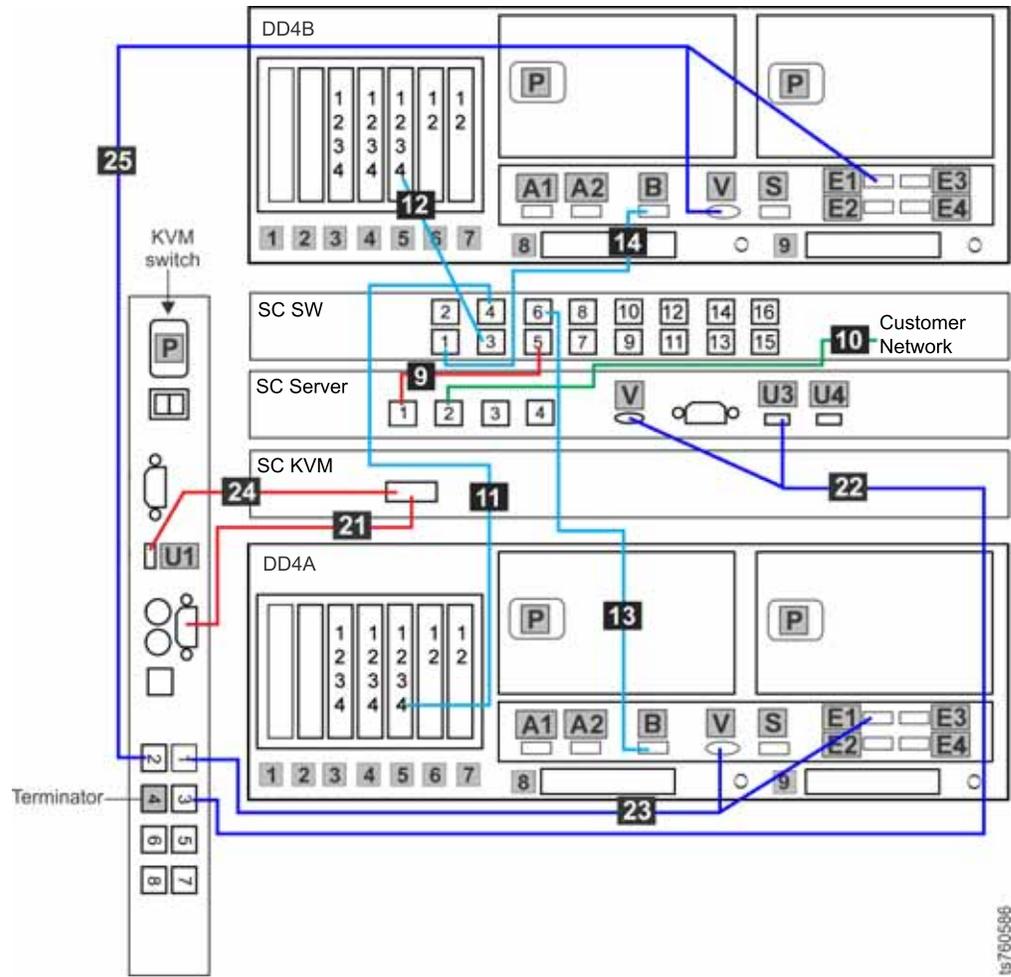


Figure 24. Clustered TSSC, KVM and customer network Ethernet connections for OpenStorage configuration

Table 21. Clustered TSSC, KVM and customer network Ethernet connections for OpenStorage configuration

| Callout | From | On Device | To | On Device/Location |
|-----------|------------|----------------------|-------------------------------|---------------------------|
| 9 | Port 5 | TSSC Ethernet switch | Port 1 | TSSC |
| 10 | Port 2 | TSSC | Customer's local area network | Customer specified device |
| 11 | Port 4 | TSSC Ethernet switch | Port 4, slot 5 | Server A |
| 12 | Port 3 | TSSC Ethernet switch | Port 4, slot 5 | Server B |
| 13 | Port 6 | TSSC Ethernet switch | Port B | Server A |
| 14 | Port 1 | TSSC Ethernet switch | Port B | Server B |
| 21 | Video port | KVM Switch | Video port | SC KVM |
| 22 | Port 3 | KVM Switch | Video port, Port U3 | SC Server |
| 23 | Port 1 | KVM Switch | Video port, Port E1 | Server A |
| 24 | Port U1 | KVM Switch | Video Port | SC KVM |

Table 21. Clustered TSSC, KVM and customer network Ethernet connections for OpenStorage configuration (continued)

| Callout | From | On Device | To | On Device/Location |
|---------|--------|------------|------------------------|--------------------|
| 25 | Port 2 | KVM Switch | Video port, Port E1 | Server B |

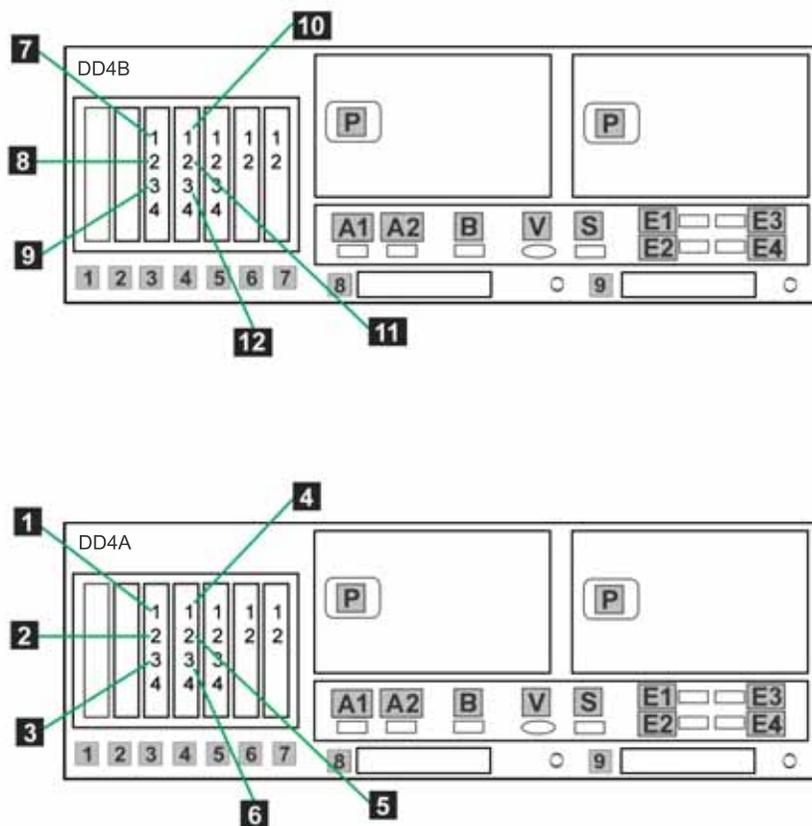


Figure 25. Clustered customer network Ethernet connections for OpenStorage configuration

Table 22. Clustered Ethernet host connections for OpenStorage configuration

| Callout | From | On Device | To | On Device/Location |
|---------|----------------|-----------|-------------------|-------------------------|
| 1 | Port 1, slot 3 | Server A | Designated device | Customer's host network |
| 2 | Port 2, slot 3 | Server A | Designated device | Customer's host network |
| 3 | Port 3, slot 3 | Server A | Designated device | Customer's host network |
| 4 | Port 1, slot 4 | Server A | Designated device | Customer's host network |
| 5 | Port 2, slot 4 | Server A | Designated device | Customer's host network |
| 6 | Port 3, slot 4 | Server A | Designated device | Customer's host network |
| 7 | Port 1, slot 3 | Server B | Designated device | Customer's host network |
| 8 | Port 2, slot 3 | Server B | Designated device | Customer's host network |
| 9 | Port 3, slot 3 | Server B | Designated device | Customer's host network |

Table 22. Clustered Ethernet host connections for OpenStorage configuration (continued)

| Callout | From | On Device | To | On Device/Location |
|-----------|----------------|-----------|-------------------|-------------------------|
| 10 | Port 1, slot 4 | Server B | Designated device | Customer's host network |
| 11 | Port 2, slot 4 | Server B | Designated device | Customer's host network |
| 12 | Port 3, slot 4 | Server B | Designated device | Customer's host network |

Procedure

1. Label and connect Ethernet cables (Cat 5e or higher) according to Table 21 on page 59 and Figure 24 on page 59.

Notes:

Connection of the replication network cables is required only if the customer is enabling the data replication feature.

2. Label and connect Ethernet cables (Cat 5e or higher) according to Figure 25 on page 60 and Table 22 on page 60 for the customers host network.
3. Go to “Clustered fibre channel connections.”

Clustered fibre channel connections

This task describes the fibre channel connections for the TS7650G server in a clustered configuration.

About this task

Important:

This document references IBM 4.8 TB Fibre Channel Disk Controllers and IBM 7.2 TB Fibre Channel Disk Expansion Units in many of the hardware installation figures, examples, and procedures.

In addition to the IBM DS4700 disk controller, the TS7650G also supports the DS5000 disk controller, the DS8000 disk controller and the XIV disk controller, as well as various non-IBM storage solutions. If the customer has elected to use disk storage components other than the IBM disk controllers mentioned above, the figures, examples, and procedures in this document will not apply to the configuration on which you are working. Therefore, it is suggested that you determine the make and model of the disk storage components in use and, if necessary, obtain the related product documentation before you begin installation of the gateway.

The RAS code no longer sends call home packages for problems with any of the disk storage products attached to the gateway including DS4700, DS5000, DS8000 and XIV.

However, if the IP address of an SMTP server is provided during RAS package configuration, the disk storage subsystems that communicate with the RAS package (which includes DS4700 and DS5000 if they have firmware levels supported by RAS) will send problem reports to the customer via email.

Clustered fibre channel connections for VTL configuration

This task describes the fibre channel connections for the TS7650G server in a clustered configuration with VTL configuration.

About this task

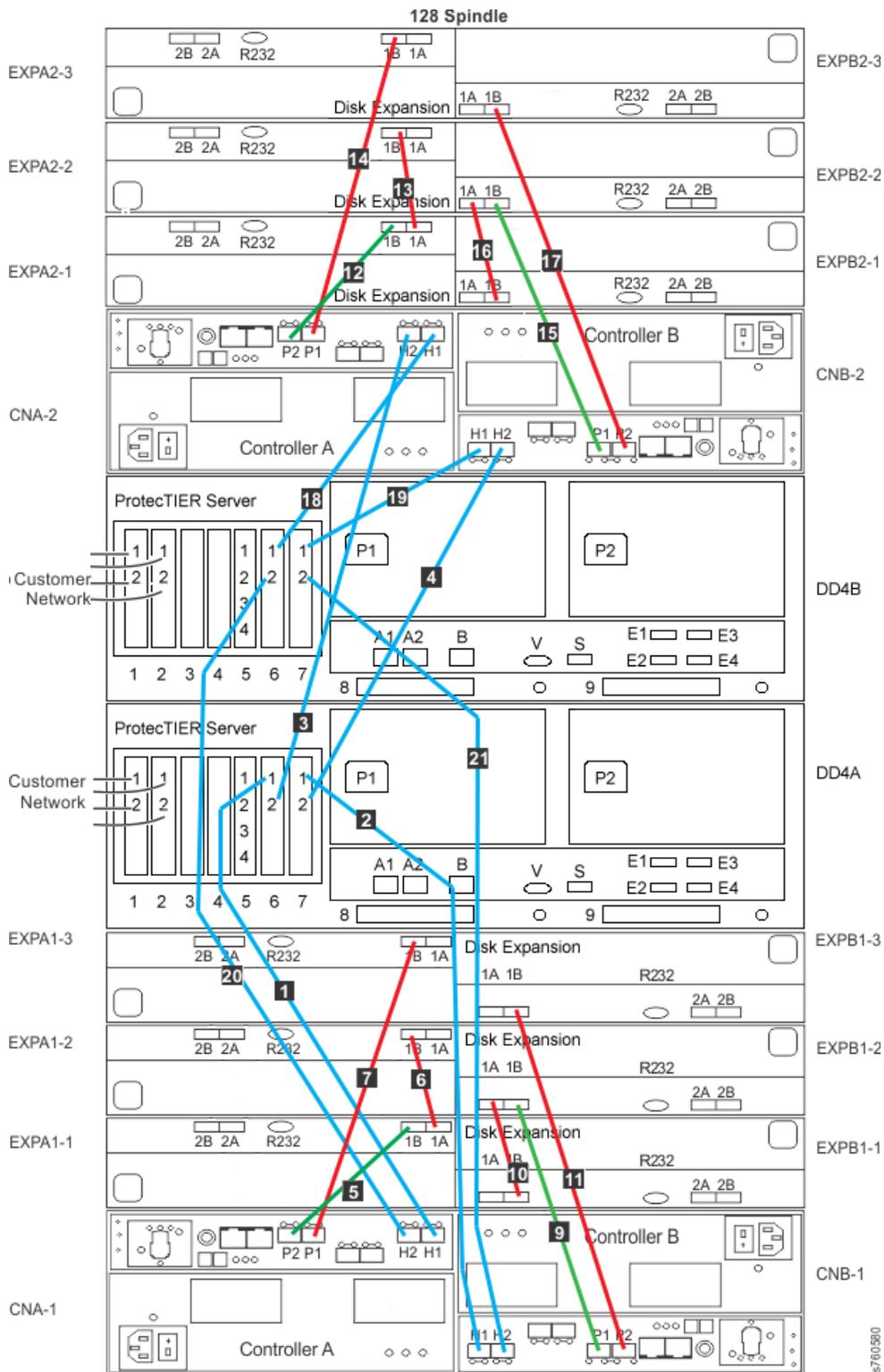


Figure 26. Clustered fibre channel connections for VTL configuration

Table 23. Clustered fibre channel connections for VTL installations

| Label | From | To | Remarks |
|-----------|------------|------------------------------------|---|
| 1 | DD4A S6 1 | Disk Array, Disk Controller A-1 H1 | |
| 2 | DD4A S7 1 | Disk Array, Disk Controller B-1 H1 | |
| 3 | DD4A S6 2 | Disk Array, Disk Controller A-2 H2 | |
| 4 | DD4A S7 2 | Disk Array, Disk Controller B-2 H2 | |
| 5 | CNA-1 P2 | Disk Array, Disk Expansion A1-1 1B | |
| 6 | EXPA1-1 1A | Disk Array, Disk Expansion A1-2 1B | |
| 7 | CNA-1 P1 | Disk Array, Disk Expansion A1-3 1B | |
| 8 | CNB-1 P1 | Disk Array, Disk Expansion B1-1 1B | This cable is used only in a minimum storage configuration, when only one expansion unit is attached. |
| 9 | CNB-1 P1 | Disk Array, Disk Expansion A1-2 1B | |
| 10 | EXPB1-1 1B | Disk Array, Disk Expansion B1-2 1A | |
| 11 | CNB-1 P2 | Disk Array, Disk Expansion B1-3 1B | |
| 12 | CNA-2 P2 | Disk Array, Disk Expansion A2-1 1B | |
| 13 | EXPA2-1 1A | Disk Array, Disk Expansion A2-2 1B | |
| 14 | CNA-2 P1 | Disk Array, Disk Expansion A2-3 1B | |
| 15 | CNB-2 P1 | Disk Array, Disk Expansion B2-2 1B | |
| 16 | EXPB2-1 1B | Disk Array, Disk Expansion B2-2 1A | |
| 17 | CNB-2 P2 | Disk Array, Disk Expansion B2-3 1B | |
| 18 | DD4B S6 1 | Disk Array, Disk Controller A-2 H1 | Used in clustered systems only |
| 19 | DD4B S7 1 | Disk Array, Disk Controller B-2 H1 | Used in clustered systems only |
| 20 | DD4B S6 2 | Disk Array, Disk Controller A-1 H2 | Used in clustered systems only |
| 21 | DD4B S7 2 | Disk Array, Disk Controller B-1 H2 | Used in clustered systems only |
| 22 | CNB-2 P1 | Disk Array, Disk Expansion B2-1 1B | This cable is used only in a minimum storage configuration, when only one expansion unit is attached. |

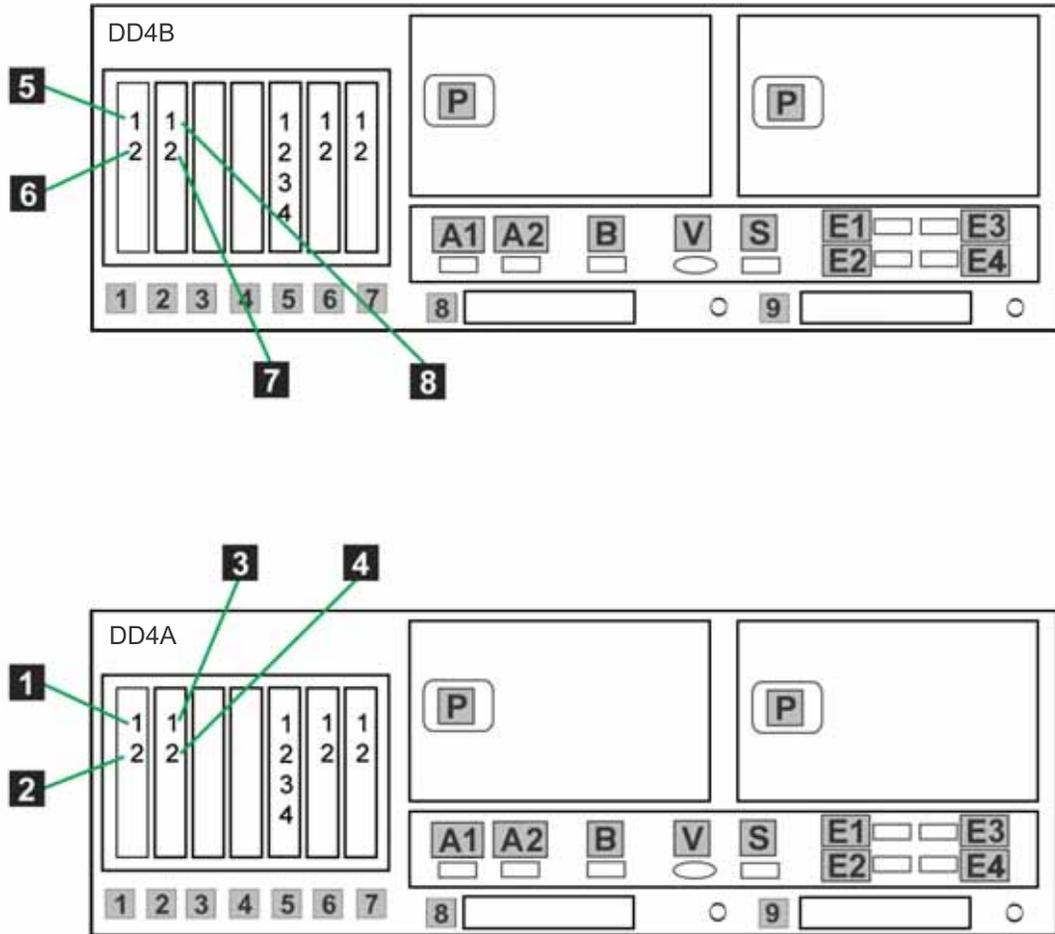


Figure 27. Clustered Host fibre channel labels

Table 24. Clustered Host fibre channel labels

| Label | From | To | Remarks |
|----------|-----------|--------|---------|
| 1 | DD4A S1 1 | HOST 1 | |
| 2 | DD4A S1 2 | HOST 2 | |
| 3 | DD4A S2 1 | HOST 3 | |
| 4 | DD4A S2 2 | HOST 4 | |
| 5 | DD4B S1 1 | HOST 1 | |
| 6 | DD4B S1 2 | HOST 2 | |
| 7 | DD4B S2 1 | HOST 3 | |

Table 24. Clustered Host fibre channel labels (continued)

| Label | From | To | Remarks |
|-------|-----------|--------|---------|
| 8 | DD4B S2 2 | HOST 4 | |

Procedure

1. Connect fibre channel cables according to Table 23 on page 64 and Figure 26 on page 63. Use Table 24 on page 65 and Figure 27 on page 65 to connect to the customer's host network.

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.

2. Use Table 23 on page 64, Table 24 on page 65, Figure 26 on page 63 and Figure 27 on page 65 to verify that the recommended disk components are cabled correctly.
3. Make any necessary adjustments to cable labeling or placement, then go to “Powering-up the components” on page 69.

Clustered fibre channel connections for OpenStorage configuration

This task describes the fibre channel connections for the TS7650G server in a clustered configuration with OpenStorage configuration.

About this task

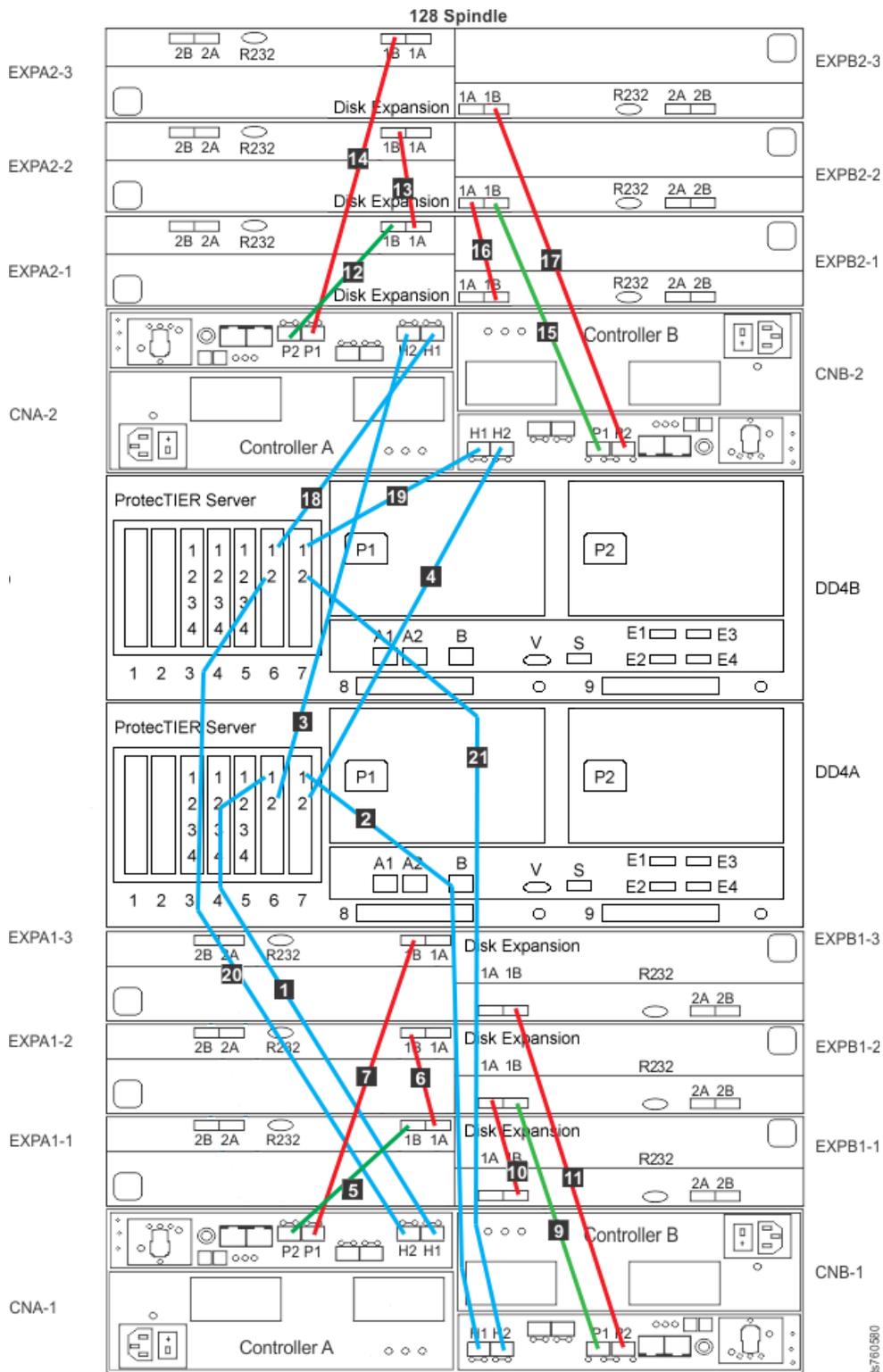


Figure 28. Clustered fibre channel connections for OpenStorage configuration

Table 25. Clustered fibre channel connections for OpenStorage installations

| Label | From | To | Remarks |
|-------|------------|------------------------------------|---|
| 1 | DD4A S6 1 | Disk Array, Disk Controller A-1 H1 | |
| 2 | DD4A S7 1 | Disk Array, Disk Controller B-1 H1 | |
| 3 | DD4A S6 2 | Disk Array, Disk Controller A-2 H2 | |
| 4 | DD4A S7 2 | Disk Array, Disk Controller B-2 H2 | |
| 5 | CNA-1 P2 | Disk Array, Disk Expansion A1-1 1B | |
| 6 | EXPA1-1 1A | Disk Array, Disk Expansion A1-2 1B | |
| 7 | CNA-1 P1 | Disk Array, Disk Expansion A1-3 1B | |
| 8 | CNB-1 P1 | Disk Array, Disk Expansion B1-1 1B | This cable is used only in a minimum storage configuration, when only one expansion unit is attached. |
| 9 | CNB-1 P1 | Disk Array, Disk Expansion A1-2 1B | |
| 10 | EXPB1-1 1B | Disk Array, Disk Expansion B1-2 1A | |
| 11 | CNB-1 P2 | Disk Array, Disk Expansion B1-3 1B | |
| 12 | CNA-2 P2 | Disk Array, Disk Expansion A2-1 1B | |
| 13 | EXPA2-1 1A | Disk Array, Disk Expansion A2-2 1B | |
| 14 | CNA-2 P1 | Disk Array, Disk Expansion A2-3 1B | |
| 15 | CNB-2 P1 | Disk Array, Disk Expansion B2-2 1B | |
| 16 | EXPB2-1 1B | Disk Array, Disk Expansion B2-2 1A | |
| 17 | CNB-2 P2 | Disk Array, Disk Expansion B2-3 1B | |
| 18 | DD4B S6 1 | Disk Array, Disk Controller A-2 H1 | Used in clustered systems only |
| 19 | DD4B S7 1 | Disk Array, Disk Controller B-2 H1 | Used in clustered systems only |
| 20 | DD4B S6 2 | Disk Array, Disk Controller A-1 H2 | Used in clustered systems only |
| 21 | DD4B S7 2 | Disk Array, Disk Controller B-1 H2 | Used in clustered systems only |
| 22 | CNB-2 P1 | Disk Array, Disk Expansion B2-1 1B | This cable is used only in a minimum storage configuration, when only one expansion unit is attached. |

Procedure

1. Connect fibre channel cables according to Table 25 on page 68 and Figure 28 on page 67.

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.

2. Use Table 25 on page 68 and Figure 28 on page 67 to verify that the recommended disk components are cabled correctly. (Connections to the customer's host network not shown).
3. Make any necessary adjustments to cable labeling or placement, then go to "Powering-up the components."

Powering-up the components

Power-up the recommended hardware components in the order shown in Table 26. For more information on power-up procedures for each recommended component type, see the related sections that follow.

Important:

This document references IBM 4.8 TB Fibre Channel Disk Controllers and IBM 7.2 TB Fibre Channel Disk Expansion Units in many of the hardware installation figures, examples, and procedures.

In addition to the IBM DS4700 disk controller, the TS7650G also supports the DS5000 disk controller, the DS8000 disk controller and the XIV disk controller, as well as various non-IBM storage solutions. If the customer has elected to use disk storage components other than the IBM disk controllers mentioned above, the figures, examples, and procedures in this document will not apply to the configuration on which you are working. Therefore, it is suggested that you determine the make and model of the disk storage components in use and, if necessary, obtain the related product documentation before you begin installation of the gateway.

The RAS code no longer sends call home packages for problems with any of the disk storage products attached to the gateway including DS4700, DS5000, DS8000 and XIV.

However, if the IP address of an SMTP server is provided during RAS package configuration, the disk storage subsystems that communicate with the RAS package (which includes DS4700 and DS5000 if they have firmware levels supported by RAS) will send problem reports to the customer via email.

Table 26. Power-on sequences

| Stand-alone configuration | Clustered configuration |
|---------------------------------|---------------------------------|
| Frame breakers | Frame breakers |
| Power distribution units (PDUs) | Power distribution units (PDUs) |
| Disk expansion modules | Disk expansion modules |
| Disk controllers | Disk controllers |

Table 26. Power-on sequences (continued)

| Stand-alone configuration | Clustered configuration |
|---------------------------|--------------------------|
| Server | WTI network power switch |
| TSSC Ethernet switch | Server A (bottom server) |
| TSSC and display panel | Server B (top server) |
| | TSSC Ethernet switch |
| | TSSC and display panel |

Disk expansion modules

For power-on instructions, refer to the documentation that came with the hardware.

Before you begin

Important: Precautions must be taken when turning on the disk expansion modules to prevent damage to the modules' enhanced disk drive module (E-DDM) hard drives. Carefully read all of the related information provided in the disk expansion module documentation before turning on the power.

Disk controllers

For power-on instructions, refer to the documentation that came with the specific disk controller(s) in the installation.

Before you begin

Important: Precautions must be taken when turning on the disk expansion modules to prevent damage to the modules' enhanced disk drive module (E-DDM) hard drives. Carefully read all of the related information provided in the disk expansion module documentation before turning on the power.

Servers

Turn on the servers using the information in this section.

About this task

When the server is connected to an AC power source but is not turned on, the operating system does not run, and all core logic except for the service processor is shut down; however, the server can respond to requests from the service processor, such as a remote request to turn on the server. The power-on LED flashes to indicate that the server is connected to AC power but not turned on.

Approximately 20 seconds after the server is connected to AC power, the power-control button becomes active, and one or more fans might start running to provide cooling while the server is connected to power.

- To turn on the servers, press the white, recessed power-control button on the server operator panel. See Figure 29 on page 71.

Important:

- In a clustered configuration, turn on the bottom server (Server A) first, wait a few moments and then turn on the top server (Server B).
- During the boot cycle, the ProtecTIER file systems are mounted. If the message: Running... displays, press <enter> to proceed to the login prompt.

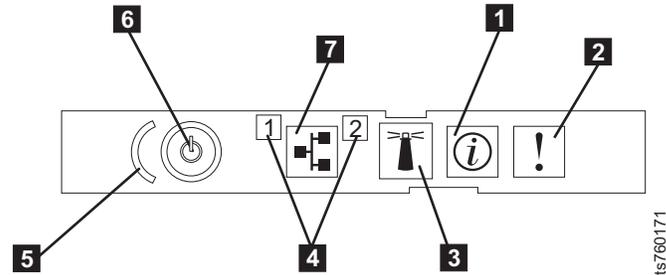


Figure 29. Server operator panel

Table 27. Server operator panel

| Callout | description |
|----------|-----------------------------------|
| 1 | Information LED |
| 2 | System-error LED |
| 3 | Locator button/locator LED |
| 4 | Ethernet port activity LEDs |
| 5 | Power control button cover |
| 6 | Power control button/power-on LED |
| 7 | Ethernet icon LED |

For more detailed information, refer to the *IBM System x3850 X5 and x3950 X5 Types 7145 and 7146 Installation and User's Guide* that was provided with the server.

TSSC and KVM kit

Use this section to turn on the TSSC and KVM.

About this task

To turn on the TSSC, press the white power button on the front of the TSSC.

If you have a KVM, press the black power button on the monitor in the KVM kit.

Visually inspecting indicator and fault LEDs

Visually inspect the indicator and fault LEDs on all TS7650G servers and recommended hardware components:

- Validate that all links on the internal Ethernet network indicate 1000 Mbps, except for the Ethernet connection to the WTI network power switch, which indicates 100 Mbps. All connections, except the connection to the WTI network power switch, must be at 1000 Mbps for the cluster configuration to work.
- If all link-up indicators and fault LEDs show normal operation, close the front and rear doors of the frames.

- If an amber LED on any component is lit, refer to the documentation for the component to diagnose and remedy the problem. Also refer to the *IBM System Storage TS7600 with ProtecTIER Problem Determination Guide for the TS7650 Appliance and TS7650G (Gateway)*, IBM form number GC53-1157, as applicable.

Next steps

Physical installation of the TS7650G hardware components is now complete. The remainder of this document provides instructions for configuration and setup of the TSSC, the ProtecTIER servers, and the ProtecTIER Manager workstation.

Attention: Interdependencies among the tasks require that the tasks be completed in the order in which they appear.

The SSR should follow the instructions in “Setting up the TSSC for use with the TS7650G” on page 77 through Chapter 7, “RAS verification,” on page 91, to configure the TSSC for use with the gateway; configure the Reliability, Availability, and Serviceability (RAS) package on the ProtecTIER server(s); and Perform RAS verification and test the RAS Call Home functionality.

After the SSR completes the TSSC and RAS configuration, the trained ProtecTIER specialist should follow the instructions in “Configuring the first server with ptconfig” on page 97 through Chapter 14, “Testing a clustered system,” on page 139 to configure ProtecTIER; install ProtecTIER Replication Manager (if applicable); install ProtecTIER Manager and create the data repository; and upgrade ProtecTIER to a cluster and test cluster functionality (if applicable).

When all SSR and trained ProtecTIER specialist tasks are complete, the trained ProtecTIER specialist should turn the system over to the customer.

Note: In a replication environment, the trained ProtecTIER specialist should also inform the customer that before replication is fully functional, the customer must create and configure the replication grid. Instructions for doing so appear in the *IBM System Storage ProtecTIER User's Guide for Enterprise Edition and Appliance Edition*, IBM form number GC53-1156.

Chapter 5. Setting up the TSSC for use with the TS7650G server

The topics in this chapter describe how to install and setup the TSSC for use with the TS7650G server. These topics include connecting the TSSC to the server, verifying the code level on the TSSC, updating the TSSC microcode if necessary, and configuring the Call Home, firewall, and network communication settings for the TSSC.

Note: For the most up-to-date information about setting up the TSSC, see *IBM System Storage TS3000 System Console (TSSC) Maintenance Information*.

Establishing a connection between the TSSC and the server

This topic describes how to establish a direct connection between a TSSC residing outside the Gateway frame and the TS7650G server, when no KVM is available in the frame.

About this task

Important: If the customer purchased the TS7650G without a TSSC, the customer must provide an alternative TSSC. You are required to install and configure a TSSC and its related components along with the other appliance hardware. Failure to do so will prevent the use of Call Home or IBM remote support.

If the TS7650G is shipped without a TSSC, the TSSC will reside outside the frame. You must establish a connection between the server and the TSSC, before you can configure the TSSC's communication settings. Use this procedure to establish a connection between the TSSC when it resides outside the frame and the TS7650G server.

Procedure

To establish a connection between the TSSC and the TS7650G server:

1. Attach a USB-compatible keyboard to any open USB port on the back of the TS7650G server.
2. Attach a graphics-capable monitor to the video port on the back of the TS7650G server.
3. If the server is powered down and the front server indicator light is blinking, press the power button until the server indicator light remains on.

Note: The system startup process may take up to ten minutes.

The ProtecTIER file systems are mounted during the system startup process.

4. If you see the message `Running. . .` on the screen, press Enter to continue to the log in prompt.
5. At the login prompt, log in with the user name `root` and password `admin`.
6. Establish a communication path from the server to the TSSC:
 - a. Connect an Ethernet cable from the Eth3 port of the NIC card in slot 5 of the server to a port in the Ethernet switch connected to the TSSC.

Note: The communication path will be activated in a later procedure. See Chapter 6, “Configuring the RAS package,” on page 83 for more information.

- b. Connect an Ethernet cable from the Integrated Management Module port to the TSSC Ethernet switch.

Note: This cable is used to allow RAS configuration to reconfigure the IP address of the IMM port.

The two Ethernet cables are now connected to the TSSC Ethernet switch. This connection is required to activate the communication paths between the server and the TSSC in Chapter 6, “Configuring the RAS package,” on page 83.

Results

The TSSC is connected to the TS7650G server and you are now ready to ensure that the code level on the TSSC is up-to-date.

Note: If you are unable to connect to the server using the this procedure, see Appendix D, “Making a server connection through the System Management Module (IMM),” on page 155 for instructions on connecting to the server using the server IMM and your service laptop.

What to do next

Go to “Checking the TSSC microcode level.”

Checking the TSSC microcode level

This topic describes how to verify the TSSC's microcode level.

Before you begin

Before you can verify the TSSC's microcode level, you must establish a connection between the TSSC and the server. If you don't have a connection between the TSSC and the server, go to “Establishing a connection between the TSSC and the server” on page 73.

About this task

In order to be compatible with ProtecTIER version 2.5, the TSSC must be running microcode version 5.9.x or higher. If the microcode version on the TSSC is not current, you must bring it up to the current level.

Use this procedure to verify the TSSC's microcode level.

Procedure

To verify the TSSC's microcode level:

1. Use one of the following options to view the microcode level on the TSSC:

| Option | Description |
|---|--|
| If the TSSC is not already powered-on | Power on the TSSC. The IBM TS3000 System Console login window displays, as shown in Figure 30. The microcode level in use on the TSSC is shown in the login panel title. |
| If you are currently logged into the TSSC | Right-click on the TSSC's blue desktop. The IBM TS3000 System Console menu displays. The microcode level in use on the TSSC is shown in the menu title. |

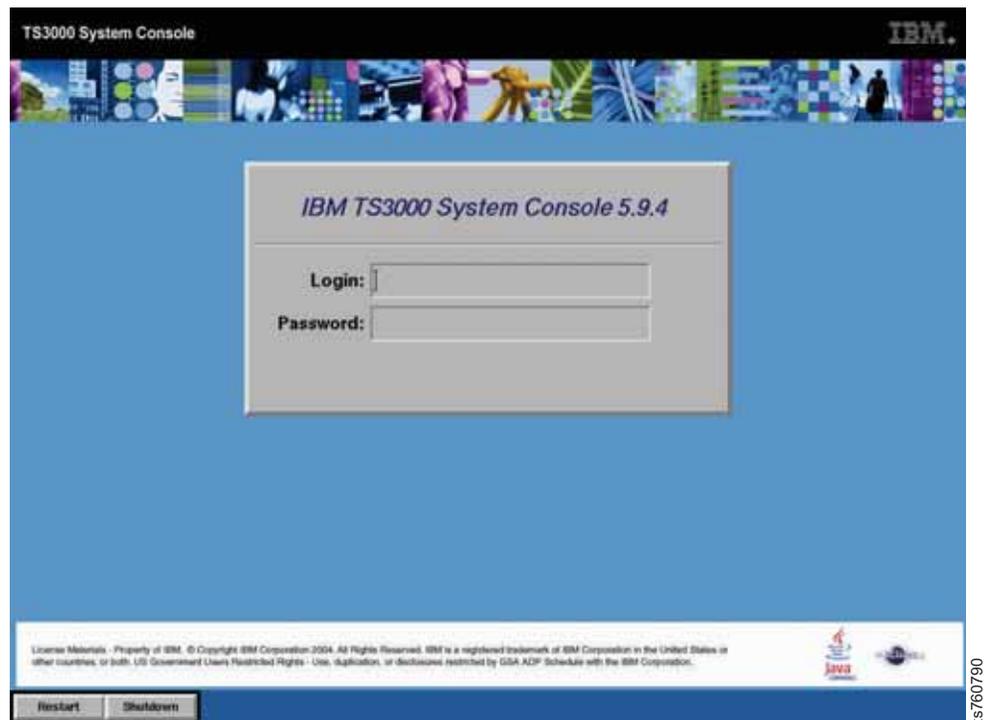


Figure 30. IBM TS3000 System Console login window

2. Make note of the TSSC microcode level.

What to do next

If the TSSC microcode level is:

- Not current, you must upgrade the TSSC microcode level. Go to “Re-imaging the TSSC microcode.”
- Current, go to “Setting up the TSSC for use with the TS7650G” on page 77.

Re-imaging the TSSC microcode

This topic gives instructions for performing a code load to bring the TSSC up to the current microcode level.

Before you begin

Verify that the microcode level running on the TSSC is the current level. In order to be compatible with ProtecTIER version 2.5, the TSSC must be running microcode version 5.7.x or higher. To determine the current version of the microcode on the TSSC, go to “Checking the TSSC microcode level” on page 74.

If the microcode version on the TSSC is not current, you must bring it up to the current level. In order to bring the TSSC up to the current level, you must perform a code load, which will rebuild the hard disk drive.

About this task

Attention:

- Rebuilding the hard disk drive will permanently destroy any local data present on the drive. Using the Product Recovery CD-ROM will return the console to its "as shipped" state.
- Do not load or attempt to use the Product Recovery CD-ROM on any machine type other than 6579, 6792, 8480, 8482, 8485, 8836, or 8849. If you use the Product Recovery CD-ROM on any other machine type, the installation will fail and that machine will be unusable.
- You must back up the TS3000 System Console configuration before you perform a code load. Refer to the related topics in *IBM System Storage TS3000 System Console (TSSC) Maintenance Information* for detailed instructions for backing up and restoring configuration data.
- Do not attempt to restore configuration settings from a v1.x.x console onto a v3.x.x or higher console. The files are incompatible. V2.x.x files are compatible with v3.x.x or higher.
- After performing the procedure below, you will need to reload any application(s) specific to the products displayed in the Attached Systems list, such as TS7650, TS7740, or attached control units. Types of applications that may need to be reloaded include Storage Manager GUIs, ProtecTIER Manager GUI, and Information Centers for TS7700, for example. The actual applications will depend upon the systems that are attached to the TSSC. Refer to the *IBM System Storage TS3000 System Console (TSSC) Maintenance Information* for additional information.

Procedure

To bring the TSSC up to the current microcode level:

1. If necessary, power-on the TSSC.
2. At the login prompt, log in with the user name root and password admin.
3. Insert the System Console Product Recovery CD-ROM into the TSSC's CD-ROM drive and press Enter.
4. If you are currently logged into the TSSC, right-click on the TSSC's blue desktop. The **IBM TS3000 System Console** menu displays.
5. Click **Logout**, then click **OK**. You are returned to the login screen.
6. Click **Restart**.
7. When prompted to restart, click **OK**.

After the restart completes, the message below displays:

```
TSSC Not Installed. Proceed. . .
This will install the Console onto /dev/sda which will erase everything on that device
Continue? ('yes' or 'no')
Abort
```

8. Type **y** and press Enter. The hard drive rebuild process begins.
9. When the rebuild is complete, the TSSC restarts automatically. Remove the CD-ROM from the CD drive.

Note: This procedure can take as long as 15 minutes to complete. You must be present at the completion of the restart or the code load will restart automatically. If you are not present to remove the CD-ROM from the CD drive tray, the tray will retract into the CD drive and the installation will start again.

10. At the console install confirmation prompt, type **n** and press Enter.
11. Remove the CD-ROM from the CD drive. The system will automatically restart.

After the initial restart, the software will determine the machine type and model number of the computer, automatically configure the appropriate drivers and settings, and automatically restart the TSSC. During the second restart, the startup background and text may look slightly different. The login menu will be displayed following the second restart. If the software determines that the machine type is not 6579, 6792, 8480, 8482, 8485, 8836, or 8849, a warning message will display on the screen and the TSSC will halt. This will continue each time the TSSC is powered on. Similar symptoms occur after software installation if the TSSC is unable to determine its machine type and model.

Note: If a product with a machine type of 6579, 6792, 8480, 8482, 8485, 8836, or 8849 reports a different machine type during an installation, the BIOS may have been corrupted. Restart the server, and make the appropriate selection during the restart to enter BIOS setup. In the BIOS, check the machine type that is configured. If the machine type does not match the specific server, you should reinstall the system BIOS. Refer to the server documentation to reinstall the BIOS and to set the correct machine type.

12. Restore the TSSC's configuration from the backup. Refer to the *IBM System Storage TS3000 System Console (TSSC) Maintenance Information* for instructions.

Setting up the TSSC for use with the TS7650G

Before the TSSC can be used to support the gateway, you must first configure the TSSC's Call Home, firewall, and network communications settings.

Procedure

1. If the TSSC is not already powered-on, do so now.

Note: When powering on the TS3000 TSSC several hardware checks run automatically. During these checks failure indications are displayed for the Eclipse Framework and AOTM. These failure indications can be ignored as they are normal and do not interfere with the operation of the TSSC or its communication to the ProtecTIER server. Failure indications other than those noted require attention. Identify any failing routines and if needed, contact your next level of support.

2. If prompted for login information, enter the username: **service** and the password: **service**.

The TSSC's blue desktop displays. See Figure 31 on page 78.

3. Configure the TSSC for Call Home. Before doing so, take note of following important information:
 - The Call Home setup procedure has been revised. If outdated procedures are used, the total Call Home solution may not be enabled and the process will fail. To ensure that you are using the most current instructions, refer to the relevant sections in the *IBM System Storage TS3000 System Console (TSSC) Maintenance Information*, provided on the *IBM System Storage TS7650 with ProtecTIER Publications CD*.
 - Do not select the **Software Call Home** checkbox unless you are certain your support center supports sending Software Call Home events down the hardware entitlement path. Enabling the routing of Software Call Home calls down the hardware entitlement path may cause software entitlement issues. While this may be supported for customers in Europe or Asia, it is not supported in the United States. With consideration of the preceding statement regarding your region, select the **Software Call Home** checkbox in the TSSC Setup GUI to set the software Call Home flag. If the flag is not set, software problems must be reported by the customer. When a software problem is detected, the logs are collected and stored on the TSSC in this location: `/var/enc/SWCH`.
4. When Call Home setup is complete, return to this page and go to step 5.
5. Right-click on the TSSC's blue desktop.
The **IBM TS3000 System Console** menu displays. See Figure 31.
6. Select **System Console Actions** → **Console Configuration Utility**.

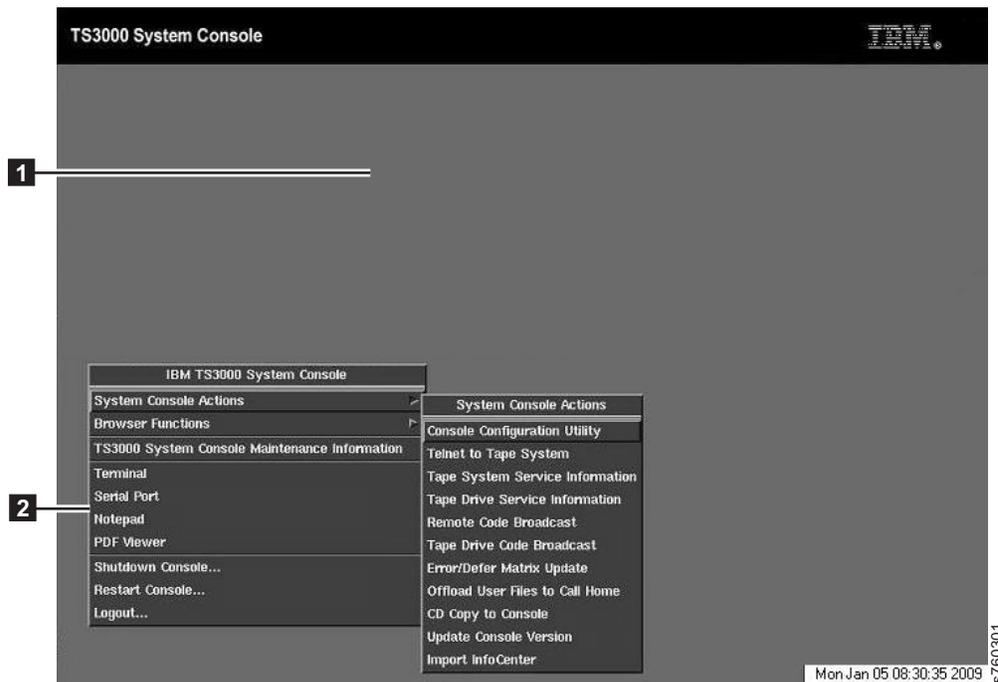


Figure 31. IBM TS3000 System Console menu

Table 28. TSSC Interface

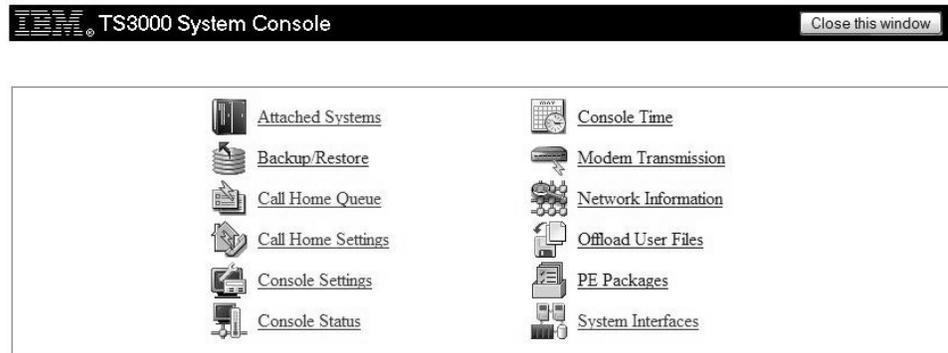
| | |
|-----------------------|---|
| 1 Blue desktop | 2 IBM TS3000 System Console menu |
|-----------------------|---|

The **Username and password** screen displays.

7. Enter **service** in both the **Username** and **Password** fields.

8. Click **OK**

The Console Configuration application starts and the **Console Configuration utility** screen displays:



ts760069

Figure 32. Console configuration utility screen

9. Click **Console Settings**

The **Console Settings** screen displays. See Figure 33.



ts760070

Figure 33. Console Settings screen

10. In the **Internal Network Interface** pane, verify that the IP Address: **172.31.1.1** and the Subnet mask: **255.255.0.0**, are displayed.

Note: If different values display in the **Internal Network Interface** pane, change them to match the IP Address and Subnet mask values provided above.

11. In the **External Network Interface** pane, enter the customer-supplied local area network (LAN) IP address and Subnet mask for the TSSC. See Appendix B, “IP address worksheet,” on page 145.
12. In the **System Properties** pane, enter the customer-supplied **Host Name** (the unique name of the TSSC), **Domain Name**, **DNS1** and **DNS2** addresses, and **Default Gateway** address.

Note: If necessary, scroll down to access the **Default Gateway** entry fields and the **Save Changes** button, located at the bottom of the screen.

13. Click **Save Changes**.

When the Save Completed Successfully message displays in the upper-left corner of the screen, the save is complete.

14. Click the **Close this window** button in the upper-right corner of the screen. The **Console Configuration Utility** menu displays.

15. Click **Console Time**.

The **Console Time and Date** screen displays:

Console Time

Note: Clicking inside or tabbing to a field will stop the clock so that you can edit the time and date. To restart the clock click "Cancel/Refresh" or "Save Changes".

Time : : UTC

Date / /

NTP Server Settings
NTP Server is off

Figure 34. Console Time and Date screen: NTP server off

16. Set the TSSC to Coordinated Universal Time (UTC). To do so:
 - a. In the **NTP Server Settings** box, verify that the NTP Server is off. If necessary, click **Stop NTP server**.
 - b. In the **Time** fields, enter the current UTC.
 - c. Click **Save Changes**.
17. Click **Start NTP server**.

The **Console Time and Date** screen re-displays with the new UTC shown:

– Console Time

Note: Clicking inside or tabbing to a field will stop the clock so that you can edit the time and date. To restart the clock click "Cancel/Refresh" or "Save Changes".

*Note: NTP server is running, you can not change the TSSC time.

Time : : UTC

Date / /

– NTP Server Settings

NTP Server is on

ts760220

Figure 35. Console Time and Date screen: NTP server running

18. Close the **Console configuration utility** screen.
You are returned to the TSSC's blue desktop.
19. Go to Chapter 6, "Configuring the RAS package," on page 83.

Chapter 6. Configuring the RAS package

The RAS package was installed during manufacturing. However, it must be configured according to the instructions provided in this chapter to enable the TS7650G server(s) to interact with the TSSC for Call Home, log collection, and system health monitoring.

Before you begin

TS7600 products depend on the RAS package to gather logs at the time of the failure and send a call home packet. When the RAS package is not configured, the customer must call 1(800) IBM SERV (in North America, only) or visit www.ibm.com/planetwide; to obtain hardware support.

The TS3000 System Console is required for servicing the TS7650G Gateway. FC 2714 and FC 2715 provide connectivity to an existing TS3000 System Console. FC 2732 provides the first TS3000 System Console.

The connection to a working TSSC is required for the 3958 DD4. The TSSC is the service console and supports remote access and call home functions. The 3958 DD4 gathers logs and sends them to the TSSC as part of a call home packet 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 2732 is the TSSC feature code. FC 2714 and FC 2715 provide connectivity to an existing TSSC.

Further disaster recovery information to assist the customer in restoration is available in the IBM System Storage ProtecTIER User's Guide for Enterprise Edition and Appliance Edition, IBM form number GC53-1156, located on the IBM System Storage TS7600 with ProtecTIER Publications CD.

Verify that the following prerequisites are met before starting the RAS package configuration:

1. The disk components are installed, configured, cabled, and powered-on.
2. The TSSC is installed, configured, cabled, and updated to code level 5.9.x or higher, as per Chapter 5, "Setting up the TSSC for use with the TS7650G server," on page 73.
3. A graphics-capable monitor and USB keyboard are available for use during the installation process.
4. The customer has completed Appendix A, "Company information worksheet," on page 141.
5. The TSSC's network IP addresses have been determined and noted in the IP address worksheet. See Appendix B, "IP address worksheet," on page 145. For additional information, see *IBM System Storage TS3000 System Console (TSSC) Maintenance Information* provided on the publications CD-ROM in the TS7650G ship group.
6. If you are adding new gateway systems to an existing TSSC, verify the IP addresses of any systems that are already attached to the TSSC. Doing so will allow you to avoid potential conflicts and adjust the IP addresses of the new systems to use alternate ranges.

Note: For example, if the TSSC's Attached Systems List displays 3958 AP1 models, the starting address range of 172.31.1.10 consumes all of the addresses through 172.31.1.19. Frames with a starting address range of 172.31.1.20 consume all of the addresses through 172.31.1.29, and so on (clustered servers use the same frame number). To ensure proper connection and communication with the TSSC, select an IP address for the TS7650G that does not fall within an IP address range that is already in use.

7. Identify a frame range that is not already reserved or in use by, another TSSC-managed device. A single frame is ten IPs, and each node within a frame requires its own set of ten IPs – from 0 to 9. If there are no attached devices/systems, the first usable frame would be 10. For example:
 - 172.31.1.10 - 172.31.1.19 would be considered frame 10
 - 172.31.1.20 - 172.31.1.29 would be considered frame 20
 - 172.31.1.30 - 172.31.1.39 would be considered frame 30...
 - 172.31.1.240 - 172.31.1.249 would be considered frame 240
8. Verify that an existing TSSC meets the minimum hardware requirements. See the *IBM System Storage TS3000 System Console (TSSC) Maintenance Information* provided on the *IBM System Storage TS7650 with ProtecTIER Publications* CD in the TS7650G ship group.

About this task

The RAS package configuration procedure performs the following tasks:

- Sets up the TSSC network (172.31.1.xxx) for the servers and the RSAs.
- Collects machine properties for the machine reported product data (MRPD) from the system, and requests system and customer information from the IBM service representative performing the installation.

Stand-alone Configuration

Use this section to configure RAS on a stand-alone TS7650G.

About this task

If you are configuring the RAS package on the single server in a stand-alone configuration, follow the procedure below.

– **OR** –

If you are configuring the RAS package on the servers in a clustered configuration, go to “Clustered Configuration” on page 85.

During the installation you will be prompted to enter the system and customer contact information listed below. It is recommended that you collect the necessary information before you start the installation, so it is readily available when needed. This information can be found on the completed Company Information and IP Address worksheets.

- Frame range number for this system. **Note:** For more information on frame ranges, refer to prerequisite number 7.
- Machine type and model number
- Business company name
- Machine location
- Callback number

- Voice phone number
- Disk array machine type and model number
- Disk array serial number
- Customer number
- Country code

Note: This is the two-digit, IBM-assigned country code used to order software or to acquire software support. **Do not** confuse this with the three-digit RETAIN country code.
- Simple Mail Transfer Protocol (SMTP) server IP address (optional)
- Customer e-mail address (optional)

Procedure

1. Establish a connection to the server. To do so:
 - a. Attach a USB keyboard to any open USB port on the back of the server.
 - b. Attach a graphics-capable monitor to the video port on the back of the server.

Note: If you are unable to connect to the server using the above procedure, see Appendix D, “Making a server connection through the System Management Module (IMM),” on page 155 for instructions on connecting to the server using the server's RSA and your service laptop or the TSSC.

2. At the server command prompt, log in with the ID **root** and the password **admin**.

Note: During the boot cycle, the ProtecTIER file systems are mounted. If the message: Running... displays, press <enter> to proceed to the login prompt.

3. Start RAS configuration on the server using the following method:

From the command line

- a. Change the directory. Type: **cd /opt/dtc/install** <enter> .
- b. Type: **./ptconfig -configRas** <enter>.

(You may need to enter the entire command string: **/opt/dtc/install/ptconfig -configRas**).

- c. Follow the on-screen instructions to complete the configuration process.

Note: If you receive an error that the frame range number entered is already in use, specify a different range in an increment of 10. For example, if frame range 20 is already in use, try frame range 30.

4. When RAS configuration is complete, go to Chapter 7, “RAS verification,” on page 91.

Clustered Configuration

Use this section to configure RAS on a clustered TS7650G.

About this task

If you are configuring the RAS package on the servers in a clustered configuration, follow the procedures below.

– OR –

If you are configuring the RAS package on the single server in a stand-alone configuration, follow the procedures in “Stand-alone Configuration” on page 84.

During the installation you will be prompted to enter the system and customer contact information listed below. You will need the information for each server in the cluster. It is recommended that you collect the necessary information before you start the installation, so it is readily available when needed. This information can be found on the completed Company Information and IP Address worksheets.

- Frame range number for this system.
Note: For more information on frame ranges, refer to prerequisite number 7 on page 84.
- Machine type and model number
- Business company name
- Machine location
- Callback number
- Voice phone number
- Disk array machine type and model number
- Disk array serial number
- Customer number
- Country code **Note:** This is the two-digit, IBM-assigned country code used to order software or to acquire software support. **Do not** confuse this with the three-digit RETAIN country code.
- Simple Mail Transfer Protocol (SMTP) server IP address (optional)
- Customer e-mail address (optional)

Procedure

1. Establish a connection to Server A. To do so:
 - a. Attach a USB keyboard to any open USB port on the back of the server.
 - b. Attach a graphics-capable monitor to the video port on the back of the server.

Note: If you are unable to connect to the server using the above procedure, see Appendix D, “Making a server connection through the System Management Module (IMM),” on page 155 for instructions on connecting to the server using the server’s RSA and your service laptop or the TSSC.

2. At the command prompt, log in with the ID **root** and the password **admin**.

Note: During the boot cycle, the ProtecTIER file systems are mounted. If the message: Running... displays, press <enter> to proceed to the login prompt.

3. Start RAS configuration on the server using the following method:
 - a. Change the directory. Type: **cd /opt/dtc/install** <enter> .
 - b. Type: **./ptconfig -configRas** <enter>.
(You may need to enter the entire command string: **/opt/dtc/install/ptconfig -configRas**).
 - c. Follow the on-screen instructions to complete the configuration process.

Important:

- If you receive an error that the frame range number entered is already in use, specify a different range in an increment of 10. For example, if frame range 20 is already in use, try frame range 30.

- Use the same frame (location) number for both nodes when clustered together in the same frame. You may be prompted during the installation with a question for setting the second node. If you are setting the primary node (Server A), answer **No**, if you are setting the second node (Server B), answer **Yes**.
4. When the RAS package configuration is complete on Server A, establish a connection to Server B. To do so:
 - a. Disconnect the USB keyboard and monitor from Server A and connect them to Server B.

Note: If you are unable to connect to the server using the above procedure, see Appendix D, “Making a server connection through the System Management Module (IMM),” on page 155 for instructions on connecting to the server using the server's RSA and your service laptop or the TSSC.
 5. Repeat steps 2 on page 86 and 3 on page 86 to configure the RAS package on Server B.
 6. When the RAS package configuration is complete on both servers, go to “Verifying the cluster's Ethernet connections.”

Verifying the cluster's Ethernet connections

Before performing RAS verification, use the procedures below to ensure that the Ethernet connections for the cluster are configured correctly.

Procedure

1. Use kudzu to run the command below and view the output to ensure that the Intel Ethernet cards and Broadcom Ethernet cards are assigned to the correct ports:
 - For VTL systems, the Intel Ethernet cards should be assigned to ports eth0, eth1, eth2 and eth3. The Broadcom Ethernet cards should be assigned to eth4 and eth5.
 - For OpenStorage systems, the Intel Ethernet cards should be assigned to ports eth0, eth1, eth2, eth3, eth4, eth5, eth6, eth7, eth8, eth9, eth10, and eth11. The Broadcom Ethernet cards should be assigned to eth12 and eth13.

Enter the following command to check the Ethernet card port assignments:

```
[root@localhost ~]# kudzu -p -c network | grep -A3 "device:" <enter>
```

The output will be similar to the following example:

```
[root@chino ~]# kudzu -p -c network | grep -A3 "device."
device: eth0
driver: e1000e
desc: "Intel Corporation 82571EB Gigabit Ethernet Controller (Copper)"
network.hwaddr: 00:15:17:df:8a:95
--
deviceId: 10bc
subVendorId: 8086
subDeviceId: 11bc
pciType: 1
--
device: eth1
driver: e1000e
desc: "Intel Corporation 82571EB Gigabit Ethernet Controller (Copper)"
network.hwaddr: 00:15:17:e8:7e:ef
--
deviceId: 10bc
subVendorId: 8086
subDeviceId: 11bc
```

```

pciType: 1
--
device: eth4
driver: e1000e
desc: "Intel Corporation 82571EB Gigabit Ethernet Controller (Copper)"
network.hwaddr: 00:21:5e:c5:96:b4
--
deviceId: 10bc
subVendorId: 8086
subDeviceId: 11bc
pciType: 1
--
device: eth11
driver: e1000e
desc: "Intel Corporation 82571EB Gigabit Ethernet Controller (Copper)"
network.hwaddr: 00:15:17:e8:7e:ee
--
deviceId: 10bc
subVendorId: 8086
subDeviceId: 11bc
pciType: 1
--
device: eth2
driver: e1000e
desc: "Intel Corporation 82571EB Gigabit Ethernet Controller (Copper)"
network.hwaddr: 00:15:17:df:8a:97
--
deviceId: 10bc
subVendorId: 8086
subDeviceId: 11bc
pciType: 1
--
device: eth3
driver: e1000e
desc: "Intel Corporation 82571EB Gigabit Ethernet Controller (Copper)"
network.hwaddr: 00:15:17:df:8a:96
--
deviceId: 10bc
subVendorId: 8086
subDeviceId: 11bc
pciType: 1
--
device: eth5
driver: e1000e
desc: "Intel Corporation 82571EB Gigabit Ethernet Controller (Copper)"
network.hwaddr: 00:15:17:e8:7e:ef
--
deviceId: 10bc
subVendorId: 8086
subDeviceId: 11bc
pciType: 1
--
device: eth6
driver: e1000e
desc: "Intel Corporation 82571EB Gigabit Ethernet Controller (Copper)"
network.hwaddr: 00:15:17:e8:7e:ef
--
deviceId: 10bc
subVendorId: 8086
subDeviceId: 11bc
pciType: 1
--
device: eth8
driver: e1000e
desc: "Intel Corporation 82571EB Gigabit Ethernet Controller (Copper)"
network.hwaddr: 00:15:17:e8:7e:ef
--

```

```

deviceId: 10bc
subVendorId: 8086
subDeviceId: 11bc
pciType: 1
--
device: eth7
driver: e1000e
desc: "Intel Corporation 82571EB Gigabit Ethernet Controller (Copper)"
network.hwaddr: 00:15:17:e8:82:de
--
deviceId: 10bc
subVendorId: 8086
subDeviceId: 11bc
pciType: 1
--
device: eth9
driver: e1000e
desc: "Intel Corporation 82571EB Gigabit Ethernet Controller (Copper)"
network.hwaddr: 00:15:17:e8:7e:ef
--
deviceId: 10bc
subVendorId: 8086
subDeviceId: 11bc
pciType: 1
--
device: eth10
driver: e1000e
desc: "Intel Corporation 82571EB Gigabit Ethernet Controller (Copper)"
network.hwaddr: 00:15:17:e8:7e:ef
--
deviceId: 10bc
subVendorId: 8086
subDeviceId: 11bc
pciType: 1
--
device: eth12
driver: bnx2
desc: "Broadcom Corporation NetXtreme II BCM5709 Gigabit Ethernet"
network.hwaddr: 00:21:5e:c5:96:b4
--
deviceId: 1639
subVendorId: 1014
subDeviceId: 03b5
pciType: 1
--
device: eth13
driver: bnx2
desc: "Broadcom Corporation NetXtreme II BCM5709 Gigabit Ethernet"
network.hwaddr: 00:21:5e:c5:96:b6
--
deviceId: 1639
subVendorId: 1014
subDeviceId: 03b5
pciType: 1
--
device: usb0
driver: cdc_ether
desc: "IBM RNDIS/CDC ETHER"
network.hwaddr: 02:21:5e:c5:b9:8b
--
deviceId: 4010
usbmfr: IBM
usbprod: RNDIS/CDC ETHER
[root@chino ~]

```

Note: The hwaddrs are specific to the Ethernet cards in each system.

2. Use ethtool to verify that a link is detected and operational on each port, as expected by the customer's network configuration. Enter the following command for each port, replacing eth1 each time with the next port, i.e., eth2, then eth3, then eth4, until you have checked all the ports:

Note: If some ports are not used in the customer's environment, such as the replication ports, they may appear as not operational or have no link detected. This is the expected result if the ports are not being used.

```
ifconfig eth1 up
# ethtool eth1
```

3. Note the results of the above procedures and pass them on to the trained ProtecTIER specialist/LBS representative for his or her use during ProtecTIER configuration.
4. Go to Chapter 7, "RAS verification," on page 91.

Chapter 7. RAS verification

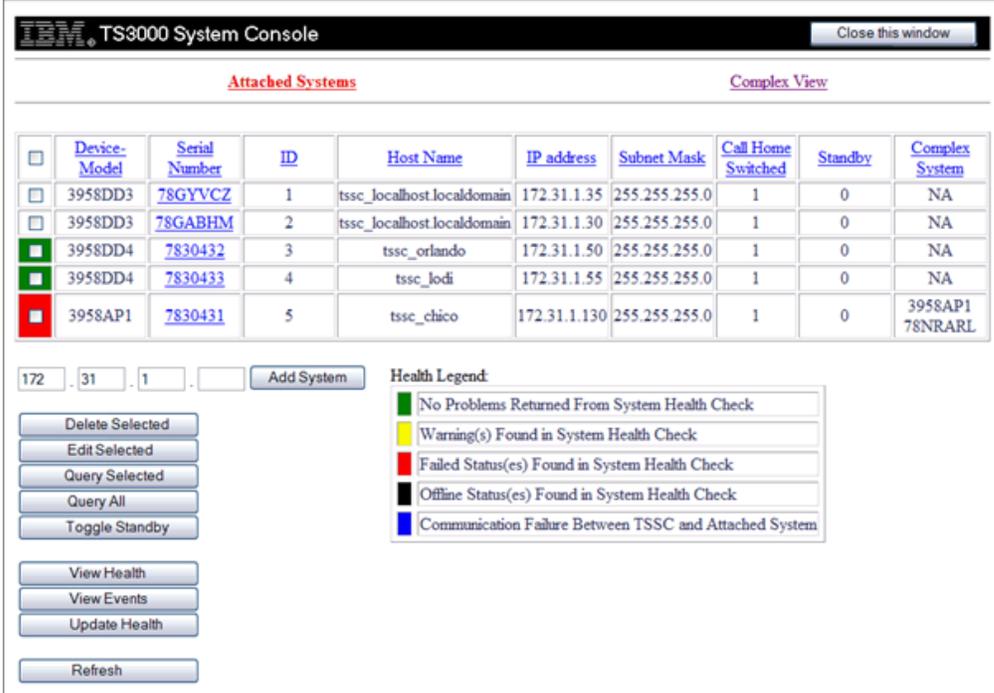
Use the following procedures to perform RAS verification and validation, and to test Call Home.

Verifying the systems attached to the TSSC

Procedure

1. If you are not already logged into the TSSC do so now, with the username **service** and the password **service**.
2. Right-click on the TSSC's blue desktop.
The **IBM TS3000 System Console** menu displays.
3. **System Console Actions** → **Console Configuration Utility**
If prompted for a username and password, enter **service** in both fields.
The **Console Configuration Utility** starts and the **Console Configuration** screen displays.
4. Click **Attached Systems**.
The **Attached Systems** screen displays with the newly-installed systems shown. See Figure 36.

Note: If the new system does not display in the Attached Systems list automatically, click **Refresh**. If it does not display, you can attempt to add in the IP address (172.31.1.xx) manually, and click **Add System**. If the system does not display after these attempts, contact your next level of support.



| <input type="checkbox"/> | Device-Model | Serial Number | ID | Host Name | IP address | Subnet Mask | Call Home Switched | Standby | Complex System |
|-------------------------------------|--------------|---------------|----|----------------------------|--------------|---------------|--------------------|---------|--------------------|
| <input type="checkbox"/> | 3958DD3 | 78GYVCZ | 1 | tsse_localhost.localdomain | 172.31.1.35 | 255.255.255.0 | 1 | 0 | NA |
| <input type="checkbox"/> | 3958DD3 | 78GABHM | 2 | tsse_localhost.localdomain | 172.31.1.30 | 255.255.255.0 | 1 | 0 | NA |
| <input checked="" type="checkbox"/> | 3958DD4 | 7830432 | 3 | tsse_orlando | 172.31.1.50 | 255.255.255.0 | 1 | 0 | NA |
| <input checked="" type="checkbox"/> | 3958DD4 | 7830433 | 4 | tsse_lodi | 172.31.1.55 | 255.255.255.0 | 1 | 0 | NA |
| <input checked="" type="checkbox"/> | 3958AP1 | 7830431 | 5 | tsse_chico | 172.31.1.130 | 255.255.255.0 | 1 | 0 | 3958AP1 78NRARL |

Figure 36. Attached Systems screen

5. Leave the **Attached Systems** screen displayed, and go to “Testing Call Home” on page 93.

Installing ProtecTIER Manager on the TSSC

About this task

Use the following procedure to install the ProtecTIER Manager GUI on the TSSC.

Procedure

1. If the TSSC is not already powered-on, do so now.
2. If prompted for login information, enter the username: **service** and the password: **service**.
The TSSC's blue desktop displays.
3. Right-click on the TSSC's blue desktop.
The **IBM TS3000 System Console** menu displays.
4. Select **Browser Functions** → **ProtecTIER Manager Functions** → **Install ProtecTIER Manager GUI**.
The TSSC's CD-ROM drive opens.

Important: If an older version of ProtecTIER Manager is already installed on the TSSC, make sure the ProtecTIER Manager GUI is closed before installing the newer version.

5. Insert the *IBM System Storage ProtecTIER Manager V2.5 DVD*.
The following message displays:
Installation may last a few moments. Please be patient.
6. When the ProtecTIER Manager installation wizard starts, follow the on-screen instructions to complete the installation.
For detailed information about using the ProtecTIER Manager wizard, refer to steps 2 on page 114 through 8 on page 115 in “Installing on a Windows-based workstation” on page 113.
When the installation is complete and ProtecTIER Manager has been successfully installed, the **Install Complete** window opens.
7. Click **Done**.
The ProtecTIER Manager Installation wizard closes and the TSSC's CD-ROM drive opens.
8. Remove the *IBM System Storage ProtecTIER Manager V2.5 DVD*, close CD-ROM drive, then go to Chapter 11, “Using ProtecTIER Manager,” on page 119.

Calibrating the server battery

Each server contains a battery that must be calibrated.

About this task

The battery in each server must be calibrated before the system can be turned over to the customer.

Procedure

1. From the command line of the server, enter the following command:
`/opt/MegaRAID/MegaCli/MegaCli64 -AdpBbuCmd -BbuLearn -a0 <enter>`

2. Observe the response to entering the command. The following message is displayed when the calibration is successful:

```
[root@LasVegas ~]# /opt/MegaRAID/MegaCli/MegaCli64 -AdpBbuCmd  
-BbuLearn -a0
```

```
Adapter 0: BBU Learn Succeeded.
```

```
Exit Code: 0x00  
[root@LasVegas ~]#
```

3. If you do not receive this response indicating the battery has been successfully calibrated, contact your next level of support before proceeding. If you receive this response indicating the battery has been successfully calibrated, repeat this procedure for each server in the system.

Testing Call Home

This section gives the procedure for testing Call Home.

About this task

The TS7650G supports four types of Call Home activity:

- Error Initiated Call Home – Triggered by failures on a TS7650G server
- Heartbeat/MRPD Call Home – Regularly scheduled calls to report system status, aliveness, and configuration of the server
- Test Call Home – Triggered from the RAS command line interface (CLI) to test the path to the IBM Customer Configuration Profile File (CCPF) system.
- User Initiated Call Home – Triggered from the TSSC graphical user interface (GUI) to collect a product engineering (PE) package

Use the procedures below to test the system's ability to successfully make a Call Home call:

Important: Be sure to complete the Call Home test message process. Failure to verify that Call Home is working properly on the new system can result in Call Home messages failing to send, as well as possible performance issues.

Procedure

1. Log in to the single server in a stand-alone configuration, or either Server A or B in a clustered configuration, with the username: **root** and password: **admin**
2. Complete Call Home Enablement and perform a Call Home test on the server using the following procedure:

Using the RAS Menu

- a. At the command line type: **rasMenu <enter>**
- b. Enter the number that corresponds to the **Call Home Commands** option, then press **<enter>**.
- c. Enter the number that corresponds to the **Enable Call Home** option, then press **<enter>**.

Note: If you receive a message stating that Call Home is already enabled, ignore the message and continue.

- d. Enter the number that corresponds to the **Test Call Home** option, then press **<enter>**

After a few seconds, you should receive the message:

Test Call Home sent successfully

The TSSC Call Home queue should have the test message listed as a pending transmission.

3. Check the **Call Home** queue for the test message. To do so:
 - a. Right-click on an empty area of the TSSC's blue desktop.
The **IBM TS3000 System Console** menu displays.
 - b. Select **System Console Actions** → **Console Configuration Utility**.
The **Console Configuration Utility** screen displays.

Note: If prompted for a username and password, enter **service** in both fields.

- c. Click **Call Home Queue**.
The **Call Home Queue** screen displays:
If the **Call Home Queue** is empty, the call may have already been sent to the IBM Customer Configuration Profile File (CCPF) system.

Important: Each TS7650G (3958-DD4) server must be under valid warranty or Maintenance Agreement (MA) coverage or it will be rejected and no record or Problem Management Report (PMR) will be generated for the Call Home event.

4. Close the **Console Configuration** window.
5. Verify that the test call was successful. To do so:
 - a. Right-click on an empty area of the TSSC's blue desktop.
The **IBM TS3000 System Console** menu displays.
 - b. Select **Browser Functions** → **Call Home Log**.
The **Call Home Event Log** displays.
 - c. Check the **Call Home Event Log** for a record that contains the serial number of the applicable server.
 - If the record appears in the log, the test completed successfully.
 - If the record does not appear in the log and a service code 20 has been filed and you are certain that the server has valid warranty or MA coverage, contact your next level of support.
6. Close any open browser windows.
The portion of the TS7650G installation and configuration for which the SSR is responsible is now complete.
7. Turn the system over to the trained ProtecTIER specialist for LBS representative for installation and configuration of ProtecTIER and ProtecTIER Manager.

Chapter 8. Configuring ProtecTIER using ptconfig

This chapter provides instructions for using the ptconfig utility to configure ProtecTIER for use with the TS7650G for both VTL and OpenStorage configurations, and enable the replication feature, if applicable.

The ProtecTIER commands in this chapter are performed on stand-alone servers, or on Server A in a cluster. Server B in a cluster is configured using procedures provided later in this document.

Throughout this chapter the terms **server** and **node**, and **target** and **destination**, are used interchangeably depending upon the task being performed. For definitions of these terms, refer to “Terminology used in this document” on page 2.

Attention: Before you begin ProtecTIER software configuration, confirm that the attached disk storage has been properly configured for use with the TS7650G. Failure to do so could result in the Red Hat Linux operating system having to be reinstalled on one or more of the TS7650G servers. Confirm disk storage setup by following the documentation specific to your attached storage.

Reinstalling Red Hat Linux is a customer responsibility. Should doing so become necessary, refer the customer to the Recovery appendix of the *IBM System Storage ProtecTIER User's Guide for Enterprise Edition and Appliance Edition*, IBM form number GC53-1156, provided on the *IBM System Storage TS7650 with ProtecTIER Publications* CD, for detailed instructions.

Note: TS7600 products depend on the RAS package to gather logs at the time of the failure and send a call home packet. When the RAS package is not installed, the customer must call 1(800) IBM SERV (in North America, only) or visit www.ibm.com/planetwide to obtain hardware support.

The ProtecTIER software must also be reinstalled following reinstallation of Red Hat. This is typically a customer responsibility. Refer the customer to the Recovery appendix of the *IBM System Storage ProtecTIER User's Guide for Enterprise Edition and Appliance Edition*, IBM form number GC53-1156, provided on the *IBM System Storage TS7650 with ProtecTIER Publications* CD.

Prerequisites

Before configuring ProtecTIER, verify that the following prerequisites and conditions have been met:

- Hardware components are installed. See Chapter 4, “Installing the TS7650G hardware,” on page 17 for additional information.
- Cabling and physical connections (including those to the customer's local area network (LAN) and replication network, if applicable, using assigned IP addresses) are complete. See “Cabling a stand-alone gateway” on page 35 or “Cabling a clustered gateway” on page 49 for additional information.
- The factory-installed copy of Red Hat Enterprise Linux v5.4.x with Kickstart (ks.cfg), is resident on each server.
- RAID groups have been created. This task occurs outside the scope of the gateway installation process.

- TCP ports 6520, 6530, 6540, 6550, 3501, and 3503 are open in the customer's firewall. Each ProtecTIER server being used for replication must allow TCP access through these ports.
- If you are in a clustered gateway configuration, Server B is powered-off.
- You have acquired, or know where to locate, the following server information about the customer's LAN and replication network, if applicable:
 - External IP address
 - External, fully-qualified, host name (*hostname.domain.com*)
 - External default gateway address
 - External network subnet mask
 - Replication Port 1 IP address
 - Replication Port 1 netmask
 - Replication Port 1 host name (*for example: jaguar_source_1*)
 - Replication Port 2 IP address
 - Replication Port 2 netmask
 - Replication Port 2 host name (*for example: jaguar_source_2*)

Note: Host names are case sensitive. Be aware of the use of upper- and lowercase characters when gathering the information and when entering host names into the system.

The above information can be found on the completed IP Address Worksheet, located in the *IBM System Storage TS7600 with ProtecTIER Introduction and Planning Guide for the TS7650G (3958 DD4)*, IBM form number GC53-1152. A blank copy of this worksheet is provided in this document for your convenience. Refer to Appendix A, “Company information worksheet,” on page 141.

- The SSR performed the required verification in “Verifying the cluster's Ethernet connections” on page 87, to ensure that the Ethernet connections for the cluster are configured correctly.

Logging into the server

This topic details how to log into the server.

About this task

Procedure

1. If you are in a clustered configuration go to step 2. If you are in a stand-alone configuration, perform the following steps:
 - a. Connect the USB keyboard and monitor to the server.
 - b. Verify that the server is powered-on.
 - c. If it is, go to step 3 on page 97.
 - d. If it is not powered-on: power it on now, wait for the boot cycle to complete, and then go to step 3 on page 97.
2. If you are in a clustered configuration, perform the following steps:
 - a. Verify that Server B (the top server) is powered-off.
 - If it is powered-off, go to step 3 on page 97.
 - If it is powered-on, power it off now. To do so:
 - Connect the USB keyboard and monitor into the server, if necessary.
 - At the server command line, enter the command:

poweroff

When the server is completely powered off, the monitor goes blank and the green Power led on the front panel of Server B, flashes.

- Disconnect the USB keyboard and monitor from Server B and connect them to Server A.
- b. Verify that Server A is powered-on:
 - If it is, go to step 3.
 - If it is not powered-on: power it on now, wait for the boot cycle to complete, and then go to step 3.
 3. At the **login:** prompt, log in with the ID **root** and the password **admin**.
 4. Go to “Configuring the first server with ptconfig.”

Configuring the first server with ptconfig

This task gives instructions for configuring the first TS7650G server for use with VTL or OpenStorage using ptconfig.

About this task

Important: Commands are case sensitive. Use care to enter the characters exactly as shown.

Perform the procedures below on all newly-purchased 3958 DD4 servers. In a replication environment, these procedures must be performed on the servers at both the source and destination sites. Configuration instructions for legacy 3958 DD1, 3958 DD3, or 3958 AP1 servers are provided in the *IBM System Storage ProtecTIER Software Upgrade and Replication Enablement Guide*, IBM form number GC53-1196.

Configuring the first server for VTL

About this task

Important: Commands are case sensitive. Use care to enter the characters exactly as shown.

Perform the procedures below on all newly-purchased 3958 DD4 servers. In a replication environment, these procedures must be performed on the servers at both the source and destination sites. Configuration instructions for legacy 3958 DD1, 3958 DD3, or 3958 AP1 servers are provided in the *IBM System Storage ProtecTIER Software Upgrade and Replication Enablement Guide*, IBM form number GC53-1196.

On the stand-alone server, or on Server A in a cluster:

Procedure

1. At the server's command prompt, change to the **/opt/dtc/install** directory. Enter the command:

```
cd /opt/dtc/install <enter>
```

2. Execute the ptconfig utility. Enter the command:

```
./ptconfig -install -model=TS7650G -app=VTL <enter>
```

The following messages display:

Stopping services, please wait

```
Stopping Cluster Services [ Done ]
Services stopped
Checking conditions...
Checking BOM [ Done ]
Checking for existing nodes [ Done ]
Checking NICs for Replication [ Done ]
Checking repository [ Done ]
Checking conditions done
```

3. You are prompted, one at a time, to enter the values listed below. After typing each value, press <enter>.

Important: Values set during manufacturing display in [brackets]. *If you are enabling replication*, you will need to change all of the default values to reflect the customer's specific configuration. *If you are not enabling replication*, you will need to change the defaults except when prompted for Replication Port information. In this case, press <enter> without entering a value.

- Customer Network, IP address [192.168.167.161]:
- Customer Network, Netmask [255.255.255.0]:
- Customer Network, Default Gateway
- Customer Network, Hostname [node1]:
(This is the name provided by the customer to identify this server on their local network. The hostname should be free of extensions or .com suffixes. *For example: cougar9000.*)
- Replication Port 1, IP Address [192.168.170.1]: (*eth2*)
- Replication Port 1, Netmask [255.255.255.0]:
- Replication Port 1, Hostname [replicationNode1_1]:
(*for example: jaguar_source_1*) (The replication hostname used by ProtecTIER Replication Manager.)
- Replication Port 2, IP Address [192.168.171.1]: (*eth5*)
- Replication Port 2, Netmask [255.255.255.0]:
- Replication Port 2, Hostname [replicationNode1_2]:
(*for example: jaguar_source_2*) (The replication hostname used by ProtecTIER Replication Manager.)

The system automatically starts the network configuration process. The following status messages display:

```
Configuring network [ Done ]
Configuring Replication Network [ Done ]
Restarting Network Service [ Done ]
Stopping cluster [Done]
Configuring cluster [Done]
Starting cluster [ Done ]
Installing NTP [ Done ]
Starting VTFD Service [ Done ]
Validation will start in 10 seconds
Testing connectivity to the Default Gateway [ Done ]
Getting number of nodes [ Done ]
This is a 1 node cluster, will not test fencing
Validation ended
```

Install ended successfully

- If you are not enabling replication, go to step 1 on page 109. Otherwise, continue to step 5.
- When you have returned to the command prompt, define the static routes used for replication. Enter the command:

```
./ptconfig -staticRoutes <enter>
```

The message below displays:

```
Gathering System information [ Done ]
```

The auto-detected system information displays. For example:

Table 29. Example auto-detected system information

| ID | Target Network Address | Target Netmask | Local Gateway Address |
|----|------------------------|----------------|-----------------------|
| 1 | 10.11.194.0 | 255.255.255.0 | 10.11.195.1 |
| 2 | 10.11.196.0 | 255.255.255.0 | 10.11.197.1 |

Important: This information is only an example. The information that displays will be specific to your system, and will be different.

Followed by the Available Options prompt:

Available Options:

```
=====
```

```
(a)dd a new record
```

```
(e)dit a record
```

```
(d)elete a record
```

```
(c)ommit changes
```

```
(q)uit
```

Please Choose (a,e,d,c,q):

- Type: **a** <enter>

You are prompted to enter information for the first destination (target - eth2) server and the local network.

Attention: Do not configure the replication ports Eth2 and Eth5 on the same subnet as the external LAN port Eth0. Doing so may cause replication errors.

- At each prompt, type the requested information and then press <enter>:

Attention: In this step, the term "target" refers to the remote node's network address and netmask (not necessarily the replication "target" server for this entry.)

Please provide the following information:

Target Network Address:

(starting network address) (for example: 10.11.194.0)

Target Network Netmask:

(for example: 255.255.255.0)

Local Gateway Address:

(the gateway IP address of the server you are currently configuring) (for example: 10.11.195.1)

A summary displays:

Table 30. Example summary for first server and local network

| ID | Target Network Address | Target Netmask | Local Gateway Address |
|----|------------------------|----------------|-----------------------|
| 1 | 10.11.194.0 | 255.255.255.0 | 10.11.195.1 |

Important: The addresses in the summary above are examples. Actual values will vary. For example, if the Target Network Address for the destination server is 10.11.194.75, its starting address would be 10.11.194.0. For the Local Gateway Address you would use the gateway address of the source server (this server).

The Available Options prompt displays a second time:

Available Options:

=====

(a)dd a new record

(e)dit a record

(d)eleate a record

(c)ommit changes

(q)uit

Please Choose (a,e,d,c,q):

8. Type: **a** <enter>.

You are prompted for the information for the second destination (target - eth5) server and the local network.

Attention: Do not configure the replication ports eth2 and eth5 on the same subnet as the external LAN port Eth0. Doing so may cause replication errors.

9. At each prompt, type the requested information and then press <enter>:

Please provide the following information:

Target Network Address:

(starting network address) (for example: 10.11.196.0)

Target Network Netmask:

(for example: 255.255.255.0)

Local Gateway Address:

(the gateway IP address of the server you are currently configuring) (for example: 10.11.197.0)

An updated summary displays:

Table 31. Example updated summary of both servers and local networks

| ID | Target Network Address | Target Netmask | Local Gateway Address |
|----|------------------------|----------------|-----------------------|
| 1 | 10.11.194.0 | 255.255.255.0 | 10.11.195.1 |
| 2 | 10.11.196.0 | 255.255.255.0 | 10.11.197.1 |

Important: The addresses in the summary are examples. In this instance the term Δ target Δ refers to the network address of the nodes at site 1 and site 2. Actual values will vary.

For reference, write the actual values from the summary screen in the blank spaces below.

Depending on your replication configuration, the "remote node" Target Network Address may be the same network starting address for Server A and B if more than one node is replicating to a single node.

Table 32. Site 1 – Server A VTL worksheet

| Site 1 – Server A | | | |
|--------------------------|--|---|---|
| ID | Target Network Address (Remote node's starting network address) | Target Netmask (Remote node's netmask) | Local Gateway Address (The gateway address for Server A at Site 1) |
| 1 (eth2) | | | |
| 2 (eth5) | | | |

Table 33. Site 1 – Server B VTL worksheet

| Site 1 – Server B | | | |
|--------------------------|--|---|---|
| ID | Target Network Address (Remote node's starting network address) | Target Netmask (Remote node's netmask) | Local Gateway Address (The gateway address for Server B at Site 1) |
| 1 (eth2) | | | |
| 2 (eth5) | | | |

Table 34. Site 2– Server A VTL worksheet

| Site 2 – Server A | | | |
|--------------------------|--|---|---|
| ID | Target Network Address (Remote node's starting network address) | Target Netmask (Remote node's netmask) | Local Gateway Address (The gateway address for Server A at Site 2) |
| 1 (eth2) | | | |
| 2 (eth5) | | | |

Table 35. Site 2– Server B VTL worksheet

| Site 2 – Server B | | | |
|--------------------------|--|---|---|
| ID | Target Network Address (Remote node's starting network address) | Target Netmask (Remote node's netmask) | Local Gateway Address (The gateway address for Server B at Site 2) |
| 1 (eth2) | | | |
| 2 (eth5) | | | |

The Available Options prompt displays a third time:

Available Options:
=====

(a)dd a new record
(e)dit a record
(d)elete a record
(c)ommit changes
(q)uit
Please Choose (a,e,d,c,q):

10. Type: **q** <enter>

The message below displays:

Would you like to commit the changes performed to the routing table now? (yes|no)

11. Type: **yes** <enter>.

The Successfully committed changes! message displays, and you are returned to the command prompt.

Configuring the first server for OpenStorage

This topic details the procedure for configuring the first server for OpenStorage using ptconfig.

About this task

Important: Commands are case sensitive. Use care to enter the characters exactly as shown.

Perform the procedures below on all newly-purchased 3958 DD4 servers. In a replication environment, these procedures must be performed on the servers at both the source and destination sites. Configuration instructions for legacy 3958 DD1, 3958 DD3, or 3958 AP1 servers are provided in the *IBM System Storage ProtecTIER Software Upgrade and Replication Enablement Guide*, IBM form number GC53-1196.

On the stand-alone server, or on Server A in a cluster:

Procedure

1. At the server's command prompt, change to the `/opt/dtc/install` directory.

Enter the command:

```
cd /opt/dtc/install <enter>
```

2. Execute the ptconfig utility. Enter the command:

```
./ptconfig -install -model=TS7650G -app=OST_1G <enter>
```

The following messages display:

```
Stopping services, please wait
```

```
Stopping Cluster Services [ Done ]
```

```
Services stopped
```

```
Checking conditions...
```

```
Checking BOM [ Done ]
```

```
Checking for existing nodes [ Done ]
```

```
Checking NICs for Replication [ Done ]
```

```
Checking repository [ Done ]
```

```
Checking conditions done
```

3. You are prompted, one at a time, to enter the values listed below. After typing each value, press **<enter>**.

Important: Values set during manufacturing display in [brackets]. *If you are enabling replication*, you will need to change all of the default values to reflect the customer's specific configuration. *If you are not enabling replication*, you will need to change the defaults except when prompted for Replication Port information. In this case, press **<enter>** without entering a value.

- Customer Network, IP address [192.168.167.161]:
- Customer Network, Netmask [255.255.255.0]:
- Customer Network, Default Gateway
- Customer Network, Hostname [node1]:
(This is the name provided by the customer to identify this server on their local network. The hostname should be free of extensions or .com suffixes. *For example: cougar9000.*)
- Replication Port 1, IP Address [192.168.170.1]: (*eth7*)
- Replication Port 1, Netmask [255.255.255.0]:
- Replication Port 1, Hostname [replicationNode1_1]:
(*for example: jaguar_source_1*) (The replication hostname used by ProtecTIER Replication Manager.)
- Replication Port 2, IP Address [192.168.171.1]: (*eth11*)
- Replication Port 2, Netmask [255.255.255.0]:
- Replication Port 2, Hostname [replicationNode1_2]:
(*for example: jaguar_source_2*) (The replication hostname used by ProtecTIER Replication Manager.)

The system automatically starts the network configuration process. The following status messages display:

```
Configuring network [ Done ]
Configuring Replication Network [ Done ]
Restarting Network Service [ Done ]
Stopping cluster [Done]
Configuring cluster [Done]
Starting cluster [ Done ]
Installing NTP [ Done ]
Starting VTFD Service [ Done ]
```

Note: When you are given the option to configure the Application Interfaces, you may choose to do that now, or later by accessing the ptconfig menu separately. See “Configuring the OpenStorage application IP interfaces” on page 107 for details.

```
Validation will start in 10 seconds
Testing connectivity to the Default Gateway [ Done ]
Getting number of nodes [ Done ]
This is a 1 node cluster, will not test fencing
Validation ended
Install ended successfully
```

4. If you are not enabling replication, go to step 1 on page 109. Otherwise, continue to step 5 on page 104.

- When you have returned to the command prompt, define the static routes used for replication. Enter the command:

```
./ptconfig -staticRoutes <enter>
```

The message below displays:

```
Gathering System information [ Done ]
```

The auto-detected system information displays. For example:

Table 36. Example auto-detected system information

| ID | Target Network Address | Target Netmask | Local Gateway Address |
|----|------------------------|----------------|-----------------------|
| 1 | 10.11.194.0 | 255.255.255.0 | 10.11.195.1 |
| 2 | 10.11.196.0 | 255.255.255.0 | 10.11.197.1 |

Important: This information is only an example. The information that displays will be specific to your system, and will be different.

Followed by the Available Options prompt:

```
Available Options:
```

```
=====
```

```
(a)dd a new record
```

```
(e)dit a record
```

```
(d)elete a record
```

```
(c)ommit changes
```

```
(q)uit
```

```
Please Choose (a,e,d,c,q):
```

- Type: **a** <enter>

You are prompted to enter information for the first destination (target - eth7) server and the local network.

Attention: Do not configure the replication ports Eth7 and Eth11 on the same subnet as the external LAN port Eth0. Doing so may cause replication errors.

- At each prompt, type the requested information and then press <enter>:

Attention: In this step, the term "target" refers to the remote node's network address and netmask (not necessarily the replication "target" server for this entry.)

Please provide the following information:

```
Target Network Address:
```

```
(starting network address) (for example: 10.11.194.0)
```

```
Target Network Netmask:
```

```
(for example: 255.255.255.0)
```

```
Local Gateway Address:
```

```
(the gateway IP address of the server you are currently configuring) (for example: 10.11.195.1)
```

A summary displays:

Table 37. Example summary for first server and local network

| ID | Target Network Address | Target Netmask | Local Gateway Address |
|----|------------------------|----------------|-----------------------|
| 1 | 10.11.194.0 | 255.255.255.0 | 10.11.195.1 |

Important: The addresses in the summary above are examples. Actual values will vary. For example, if the Target Network Address for the destination server is 10.11.194.75, its starting address would be 10.11.194.0. For the Local Gateway Address you would use the gateway address of the source server (this server).

The Available Options prompt displays a second time:

```
Available Options:
=====
(a)dd a new record
(e)dit a record
(d)elete a record
(c)ommit changes
(q)uit
Please Choose (a,e,d,c,q):
```

8. Type: **a** <enter>.

You are prompted for the information for the second destination (target - eth11) server and the local network.

Attention: Do not configure the replication ports eth7 and eth11 on the same subnet as the external LAN port Eth0. Doing so may cause replication errors.

9. At each prompt, type the requested information and then press <enter>:

Please provide the following information:

Target Network Address:
(starting network address) (for example: 10.11.196.0)

Target Network Netmask:
(for example: 255.255.255.0)

Local Gateway Address:
(the gateway IP address of the server you are currently configuring) (for example: 10.11.197.0)

An updated summary displays:

Table 38. Example updated summary of both servers and local networks

| ID | Target Network Address | Target Netmask | Local Gateway Address |
|----|------------------------|----------------|-----------------------|
| 1 | 10.11.194.0 | 255.255.255.0 | 10.11.195.1 |
| 2 | 10.11.196.0 | 255.255.255.0 | 10.11.197.1 |

Important: The addresses in the summary are examples. In this instance the term △target△ refers to the network address of the nodes at site 1 and site 2. Actual values will vary.

For reference, write the actual values from the summary screen in the blank spaces below.

Depending on your replication configuration, the "remote node" Target Network Address may be the same network starting address for Server A and B if more than one node is replicating to a single node.

Table 39. Site 1 – Server A OpenStorage worksheet

| Site 1 – Server A | | | |
|--------------------------|--|---|---|
| ID | Target Network Address (Remote node's starting network address) | Target Netmask (Remote node's netmask) | Local Gateway Address (The gateway address for Server A at Site 1) |
| 1 (eth7) | | | |
| 2 (eth11) | | | |

Table 40. Site 1 – Server B OpenStorage worksheet

| Site 1 – Server B | | | |
|--------------------------|--|---|---|
| ID | Target Network Address (Remote node's starting network address) | Target Netmask (Remote node's netmask) | Local Gateway Address (The gateway address for Server B at Site 1) |
| 1 (eth7) | | | |
| 2 (eth11) | | | |

Table 41. Site 2– Server A OpenStorage worksheet

| Site 2 – Server A | | | |
|--------------------------|--|---|---|
| ID | Target Network Address (Remote node's starting network address) | Target Netmask (Remote node's netmask) | Local Gateway Address (The gateway address for Server A at Site 2) |
| 1 (eth7) | | | |
| 2 (eth11) | | | |

Table 42. Site 2– Server B OpenStorage worksheet

| Site 2 – Server B | | | |
|--------------------------|--|---|---|
| ID | Target Network Address (Remote node's starting network address) | Target Netmask (Remote node's netmask) | Local Gateway Address (The gateway address for Server B at Site 2) |
| 1 (eth7) | | | |
| 2 (eth11) | | | |

The Available Options prompt displays a third time:

Available Options:

=====

- (a)dd a new record
- (e)dit a record
- (d)elete a record

- (c)ommit changes
- (q)uit
- Please Choose (a,e,d,c,q):
- 10. Type: **q** <enter>
- The message below displays:
- Would you like to commit the changes performed to the routing table now? (yes|no)
- 11. Type: **yes** <enter>.
- The Successfully committed changes! message displays, and you are returned to the command prompt.

What to do next

After you have finished updating the OpenStorage interface settings, you will need to install and configure the OpenStorage plug-in on your NetBackup media server(s). To do so, refer to the instructions in the *IBM System Storage ProtecTIER User's Guide for Enterprise Edition and Appliance Edition*, IBM form number GC53-1156.

Configuring the OpenStorage application IP interfaces

This section describes how to update the OpenStorage IP communication interfaces on a node.

About this task

Use the `./ptconfig -appInterfaces` command to update the application-related IP interfaces.

Note: Refer to the *IBM System Storage TS7650 Best Practices Guide for ProtecTIER v 2.5 and TS7650G (Gateway) Attached Storage*, IBM form number GA32-0646 for more detailed information on updating the application-related IP interfaces.

Procedure

1. At the command prompt, change directories to launch the ptconfig utility for the interfaces

```
cd /opt/dtc/install
and hit Enter.
```

2. At the command prompt, enter the command:

```
./ptconfig -appInterfaces
```

The following output is displayed, for example:

| # | Interface | L/B Method | IP Address | Netmask | Devices |
|---|-----------|------------|---------------|-----------------|----------------|
| 1 | virt1 | RR | 10.10.1.1 | 255.255.255.192 | eth5,eth6,eth9 |
| 2 | virt2 | RR | 192.168.151.2 | 255.255.255.0 | |
| 3 | virt3 | RR | 192.168.152.2 | 255.255.255.0 | |
| 4 | virt4 | RR | 192.168.153.2 | 255.255.255.0 | |
| 5 | virt5 | RR | 192.168.154.2 | 255.255.255.0 | |
| 6 | virt6 | RR | 10.10.1.98 | 255.255.255.192 | eth7 |

Available Options:

=====

(e)edit a virtual interface

(r)re-assign a physical interface
(c)commit changes
(q)quit

Please Choose (e,r,c,q):

3. To edit the virtual interface, type **e <enter>** .

The following is displayed:

4. Choose a virtual interface to edit and type the requested information at each prompt. For example, type **1 <enter>**:

Available Options:

=====

(e)edit a virtual interface
(r)re-assign a physical interface
(c)commit changes
(q)quit

Please Choose (e,r,c,q): e

Please choose a virtual interface to edit: 1

The following is displayed:

Available Load Balancing methods are:

RR, L2, L2L3, L3L4

Choose a Load Balancing method [RR]: (for example: L2)

IP Address for virt1 [10.10.1.1]: (for example: 10.10.2.1)

Netmask for virt1 [255.255.255.192]: (for example: 255.255.255.192)

5. If you want to reassign a physical interface, type **r <enter>** and select the device to reassign and the virtual device to assign it to from the available virtual devices displayed.

For example:

| # | Interface | L/B Method | IP Address | Netmask | Devices |
|---|-----------|------------|---------------|-----------------|----------------|
| 1 | virt1 | RR | 10.10.1.1 | 255.255.255.192 | eth5,eth6,eth9 |
| 2 | virt2 | RR | 192.168.151.2 | 255.255.255.0 | |
| 3 | virt3 | RR | 192.168.152.2 | 255.255.255.0 | |
| 4 | virt4 | RR | 192.168.153.2 | 255.255.255.0 | |
| 5 | virt5 | RR | 192.168.154.2 | 255.255.255.0 | |
| 6 | virt6 | RR | 10.10.1.98 | 255.255.255.192 | eth7 |

Available Options:

=====

(e)edit a virtual interface
(r)re-assign a physical interface
(c)commit changes
(q)quit

Please Choose (e,r,c,q): r

Available Devices:

eth5 eth9 eth7 eth6

Device to re-assign: (for example: eth5)

Available Virtual Devices:

virt3 virt6 virt5 virt4 virt1 virt2

Virtual to assign into: (for example: virt3)

6. When you want to commit the changes, type **c <enter>**.
7. Type **q <enter>** to quit.
8. You will be returned to the prompt command.

Creating file systems

Use this procedure to create file systems.

About this task

Creating file systems allows a repository to be created later.

Attention: If this is a 2 node cluster, the file systems must be created while one of the nodes is powered off. Otherwise, creating the file systems will fail during the build process. Once all of the file systems are created, power the other node back on.

Procedure

1. Change directories to the `/opt/dtc/app/sbin` directory. Enter the command:

```
cd /opt/dtc/app/sbin <enter>
```

2. Confirm that the anticipated number of logical unit numbers (LUNs) are attached. Enter the command:

```
./fsCreate -u <enter>
```

A list of the valid multipath devices found, displays. The number of devices found should match the predetermined number of devices planned.

3. Create the file system on the server. Enter the command:

```
./fsCreate -n <enter>
```

A message displays stating that any existing data on the disk storage will be removed.

Note: For a detailed description of what the fsCreate tool does, or to manually create file systems using the Linux Command Line Interface (CLI), refer to the *IBM System Storage ProtecTIER User's Guide for Enterprise Edition and Appliance Edition*, IBM form number GC53-1156.

4. At the prompt, type: `data loss <enter>` .

The fsCreate tool creates the logical volumes and file systems on all accessible LUNs, updates the `/etc/fstab` file, and mounts all file systems.

5. When you are returned to the command prompt, proceed as appropriate:

- If data replication is being used, go to Chapter 9, “Enabling the ProtecTIER Replication Manager,” on page 111
- If data replication is not being used, go to Chapter 10, “Installing ProtecTIER Manager,” on page 113

Chapter 9. Enabling the ProtecTIER Replication Manager

About this task

The ProtecTIER Replication Manager application is installed on a customer-designated ProtecTIER v2.5 server. IBM recommends installing ProtecTIER Replication Manager at the replication destination site, so that the ProtecTIER Replication Manager will remain available in a disaster recovery situation.

Note: If you are not enabling replication, proceed to Chapter 10, “Installing ProtecTIER Manager,” on page 113.

Important: ProtecTIER Replication Manager requires access to TCP port 6202. Before installing the ProtecTIER Replication Manager application, ensure that TCP port 6202 is open in the customer's firewall. If port 6202 is behind the firewall, data replication will fail.

Procedure

1. Log in to the ProtecTIER v2.5 server on which the ProtecTIER Replication Manager application will reside:
 - a. Connect a USB keyboard and monitor (if not already present) to the server.
 - b. Verify that the server is powered-on:
 - If it is powered-on, go to step 2.
 - If it is not powered-on do so now, wait for the boot cycle to complete, then go to step 2.
2. At the **login:** prompt, log in with the ID **root** and the password **admin**.
3. To activate the ProtecTIER Replication Manager enter the following commands:

```
cd /opt/dtc/install <enter>
./ptconfig -activatePTRepMan <enter>
```

Note: If in the future you should need to deactivate the ProtecTIER Replication Manager, use the following command:

```
./ptconfig -deactivatePTRepMan <enter>
```

4. The following ProtecTIER Replication Manager messages are displayed: Are you sure you want to activate the ProtecTIER Replication Manager on this node? (yes|no) Enter yes to activate the ProtecTIER Replication Manager or no if not activating the ProtecTIER Replication Manager.
5. The following ProtecTIER Replication Manager messages are displayed after selecting yes : Gathering information activatePTReplicationManager ended successfully
6. Go to Chapter 10, “Installing ProtecTIER Manager,” on page 113.

Chapter 10. Installing ProtecTIER Manager

Install the ProtecTIER Manager GUI on one or more designated ProtecTIER Manager workstations. **Do not** install ProtecTIER Manager on the ProtecTIER servers.

Use ProtecTIER Manager to:

- Configure ProtecTIER for use with the TS7650G
- Manage replication grids
- Create and manage virtual tape libraries
- Monitor the status of nodes and clusters
- Manage repositories and services
- Change the system configuration

The ProtecTIER Manager installer is provided on the *IBM System Storage ProtecTIER Manager V2.5 DVD*. Because different ProtecTIER Manager installers are provided for Windows and Linux, make sure that the installer you use is correct for the operating system running on your ProtecTIER Manager workstation:

- If you are installing ProtecTIER Manager on a workstation running Windows, see “Installing on a Windows-based workstation.”
- If you are installing ProtecTIER Manager on a workstation running Linux, see “Installing on Linux” on page 116.

Important: If an older version of ProtecTIER Manager is already installed on the ProtecTIER Manager workstation or the TSSC, make sure the ProtecTIER Manager GUI is closed before installing the newer version from the *IBM System Storage ProtecTIER Manager V2.5 DVD*.

Installing on a Windows-based workstation

About this task

To install ProtecTIER Manager on Windows:

Procedure

1. Insert the *IBM System Storage ProtecTIER Manager V2.5 DVD* into the CD-ROM drive of the designated ProtecTIER Manager workstation.
 - If the ProtecTIER Manager Autorun launches and starts the installation, go to step 2 on page 114.
 - If the ProtecTIER Manager Autorun does not launch automatically, do the following:
 - a. On the Windows task bar, click: **Start** → **Run**.
The **Run** dialog box opens.
 - b. In the **Open** field, type: **D:** (where D: is the server's CD-ROM drive)
 - c. Click OK.

The contents of the *IBM System Storage ProtecTIER Manager V2.5 DVD*, display.

- d. From the list of files, locate the **ProtectTIER Manager for Windows** installation file.
- e. Double-click the file to start the installation.
2. Read the **Introduction** window, and then click **Next**.
Two **License Agreement** windows open.
3. Read and accept the terms of each license agreement, and then click **Next**.
The **Choose Install Folder** window opens:

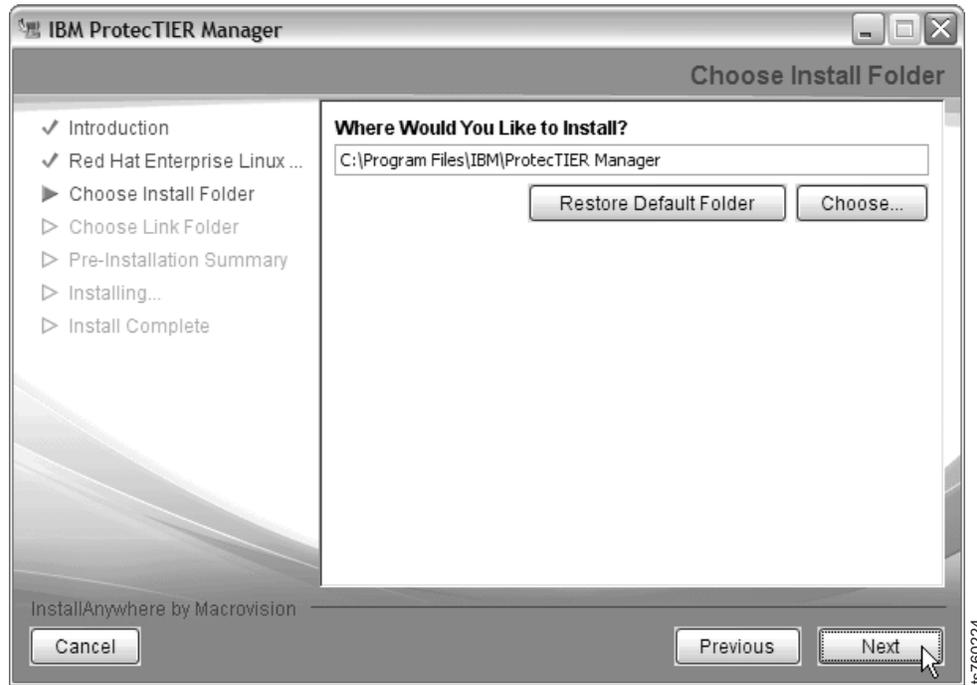


Figure 37. Choose Install Folder window

4. Specify the folder where the ProtecTIER Manager program files will be installed, and then click **Next**.
The **Choose Shortcut Folder** window opens:

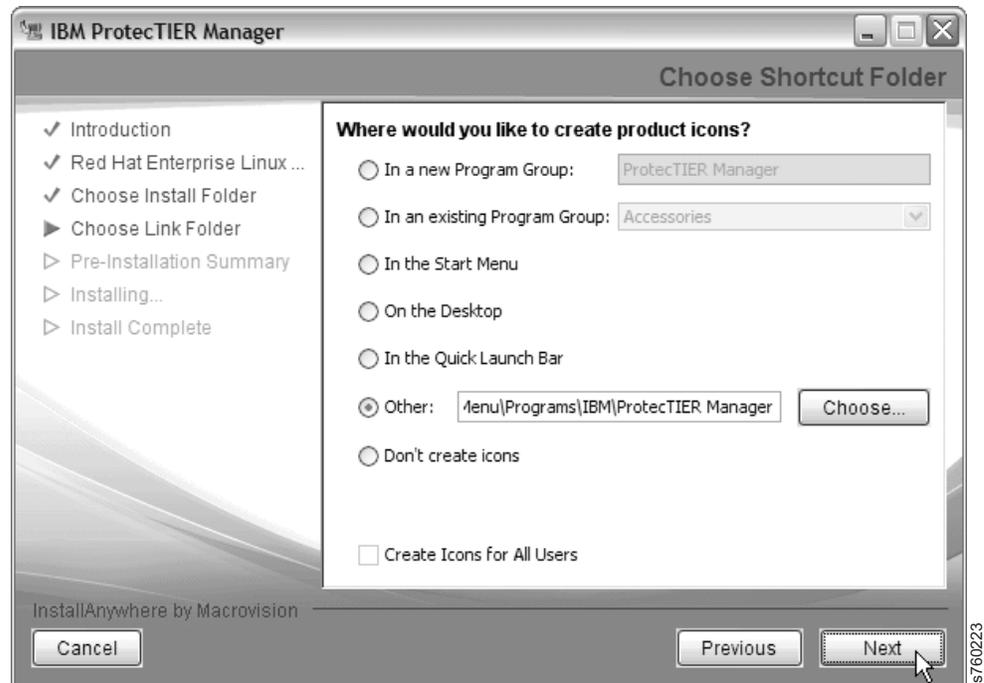


Figure 38. Choose Shortcut Folder window

5. Select the location where the program icons will be created:
 - **In a new Program Group** – Creates a new program group in the Program list of the Start menu.
 - **In an existing Program Group** – Adds the shortcut to an existing program group in the Program list of the Start menu.
 - **In the Start Menu**
 - **On the Desktop**
 - **In the Quick Launch Bar**
 - **Other** – Enables you to enter a path location for the shortcut, or to browse for a location by clicking *Choose*.
 - **Don't create icons** – No shortcuts are created.

Note: When relevant, you can select **Create Icons for All Users** to create a shortcut in the defined location for all user accounts on the workstation.

6. Click **Next**.
The **Pre-Installation Summary** window opens:
7. Review the Summary window, and then click **Install** to start the installation.
The **Installing ProtecTIER Manager** window opens:
When the installation is complete and ProtecTIER Manager has been successfully installed, the **Install Complete** window opens.
8. Click **Done**.
The ProtecTIER Installation wizard closes.
9. Go to Chapter 11, “Using ProtecTIER Manager,” on page 119.

Installing on Linux

Before you begin

Important: The procedure below assumes that the workstation on which ProtecTIER Manager is being installed has a Linux graphical user interface (GUI). A GUI is required for ProtecTIER Manager operation on Linux.

About this task

To install ProtecTIER Manager on Linux:

Procedure

1. Insert the *IBM System Storage ProtecTIER Manager V2.5* DVD into the CD-ROM drive of the designated ProtecTIER Manager workstation.
2. Run the ProtecTIER Manager installer. To do so:
 - a. From the Linux desktop, double-click the CD-ROM icon, and then double-click the installation folder for the version of Linux you are using.
Linux for version **64** or **Linux32** for version **32**
 - b. From the installation folder, select the **InstallLinuxXX.bin** file (where **XX** is **64** or **32**, depending on the folder you are in) and drag the file onto the desktop.
 - c. Close any open windows.
 - d. Right-click on any open area of the desktop, and from the menu that displays, click **Open Terminal**.
The terminal window opens.
 - e. At the terminal command prompt, change to the **Desktop** directory. Enter the command:
cd Desktop <enter>

Note: The above command is case-sensitive. Type it using a capital "D".
 - f. From the Terminal Window's Desktop directory, run the ProtecTIER Manager installer:
In all commands below, **XX** is **64** or **32**.
./InstallLinuxXX.bin and press **<enter>**
If the message: Permission Denied displays, enter the following commands:
chmod +x InstallLinuxXX.bin <enter>
./InstallLinuxXX.bin <enter>
The **IBM ProtecTIER Manager Wizard Introduction** screen displays.
3. Click **Next**.
Two separate **Software License Agreement** screens display.
4. Read the terms for each license agreement, indicate your acceptance, and then click **Next**.
The **Choose Install Folder** screen displays.
5. Specify the location for the ProtecTIER Manager program files. To do so, perform one of the following:
 - Enter the path to the location where the ProtecTIER Manager program files will be installed.
 - Click **Choose** to browse for a location.

Note: Click **Restore Default Folder** to revert to the default installation path.

6. Click **Next**.

The **Choose Link Folder** screen displays:



Figure 39. Choose Link folder

7. Select the location where the program links will be created:

- **In your Home folder** – Creates the links in the directory where the user's files are typically stored. For example: `/home/bill`.
- **Other** – Creates the links in the default location (`/opt/IBM/PTManager`). To specify a different location, click **Choose** and select a directory on the workstation's hard drive.
- **Don't create links** – No links will be created.

8. Click **Next**.

The **Pre-Installation Summary** screen displays.

9. Click **Install**.

The **Installing ProtecTIER Manager** screen displays and ProtecTIER Manager is installed.

When the installation finishes, the **Install Complete** screen displays.

10. Click **Done**.

The **ProtecTIER Manager Wizard** closes.

11. When the command prompt returns to the **Terminal** window, type: **Exit** `<enter>` to close the window:

12. Go to Chapter 11, “Using ProtecTIER Manager,” on page 119.

Chapter 11. Using ProtecTIER Manager

The ProtecTIER Manager GUI enables the registration of ProtecTIER nodes, and the creation and maintenance of data repositories. For more information, refer to the *IBM System Storage ProtecTIER User's Guide for Enterprise Edition and Appliance Edition*, IBM form number GC53-1156.

For best results, set the monitor screen resolution to 1280 x 1024.

Adding a node to the ProtecTIER Manager GUI

The Add Node process registers the node's IP address and port number with the instance of the ProtecTIER Manager GUI running on the TSSC or the ProtecTIER Manager workstation. You must add the node in ProtecTIER Manager before you can create the repository.

Procedure

1. Start the ProtecTIER Manager application using the applicable procedure below:

If the ProtecTIER Manager GUI is installed on the TSSC

- a. If the TSSC is not already powered-on, do so now.
- b. If prompted for login information, enter the username: **service** and the password: **service**.

The TSSC's blue desktop displays.

- c. Right-click on the TSSC's blue desktop.
The **IBM TS3000 System Console** menu displays.
- d. Select **Browser Functions** → **ProtecTIER Manager Functions** → **Launch ProtecTIER Manager GUI**.

The ProtecTIER Manager screen opens. See Figure 40 on page 120.

- e. Go to step 2 on page 120.

If the ProtecTIER Manager GUI is installed on a Windows-based workstation

- a. Click **Start** → **Programs** → **IBM** → **ProtecTIER Manager 2.3.2.0** → **IBM ProtecTIER Manager**.

The ProtecTIER Manager screen opens. See Figure 40 on page 120.

- b. Go to step 2 on page 120.

If the ProtecTIER Manager GUI is installed on a Linux-based workstation

- a. Double-click the **PT Manager** icon found on the Linux desktop, or in the shortcut location you specified during installation.

The ProtecTIER Manager screen opens. See Figure 40 on page 120.

- b. Go to step 2 on page 120.

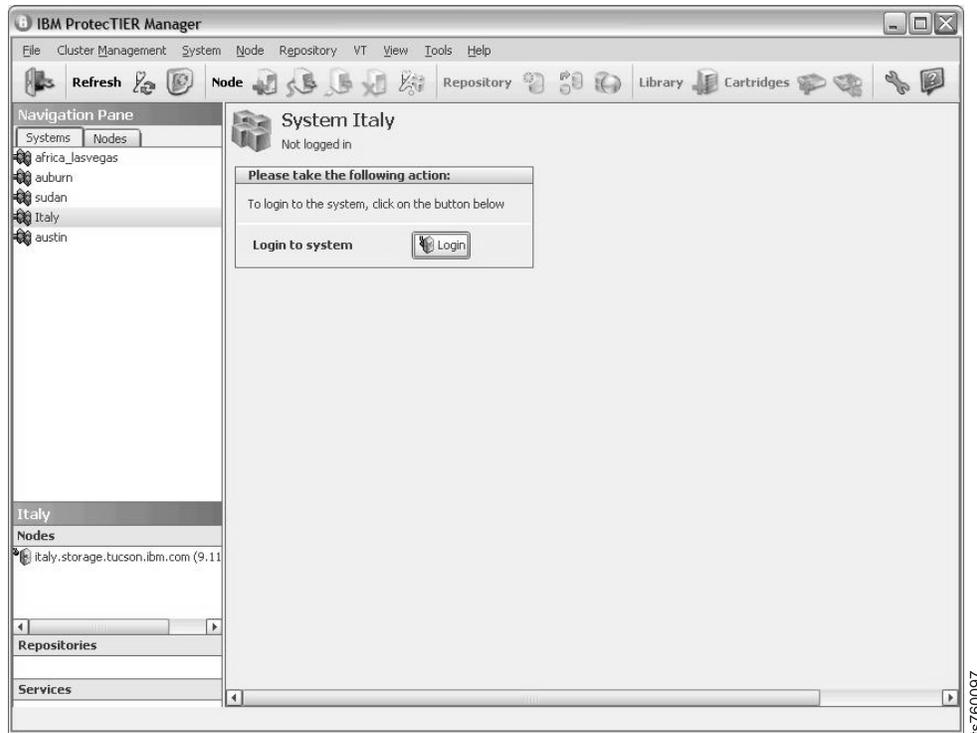


Figure 40. ProtecTIER Manager screen

Any configured networked systems are listed along with their IP addresses in the **Nodes** section of the **Navigation** pane, and are available for login.

2. On the **ProtecTIER Manager** toolbar, click the  (**Add Node**) button. The **Add node** dialog displays and prompts you for the IP address and port number of the node you want to add.
3. Enter the IP address of the node to be added, and then click **Ok**.

Note: Do not change the port number of the node unless directed to do so by IBM Support.

The node appears in the **Nodes** pane and the **Login** button displays in the **View** pane.

The Success dialog displays and provides information about the repository, which is created in an upcoming procedure.

4. Click **Login**.
5. When prompted for login information, enter **ptadmin** for both the username and password, and then click **Ok**.

ProtecTIER Manager displays the information for the added node. If the node has an existing repository, the node's cluster displays on the **Systems** tab of the **Navigation** pane. If the cluster contains a second node, that node displays in the **Nodes** pane.

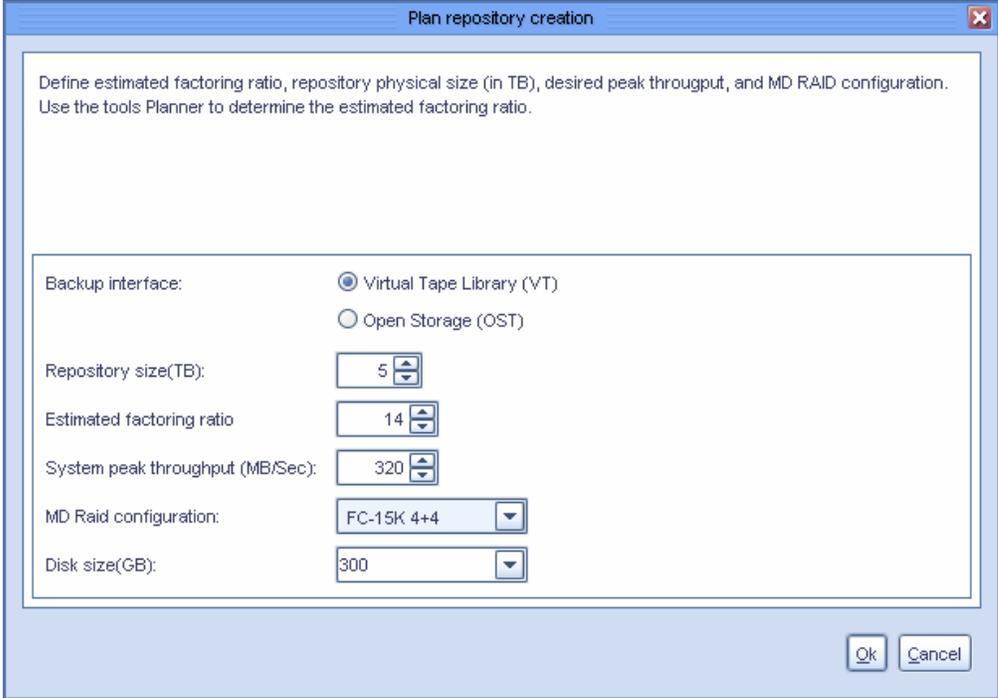
6. Go to “Planning the repository” on page 121.

Planning the repository

Use the Repository Planning wizard in conjunction with guidance from IBM support, to determine the optimum repository size and meta data file system arrangement for the repository.

Procedure

1. On the ProtecTIER Manager workstation, run ProtecTIER Manager.
2. Select **Repository** → **Create repository planning**.
The **Create repository planning** wizard opens.



Plan repository creation

Define estimated factoring ratio, repository physical size (in TB), desired peak throughput, and MD RAID configuration. Use the tools Planner to determine the estimated factoring ratio.

Backup interface: Virtual Tape Library (VT)
 Open Storage (OST)

Repository size(TB): 5

Estimated factoring ratio: 14

System peak throughput (MB/Sec): 320

MD Raid configuration: FC-15K 4+4

Disk size(GB): 300

Ok Cancel

Figure 41. Create repository planning wizard

3. In the **Estimated factoring ratio** field, enter the value estimated for the customer's environment based on the data change rate, backup policies, and retention period.
4. In the **Minimum repository physical size** and **Maximum repository physical size** fields, select values above and below the size of the repository you want to create.

Note: The maximum possible repository physical size is 1 petabyte (1PB).

5. In the **System peak throughput** field, specify the rate of system peak throughput that the meta data file systems can support.
6. In the **MD Raid configuration** field, select the RAID configuration of the logical volumes on which the repository meta data file systems are to be created.

For example, select FC-10K 2+2 for a configuration of RAID 10 2+2 with fibre channel 10 KRPM disks.

7. Click **Ok**.

The **Repository meta data storage requirements** dialog displays with a list of file system arrangement options.



Figure 42. Repository meta data storage requirements screen

8. To print the information in the **Repository meta data storage requirements** dialog, or to save the information as a .csv file, click **Options**.
9. Click **Ok**.

The **Repository meta data storage requirements** dialog closes.

Using the information provided by the **Repository meta data storage requirements** dialog, choose the meta data file system arrangement that is most appropriate.

For example, if the projected repository size is 15 TB, but the file system arrangement for 16 TB more closely matches the logical disk arrangement of your disk array, it is recommended that you choose 16 TB instead of the original, smaller planned value.

10. Go to "Creating the repository."

Creating the repository

About this task

After the necessary file systems have been created, use the information generated during the repository planning process to create the repository. A repository can only be created on a one-node cluster.

Note: Creating a repository is a prerequisite for adding a second node to a cluster, as repository creation **must** be performed on Node A.

Procedure

1. On the ProtecTIER Manager workstation, if it is not already running, run the ProtecTIER Manager application. To do so:

Click **Start** → **Programs** → **IBM** → **ProtecTIER Manager 2.3.2.0** → **IBM ProtecTIER Manager**.

The **ProtecTIER Manager** window opens.

2. In the **Nodes** pane, select the node on which to create the repository.
3. Select **Create repository**.

The **Create repository** wizard starts the data collection process. When data collection is complete, the **Welcome** window opens.

4. Read the information on the **Welcome** window, and then click **Next**.

The **Name** window opens. See Figure 43.

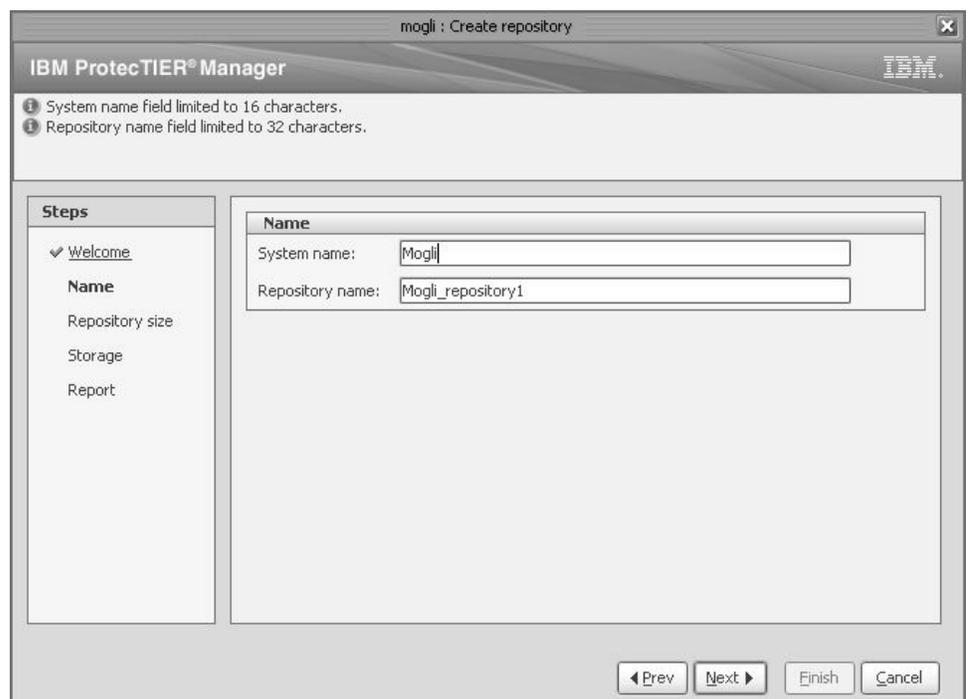


Figure 43. Create Repository Name window

5. In the **Name** window, provide the following information:
 - a. In the **System name** field, enter the name of the server on which the repository is being created.
 - b. In the **Repository name** field, enter the name for the repository being created.
6. Click **Next**.

The **Repository size** window opens. See Figure 44 on page 124.

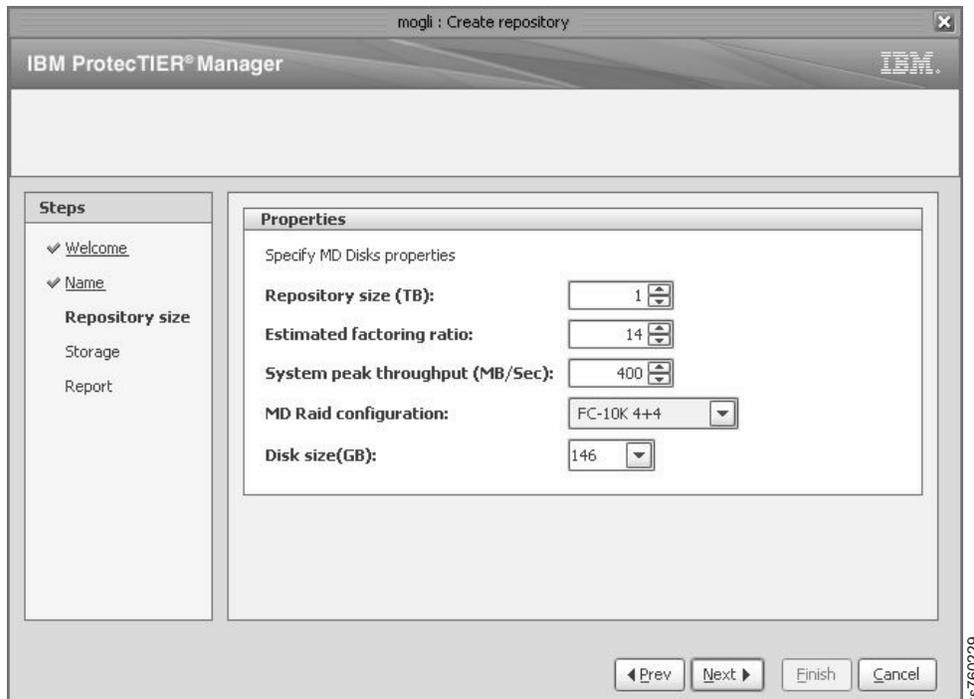


Figure 44. Repository size window

7. In the **Repository Size** window, provide the following information:
 - a. In the **Repository size (TB)** field, enter the repository size (in terabytes) that you determined using the **Create repository planning wizard**.
 - b. In the **Estimated factoring ratio** field, enter the estimated factoring ratio value that was determined with the assistance of IBM Support personnel.
 - c. In the **System peak throughput (MB/Sec)** field, specify the rate of system peak throughput that the meta data file systems can support.
 - d. In the **MD Raid configuration** field, select the RAID configuration of the logical volumes on which the repository meta data file systems are to be created. For example, select FC-10K 2+2 for a configuration of RAID 10 2+2 with Fibre Channel 10K rpm disks.
 - e. In the **Disk Size (GB)** field, from the drop-down list, select the disk size that is the closest match to the disk size of the server on which the repository is being created. If an exact match is not available, choose the next larger value.
8. Click **Next**.

The **Storage** window opens. See Figure 45 on page 125. In this window, the **Allocated meta data size** field displays (in gigabytes) the amount of disk space allocated for meta data. The **Allocated user data size** field displays, (in gigabytes) the amount of disk space allocated for user data, based on the estimated factoring ratio and the set of existing file systems.

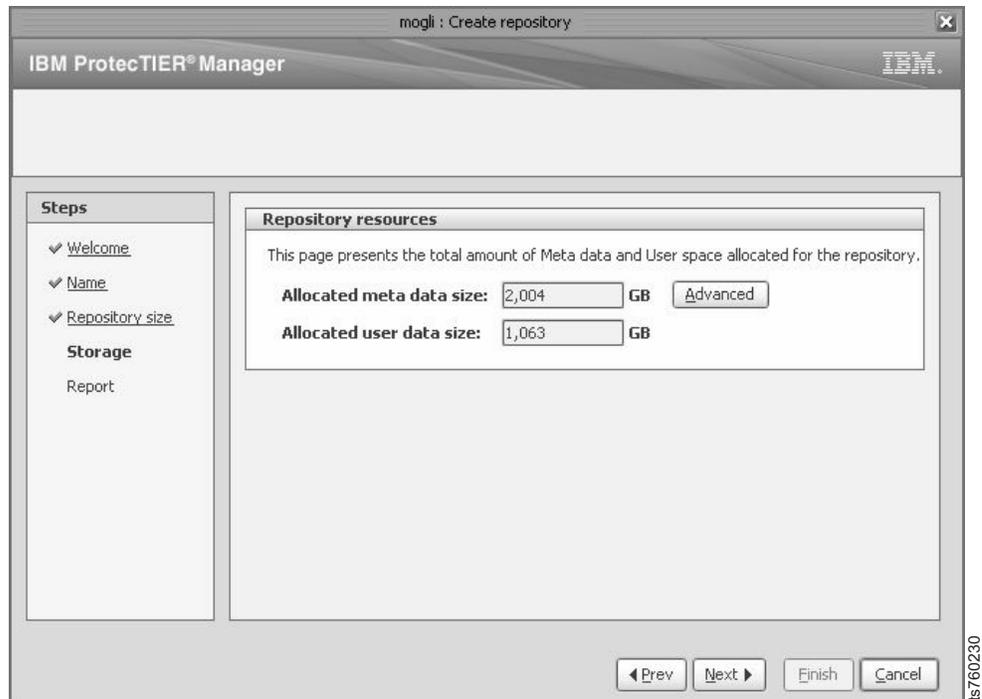


Figure 45. Storage window

9. Click Next.

The **Repository resources** dialog box opens. See Figure 46.

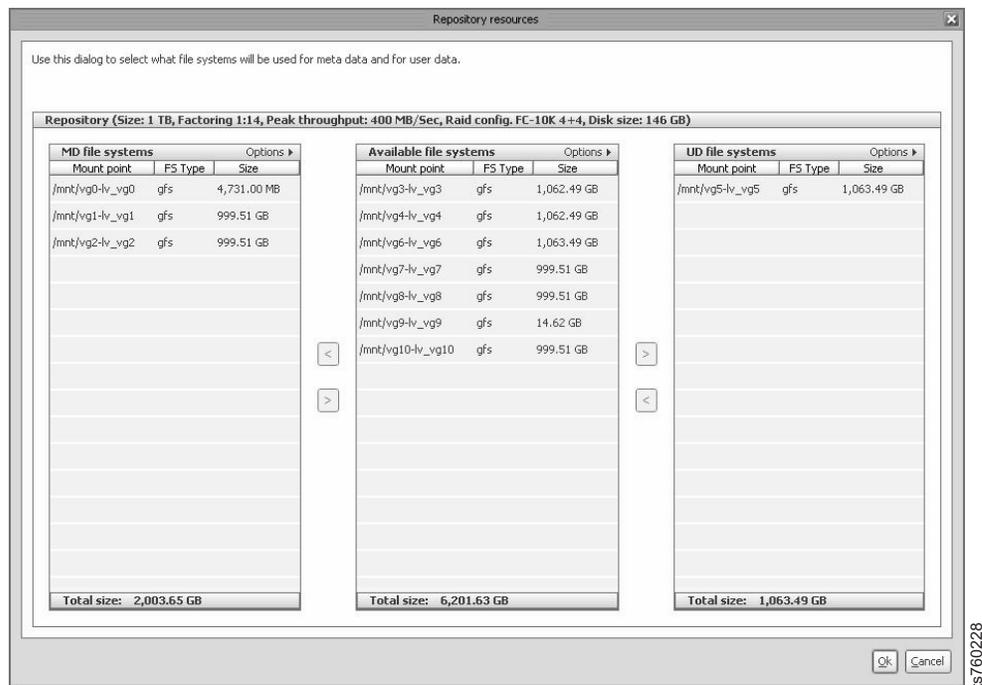


Figure 46. Repository resources dialog

10. Verify that the correct file systems are selected for meta data and user data, based on the meta data file system sizes indicated by the repository planning process.

Note: By default, the ProtecTIER system generally selects the smallest available file systems for use as meta data file systems. The remaining file systems are available for user data. Storage space for user data cannot exceed the repository size defined in the **Repository Size** window.

11. If the file systems selected by ProtecTIER for meta data and user data do not match the file systems created for those purposes, change the assignment. To do so:
 - a. In the **Repository resources** dialog box, from the **Available file systems** list, select **File Systems**.
 - b. Use the left and right arrows to move file systems to and from the **MD file systems** (meta data) and **UD file systems** (user data) lists.
12. When the assignments are correct, click **Ok**.
The **Report** window opens.
13. Review the summary report information and then click **Finish**.
The **Create repository** wizard closes and the ProtecTIER system temporarily goes offline to create the repository.
This process may take several minutes to complete.
14. Click **Next** and then click **Finish**.
15. Proceed as appropriate:
 - If this is a stand-alone configuration, TS7650G installation and setup is now complete. Turn the system over to the customer and refer them to the *IBM System Storage ProtecTIER User's Guide for Enterprise Edition and Appliance Edition*, IBM form number GC53-1156, for information on customizing, using, and maintaining ProtecTIER; and creating, configuring, and managing replication grids, if applicable.
 - If this is a clustered configuration, go to Chapter 12, "Upgrading ProtecTIER to a cluster," on page 127.

Chapter 12. Upgrading ProtecTIER to a cluster

The installation of a second node upgrades the system from single node to a cluster. ProtecTIER must be installed on the first node with a repository created before the second node is added.

Configuring the second server

Use the procedures in this section to configure Server B in a clustered configuration.

About this task

Before you can configure Server B you must have already configured Server A using the procedures in “Configuring the first server with ptconfig” on page 97.

Procedure

1. If you are not already connected and logged into Server A, do the following:
 - a. Connect a USB keyboard and graphics-capable monitor to Server A.
 - b. At the command prompt, log in to Server A with the username **root** and password **admin**.
2. Stop the vtfd and gfs services on Server A. Enter the commands:

```
service vtfd stop <enter>
service gfs stop <enter>
```
3. Wait until the services are stopped on Server A and you are returned to the command prompt, then proceed to step 4.
4. Disconnect the USB keyboard and monitor from Server A and connect them to Server B.
5. If Server B is already powered-on, log in with the username **root** and password **admin**, then go to step 7.
6. If Server B is not already powered-on:
 - a. Power-on Server B.
 - b. When bootup completes, login with the username **root** and password **admin**, then go to step 7.
7. On Server B, set the user to **ptadmin**. Enter the command: **su - ptadmin**.
8. If prompted for a password, enter: **ptadmin**.
9. At the server's command prompt, change to the **/opt/dtc/install** directory. Enter the command:

```
cd /opt/dtc/install <enter>
```
10. Execute the ptconfig utility. Enter the command:
 - a. For a VTL Gateway, type:

```
./ptconfig -install -model=TS7650G -app=VTL <enter>
```
 - b. For an OpenStorage Gateway, type:

```
./ptconfig -install -model=TS7650G -app=OST_1G <enter>
```The following messages display:

```
Stopping services, please wait
Stopping Cluster Services [ Done ]
```

```

Services stopped
Checking conditions...
Checking BOM [ Done ]
Checking for existing nodes [ Done ]
Checking NICs for Replication [ Done ]
Checking repository [ Done ]
Checking conditions done
The following message displays. In the message, the term "remote node" refers
to Server A.
In order to continue, the GFS and VTFD services on the remote node must
be stopped. Are the GFS and VTFD services stopped on the remote node?
(yes/no)

```

11. Type: **yes <enter>**.
12. You are then prompted, one at a time, to enter the values listed below for Node B. After typing each value, press **<enter>**:

Important: Values set during manufacturing display in [brackets]. *If you are enabling replication*, you will need to change all of the default values to reflect the customer's specific configuration. *If you are not enabling replication*, you will need to change the defaults except when prompted for Replication Port information. In this case, press **<enter>** without entering a value.

- Customer Network, IP address [192.168.167.162]:
- Customer Network, Netmask [255.255.255.0]:
- Customer Network, Default Gateway [168.159.150.9]:
- Customer Network, Hostname [node2]:
(This is the name provided by the customer to identify this server on their local network. The hostname should be free of extensions or .com suffixes. *For example: cougar9000*)
- Replication Port 1, IP Address [192.168.170.1]: *(eth3)*
- Replication Port 1, Netmask [255.255.255.0]:
- Replication Port 1, Hostname [replicationNode1_1]:
(for example: jaguar_source_1)
- Replication Port 2, IP Address [192.168.171.1]: *(eth4)*
- Replication Port 2, Netmask [255.255.255.0]:
- Replication Port 2, Hostname [replicationNode1_2]:
(for example: jaguar_source_2)

The system automatically starts the network configuration process and a series of status messages display.

13. When a message displays indicating that configuration is complete, proceed as appropriate:
 - If you are enabling replication, continue to step 14.
 - If you are not enabling replication, go to step 21 on page 132.
14. When you have returned to the command prompt, define the static routes used for replication. Enter the command:

```
./ptconfig -staticRoutes <enter>
```

The message below displays:

```
Gathering System information [ Done ]
```

The auto-detected system information displays. For example:

Table 43. Example auto-detected system information

| ID | Target Network Address | Target Netmask | Local Gateway Address |
|----|------------------------|----------------|-----------------------|
| 1 | 10.11.194.0 | 255.255.255.0 | 10.11.195.1 |
| 2 | 10.11.196.0 | 255.255.255.0 | 10.11.197.1 |

Important: This information is only an example. The information that displays will be specific to your system, and will be different.

Followed by the Available Options prompt:

Available Options:

=====

(a)dd a new record

(e)dit a record

(d)elete a record

(c)ommit changes

(q)uit

Please Choose (a,e,d,c,q):

15. Type: **a <enter>**

You are prompted to enter information for the first destination (target - eth2 for VTL, eth7 for OpenStorage) server and the local network.

Attention: Do not configure the replication ports Eth2 and Eth5 (VTL) or Eth7 and Eth11 (OpenStorage) on the same subnet as the external LAN port Eth0. Doing so may cause replication errors.

16. At each prompt, type the requested information and then press **<enter>**:

Attention: In this step, the term "target" refers to the remote node's network address and netmask (not necessarily the replication "target" server for this entry.)

Please provide the following information:

Target Network Address:

(starting network address) (for example: 10.11.194.0)

Target Network Netmask:

(for example: 255.255.255.0)

Local Gateway Address:

(the gateway IP address of the server you are currently configuring) (for example: 10.11.195.1)

A summary displays:

Table 44. Example summary for first server and local network

| ID | Target Network Address | Target Netmask | Local Gateway Address |
|----|------------------------|----------------|-----------------------|
| 1 | 10.11.194.0 | 255.255.255.0 | 10.11.195.1 |

Important: The addresses in the summary above are examples. Actual values will vary. For example, if the Target Network Address for the destination server is 10.11.194.75, its starting address would be 10.11.194.0. For the Local Gateway Address you would use the gateway address of the source server (this server).

The Available Options prompt displays a second time:

Available Options:
 =====
 (a)dd a new record
 (e)dit a record
 (d)elete a record
 (c)ommit changes
 (q)uit
 Please Choose (a,e,d,c,q):

17. Type: **a** <enter>.

You are prompted for the information for the second destination (target - eth5 for VTL, eth11 for OpenStorage) server and the local network.

Attention: Do not configure the replication ports Eth2 and Eth5 (VTL) or Eth7 and Eth11 (OpenStorage) on the same subnet as the external LAN port Eth0. Doing so may cause replication errors.

18. At each prompt, type the requested information and then press<enter>:

Please provide the following information:

Target Network Address:
 (starting network address) (for example: 10.11.196.0)

Target Network Netmask:
 (for example: 255.255.255.0)

Local Gateway Address:
 (the gateway IP address of the server you are currently configuring) (for example: 10.11.197.0)

An updated summary displays:

Table 45. Example updated summary of both servers and local networks

| ID | Target Network Address | Target Netmask | Local Gateway Address |
|----|------------------------|----------------|-----------------------|
| 1 | 10.11.194.0 | 255.255.255.0 | 10.11.195.1 |
| 2 | 10.11.196.0 | 255.255.255.0 | 10.11.197.1 |

Important: The addresses in the summary are examples. In this instance the term Δ target Δ refers to the network address of the nodes at site 1 and site 2. Actual values will vary.

For reference, write the actual values from the summary screen in the blank spaces below.

Depending on your replication configuration, the "remote node" Target Network Address may be the same network starting address for Server A and B if more than one node is replicating to a single node.

Table 46. Site 1 – Server A worksheet

| Site 1 – Server A | | | |
|-------------------|--|---|---|
| ID | Target Network Address (Remote node's starting network address) | Target Netmask (Remote node's netmask) | Local Gateway Address (The gateway address for Server A at Site 1) |

Table 46. Site 1 – Server A worksheet (continued)

| Site 1 – Server A | | | |
|---|--|--|--|
| 1 (eth2) VTL systems or 1 (eth7) OpenStorage | | | |
| 2 (eth5) VTL systems or 2 (eth11) OpenStorage | | | |

Table 47. Site 1 – Server B worksheet

| Site 1 – Server B | | | |
|---|--|---|---|
| ID | Target Network Address (Remote node's starting network address) | Target Netmask (Remote node's netmask) | Local Gateway Address (The gateway address for Server B at Site 1) |
| 1 (eth2) VTL systems or 1 (eth7) OpenStorage | | | |
| 2 (eth5) VTL systems or 2 (eth11) OpenStorage | | | |

Table 48. Site 2– Server A worksheet

| Site 2 – Server A | | | |
|---|--|---|---|
| ID | Target Network Address (Remote node's starting network address) | Target Netmask (Remote node's netmask) | Local Gateway Address (The gateway address for Server A at Site 2) |
| 1 (eth2) VTL systems or 1 (eth7) OpenStorage | | | |
| 2 (eth5) VTL systems or 2 (eth11) OpenStorage | | | |

Table 49. Site 2– Server B worksheet

| Site 2 – Server B | | | |
|--|--|---|---|
| ID | Target Network Address (Remote node's starting network address) | Target Netmask (Remote node's netmask) | Local Gateway Address (The gateway address for Server B at Site 2) |
| 1 (eth2) VTL systems or 1 (eth7) OpenStorage | | | |

Table 49. Site 2– Server B worksheet (continued)

| | | | |
|---|--|--|--|
| Site 2 – Server B | | | |
| 2 (eth5) VTL systems or 2 (eth11) OpenStorage | | | |

The Available Options prompt displays a third time:

Available Options:

=====

- (a)dd a new record
- (e)dit a record
- (d)elete a record
- (c)ommit changes
- (q)uit

Please Choose (a,e,d,c,q):

19. Type: **q** <enter>

The message below displays:

Would you like to commit the changes performed to the routing table now? (yes|no)

20. Type: **yes** <enter>.

The Successfully committed changes! message displays, and you are returned to the command prompt.

Server B should now appear as a cluster member in the ProtecTIER Manager GUI.

Note: This is only true if the repository was created before configuring the second node.

21. Verify that Server B was automatically added as a cluster member. To do so:

- a. At the ProtecTIER Manager workstation, in the **PT Systems** tab of the **Navigation** pane, select Server A.
- b. Log in to Server A with the username **ptadmin** and password **ptadmin**. In the **Servers** pane, verify that the IP addresses of both Server A and Server B, display.
- c. If Servers A and B are both listed in the **Servers** pane, go to Chapter 14, “Testing a clustered system,” on page 139.
- d. If Server B is not listed in the **Servers** pane, you will need to manually add it as a cluster member. To do so:

- 1) From the **ProtecTIER Manager** menu bar, select **Cluster Management** → **Add Cluster Member**.

The **Add cluster member** wizard **Welcome** screen opens.

- 2) Click **Next**.

The **Server Selection** screen opens. See Figure 47 on page 133.

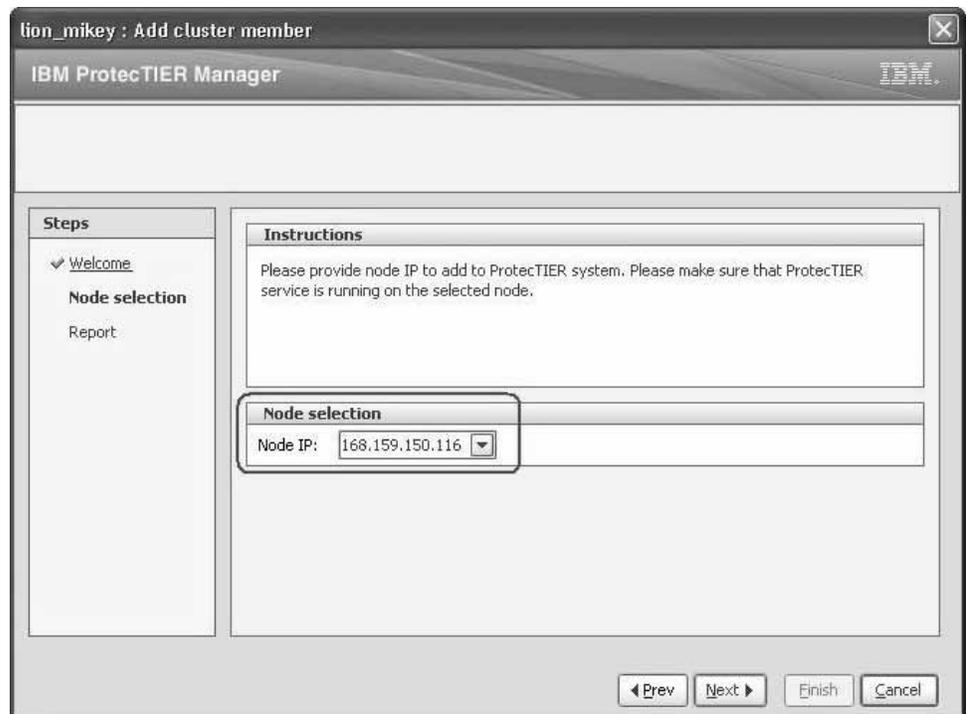


Figure 47. Server selection screen

- 3) In the **Server IP** field of the **Server Selection** pane, enter the IP address of the Server you want to add to the cluster. Alternatively, you can select the IP address from the dropdown list.
- 4) Click **Next** and then click **Finish**
The **Add cluster member** wizard closes and the Server is added to the selected cluster.
- 5) Go to Chapter 13, “Changing the system date and time,” on page 135.

Note: If Server B was not automatically added to the cluster, and you were unable to add it manually, contact your next level of support. You will need the customer number when contacting software support. To avoid entitlement delays, have the customer number available before initiating the call.

Chapter 13. Changing the system date and time

The following procedure describes the steps required for changing the system's date, time and time zone. In a two-node cluster, each node must be changed separately. When both nodes are running, there is only a need to run this from one of the nodes. The change will take effect on both.

About this task

After configuring the ProtecTIER server, you can change the system's date, time and time zone and add timeservers to the system.

Attention: If you are running the **setClock** configuration to change the date and time, IBM recommends that once you complete the procedure, you commit the changes and exit the session. Do not proceed to setting a different timezone in the same session. If you are planning to run both the *Set date & time* and *Set Timezone* operations, first set the timezone, and then the date and time. This is recommended because the timezone settings affect the time that is displayed.

Procedure

1. If you are not already connected to a node, plug a USB keyboard and monitor into the back of the server.
2. Log in to the server with the username **root** and password **admin**.
3. Access the `/opt/dtc/install` directory by typing the command:
`cd /opt/dtc/install/ <Enter>`
4. Type the following command to begin the set clock configuration:
`./ptconfig -setClock <Enter>`

As the procedure runs, the following is displayed:

```
Date, Time, Timezone & Timeserver(s) configuration
=====
1. Set date & time
2. Set Timezone
3. Set Timeserver(s)

c. Commit changes and exit
q. Exit without committing changes

Please Choose:
```

5. Synchronize the date and time by typing `1 <Enter>` in the Please Choose: field.

The following is displayed:

```
Please Choose:1
Please specify the date in DD/MM/YYYY format [09/11/2009]:
```

6. Type the date in the specified format and press `<Enter>`. If you do not enter a date, the default will be the date that appears within the brackets.

The following is displayed:

```
Please specify the date in DD/MM/YYYY format [09/11/2009]: 09/11/2009
Please specify the time in HH:MM:SS format [11:56:16]:
```

7. Type the time in the specified format and press <Enter>. If you do not enter a time, the default will be the time that appears within the brackets.

The following is displayed:

```
Date, Time, Timezone & Timeserver(s) configuration
=====
1. Set date & time
2. Set Timezone
3. Set Timeserver(s)

c. Commit changes and exit *
q. Exit without committing changes

Please Choose:
```

Note: If you have typed in new information, an asterisk (*) will appear at the end of the c. Commit changes and exit menu option to show that there are modifications to be saved.

At this point, you can choose either c to save the changes and exit the setClock configuration, choose q to exit the configuration without saving the changes, or continue synchronizing the local timezone (step 8) and/or adding the timeservers to the system (step 11 on page 137).

8. Synchronize the local timezone by typing 2 <Enter> in the Please Choose: field.

The following is displayed:

```
Please Choose:2
Enter a 2 letter country code (or type 'm' to enter the timezone manually):
```

9. Type, for example, US <Enter> for the United States. If you need a list of time zone codes from countries other than the United States, see Appendix E, “Worldwide time zone codes,” on page 161.

The following is displayed:

```
Time zones under US:
=====
1. America/New_York
2. America/Detroit
3. America/Kentucky/Louisville
4. America/Kentucky/Monticello
5. America/Indiana/Indianapolis
6. America/Indiana/Vincennes
7. America/Indiana/Knox
8. America/Indiana/Winamac
9. America/Indiana/Marengo
10. America/Indiana/Vevay
11. America/Chicago
12. America/Indiana/Tell_City
13. America/Indiana/Petersburg
14. America/Menominee
15. America/North_Dakota/Center
16. America/North_Dakota/New_Salem
17. America/Denver
18. America/Boise
19. America/Shiprock
20. America/Phoenix
21. America/Los_Angeles
22. America/Anchorage
23. America/Juneau
24. America/Yakutat
25. America/Nome
26. America/Adak
27. Pacific/Honolulu

Please choose a timezone:
```

If you typed `m` to manually enter the timezone, the following is displayed:

```
Enter the time zone (case sensitive):
```

Type, for example, *Italy* `<Enter>`.

10. Type a number corresponding to the timezone you want to synchronize from the list under the country code entered. The following is displayed:

```
Date, Time, Timezone & Timeserver(s) configuration
=====
1. Set date & time
2. Set Timezone
3. Set Timeserver(s)

c. Commit changes and exit *
q. Exit without committing changes

Please Choose:
```

As previously stated, you can choose either `c` to save the changes and exit the `setClock` configuration, choose `q` to exit the configuration without saving the changes, or continue synchronizing the local timezone and/or adding the timeservers to the system.

11. Add timeservers to the system by typing `3` `<Enter>` in the `Please Choose:` field.

The following is displayed:

- a. Please specify the timeserver's IP Address:

Type the timeserver's IP Address. For example: *192.168.10.15* `<Enter>`

- b. Would you like to set a secondary timeserver? (yes|no)

Type `y` `<Enter>` to set a secondary timeserver.

- c. Please specify the secondary timeserver's IP Address:

Type the secondary timeserver's IP address. For example: *192.168.12.15* `<Enter>`

The following is displayed:

```
Date, Time, Timezone & Timeserver(s) configuration
=====
1. Set date & time
2. Set Timezone
3. Set Timeserver(s)

c. Commit changes and exit *
q. Exit without committing changes

Please Choose:
```

12. Confirm and save your changes to the configuration by typing `c` `<Enter>` in the `Please Choose:` field. A list of the configuration changes is displayed for review.

Reviewing the results

Note: If only the date was modified, and not the timezones and/or timeservers, only the date will be displayed in the contents.

For example: if you modified the date, added a primary and secondary time server, and specified *America/Chicago* as the time zone, when you choose `c` to commit the changes and exit, the file contents appear as follows:

Please review the following information:

=====

Date: Mon Nov 9 14:51:34 2009
Primary time server: 192.168.10.11
Secondary time server: 192.168.15.11
Timezone: America/Chicago

Do you wish to apply those settings? (yes|no)

Type y to apply the configuration.

Note: the cluster & VTFD services on all nodes must be stopped in order to continue. Do you wish to continue? (yes|no)

Type y to stop and restart the cluster and VTFD services on all the nodes.

| | |
|---------------------------|----------|
| Stopping Cluster Services | [Done] |
| Stopping NTPD | [Done] |
| Setting Time Zone | [Done] |
| Setting Timeserver | [Done] |
| Setting Date & Time | [Done] |
| Starting NTPD | [Done] |
| Starting cluster | [Done] |
| Cluster Started | |

Chapter 14. Testing a clustered system

About this task

After using `ptconfig` to successfully configure both nodes in the cluster, run the system verification tests.

Note:

- The system verification tests perform checks on the Red Hat cluster, including fencing the other node, and waits for the system to reboot. When performed on a stand-alone configuration, fencing is not tested.
- In a replication environment, the procedures in this chapter should be performed on the clustered servers at both the source and the destination locations.

Performing the system verification test

About this task

Run the test on both nodes, starting with Node 1 (the bottom server).

Procedure

1. If you are not already connected to Node 1, connect a USB keyboard and graphics-capable monitor to the server.
2. Log into Node 1 with the username: **root** and the password: **admin**.
3. At the command prompt, enter the following command:
cd /opt/dtc/install
4. From the command prompt, enter the following command:
./ptconfig -validate
The messages below display:
Testing fence ports [Done]
Validation is about to execute a fence on 1 node in the cluster, the node will be forcefully shutdown and rebooted
To Continue please type "fence test", or "q" to quit:
5. Type: **fence test <enter>**
The messages below display:
Testing connectivity to the fence device [Done]
Would you like to stop the VTFD service on both nodes? (yes|no)
6. Type: **yes <enter>**
The message below displays:
Stopping VTFD locally [-]
7. After `vtfd` is stopped and the test finishes on Node 1, disconnect the keyboard and monitor from Node 1 and connect them to Node 2.
8. Log in to Node 2 with the username **root** and password **admin**.
9. Repeat steps 3 through 6 on Node B.

Note: Alerts may be generated as the validation tests are running. The **ProtecTIER Manager Alerts Log** allows you to monitor the alerts as they

occur. To do so, on the ProtecTIER Manager workstation, click **Alerts** in the lower right corner of the **ProtecTIER Manager** screen. The **Alerts Log** opens. See Figure 48.

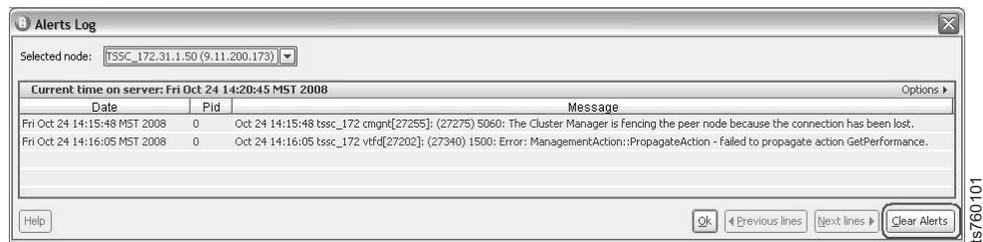


Figure 48. Alerts Log

When you are finished reviewing alerts, click **Clear Alerts** in the lower-right corner of the Alerts Log screen.

10. If the test succeeds on both nodes, TS7650G installation and setup is complete. Turn the system over to the customer and refer them to the *IBM System Storage ProtecTIER User's Guide for Enterprise Edition and Appliance Edition*, IBM form number GC53-1156 for information on customizing, using, and maintaining ProtecTIER; and creating, configuring, and managing replication grids, if applicable.
11. If the test fails on either node, contact your next level of support to resolve the failure conditions.

You will need the customer number when contacting software support. To avoid entitlement delays, have the customer number available before initiating the call.

Appendix A. 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 50. 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-digit number 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 51 on page 143. | |
| Frame range number | This value is specific for setting the IP address range for a TSSC connection (172.31.1.xxx). These ranges are set in units of 10 for standalone servers. For example: standalone server 1 would be frame range 10, standalone server 2 (connected to the same TSSC) would be frame range 20, etc. When clustering a second server, the frame range number entered should be the same number used for the first frame. For example: 10 for the original server's frame number (172.31.1.10), and when prompted, enter 10 for the second node. The system will automatically assign the frame range to 15 and the IP of the second node (in this case: 172.31.1.15). To check the original server's IP address, view the Attached System list on the TSSC, where the last octet of the IP address is the frame number (172.31.1.10 = 10). | |
| SMTP Server ID / IP address | | |

Table 50. Company information worksheet (continued)

| Required information | Description | Your information |
|--|--|--|
| SMTP E-mail address | The e-mail 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 e-mail address | The storage system administrator's e-mail 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. | |
| 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 type and model number | The machine type and model number for the TS7650 servers. | 7141 Gateway = 3958-DD1 7233 Gateway = 3958-DD3 7233 Gateway = 3958-DD4 7233 Appliance = 3958 AP1 |
| 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. | |

Table 50. Company information worksheet (continued)

| Required information | Description | Your information |
|---|---|------------------|
| 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 50 on page 141.

Table 51. 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 |
| 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 |

Table 51. Country codes (continued)

| Country | Code | Country | Code | Country | Code | Country | Code | Country | Code |
|--------------------------------|------|-----------------------------|------|---------------------|------|------------------------------------|------|----------------------------|------|
| 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 |
| 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 | Mongoliar | 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 B. IP address worksheet

Use this worksheet to specify the IP addresses assigned to the TS7650G or TS7650 Appliance components. IBM service representatives use the information provided to define the IP addresses of components supported by the TSSC. When the TSSC sends Call Home information 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 TSSC that sent a service request.

Table 52 on page 146 and Table 54 on page 147 show the default IP addresses for the TS7650G and TS7650 Appliance servers with VTL configurations.

Table 53 on page 146 and Table 55 on page 148 show the default IP addresses for the TS7650G and TS7650 Appliance servers with OpenStorage configurations.

Table 57 on page 149 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 58 on page 150 shows the host names and other settings needed for replication. Write the appropriate information in the spaces provided for future reference.

Table 59 on page 151 shows the default IP addresses for the TSSC.

Table 60 on page 152 shows the IP address ranges for the gateway or appliance components once they are configured to be on the TSSC's 172.31.1.xx network. In the spaces provided in Table 60 on page 152, write the IP addresses that you assign for each component, so that the IP address information is available for future reference.

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 Eth0. Doing so may cause replication errors.

Factory-default IP addresses for a stand-alone VTL configuration for a TS7650G 3958 DD4 or TS7650 Appliance

Table 52. Factory-default server IP addresses for a stand-alone VTL ProtecTIER server (3958 DD4 or 3958 AP1)

| 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 stand-alone OpenStorage configuration for a TS7650G 3958 DD4 or TS7650 Appliance

Table 53. Factory-default server IP addresses for a stand-alone OpenStorage ProtecTIER server (3958 DD4 or 3958 AP1)

| Stand-alone TS7650 OpenStorage 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 | Free | N/A |
| | Server A | eth3 | RAS | 172.31.1.xx |
| | Server A | eth4 | OpenStorage | 192.168.150.1 |
| | Server A | eth5 | OpenStorage | 192.168.151.1 |
| | Server A | eth6 | OpenStorage | 192.168.152.1 |
| | Server A | eth7 | Replication 1 | 192.168.20.1 |
| | Server A | eth8 | OpenStorage | 192.168.153.1 |
| | Server A | eth9 | OpenStorage | 192.168.154.1 |
| | Server A | eth10 | OpenStorage | 192.168.155.1 |
| | Server A | eth11 | Replication network 2 | 192.168.21.1 |
| | Server A | eth12 | Cluster network 2 | N/A |
| | Server A | eth13 | Free | N/A |

Factory-default server IP addresses for a clustered VTL TS7650G 3958 DD4 or TS7650 Appliance

Table 54. Factory-default server IP addresses for a clustered VTL ProtecTIER system (3958 DD4 or 3958 AP1)

| 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 |
| 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 |

Factory-default server IP addresses for a clustered OpenStorage TS7650G 3958 DD4 or TS7650 Appliance

Table 55. Factory-default server IP addresses for a clustered OpenStorage ProtecTIER system (3958 DD4 or 3958 AP1)

| 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 | Free | |
| | Server A | eth3 | RAS | 172.31.1.xx |
| | Server A | eth4 | OpenStorage | 192.168.150.1 |
| | Server A | eth5 | OpenStorage | 192.168.151.1 |
| | Server A | eth6 | OpenStorage | 192.168.152.1 |
| | Server A | eth7 | Replication network 1 | 192.168.20.1 |
| | Server A | eth8 | OpenStorage | 192.168.153.1 |
| | Server A | eth9 | OpenStorage | 192.168.154.1 |
| | Server A | eth10 | OpenStorage | 192.168.155.1 |
| | Server A | eth11 | Replication network 2 | 192.168.21.1 |
| | Server A | eth12 | Cluster network 2 | 10.0.0.51 |
| | Server A | eth13 | Free | |
| Network Power Switch | N/A | | 10.0.0.50 | |
| 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 | Free | |
| | Server B | eth3 | RAS | 172.31.1.xx |
| | Server B | eth4 | OpenStorage | 192.168.150.2 |
| | Server B | eth5 | OpenStorage | 192.168.151.2 |
| | Server B | eth6 | OpenStorage | 192.168.152.2 |
| | Server B | eth7 | Replication network 1 | 192.168.20.2 |
| | Server B | eth8 | OpenStorage | 192.168.153.2 |
| | Server B | eth9 | OpenStorage | 192.168.154.2 |
| | Server B | eth10 | OpenStorage | 192.168.155.2 |
| | Server B | eth11 | Replication network 2 | 192.168.21.2 |
| | Server B | eth12 | Cluster network 2 | 10.0.0.52 |
| | Server B | eth13 | Free | |
| Network Power Switch | N/A | | 10.0.0.50 | |

Customer IP addresses

Table 56. 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 57. Customer and Replication IP addresses for VTL or OpenStorage systems

Default gateways for eth2 and eth5 for VTL systems or eth5 or eth13 for OpenStorage systems should be different, otherwise the vlans are meaningless.

For VTL systems, provide a routing path from the IP address on eth2-server1 to the IP address of eth2-server2, and a routing path from the IP address on eth5-server1 to the IP address of eth5-server2. For OpenStorage systems, provide a routing path from the IP address on eth5-server1 to the IP address of eth5-server2, and a routing path from the IP address on eth13-server1 to the IP address of eth13-server2.

| 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 or eth5 for OpenStorage systems | | | | |
| | eth5 for VTL systems or eth13 for OpenStorage 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 or eth5 for OpenStorage systems | | | | |
| | eth5 for VTL systems or eth13 for OpenStorage 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 or eth5 for OpenStorage systems | | | | |
| | eth5 for VTL systems or eth13 for OpenStorage systems | | | | |

Table 57. Customer and Replication IP addresses for VTL or OpenStorage systems (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 or eth5 for OpenStorage systems | | | | |
| | eth5 for VTL systems or eth13 for OpenStorage systems | | | | |

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

Table 58. 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. | | | |
| Media speed (Ethernet) | Check Autodetection or the media speed of the Ethernet adapter. | _ Autodetection _ 10Mbps Half Duplex _ 10Mbps Full Duplex _ 100Mbps Half Duplx _ 100Mbps Full Duplx _ 1000Mbps Half Duplx _ 1000Mbps Full Duplx | _ 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). | | |

Table 58. Host names and DNS settings for setting up the TSSC with the TS7650G (continued)

| Item or setting | Instructions | eth0 | eth1 (if applicable) |
|---|---|------|----------------------|
| 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). | | |

TSSC IP addresses

Table 59. 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 |

TSSC IP addresses from frame-to-frame

A single frame is ten IP addresses, and each node within a frame requires its own set of ten IP addresses – from 0 to 9. If there are no attached devices/systems, the first usable frame would be 10. For example:

- 172.31.1.10 - 172.31.1.19 would be considered frame 10
- 172.31.1.20 - 172.31.1.29 would be considered frame 20
- 172.31.1.30 - 172.31.1.39 would be considered frame 30...
- 172.31.1.240 - 172.31.1.249 would be considered frame 240

Table 60. Base Clusters and Additional Storage Component IP addresses

The TSSC IP address range changes from frame to frame, and each new frame increments by a multiple of 10. For example, the first stand-alone frame range would be 10, and the second frame range would be 20.

If this is a clustered set of servers, the entry for the first server (A) will most likely be 10. For the entry for the second server (B), you will also enter 10 for the frame number. The code will make the adjustment automatically based on the answer you provide during the RAS package installation process that asks you if you are setting up the second node. If you reply "Yes", the code will set the IP range for node 2 at 5 octets higher than what is set for node 1 (server A). For example, if server A is set for 172.31.1.10 then server B will be set for 172.31.1.15.

Note: Depending upon the address ranges available on the TSSC, the IBM Service representative may have to use ranges other than those shown here.

| Component | Port | IP Addresses: Stand-alone server -or- Node A in a cluster (the server located in the lower part of the rack) Examples: For eth3, 172.31.1.x0 For RSA or IMM, 172.31.1.x1 | IP Addresses: Node B in a cluster (the server located in the upper part of the rack) Examples: For eth3, 172.31.1.x5 For RSA or IMM, 172.31.1.x6 |
|------------------|-------------|--|--|
| Server | eth3 | | |
| Server | RSA or IMM | | |

Appendix C. Replication settings worksheet

Use this worksheet to determine and record the information you need to implement replication on your TS7650G or TS7650 Appliance.

Replication policy and Grid management information

Table 61. 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 | | | |
| | | | |

Appendix D. Making a server connection through the System Management Module (IMM)

This appendix provides an alternative method for establishing a connection to a server during RAS package configuration, using the remote supervisor adapter (RSA) port.

Before you begin

Note: Currently, for the DD4 xSeries server, remote control access to the server via the IMM port requires a file not available in the current provided IBM supported browsers. Some third party browsers have this file resident, that can enable this function (example: Google Chrome), and it can be used to perform this function if required.

About this task

By default, the RSA ports on Servers A and B in a cluster have the same default IP address. This will cause a conflict when the servers attempt to communicate with the TSSC network switch via the RSA ports, and will result in abnormal system behavior. To avoid the conflict, you must change the IP address of the RSA on **Server B** to make the RSA's IP address unique. Do not change the IP address of the RSA on Server A. The default IP address of an RSA FRU replacement is 192.168.70.125.

Depending upon the equipment you have available, you will perform the procedures that follow using a USB keyboard and graphics-capable monitor (the preferred method), or the TSSC (code-level 5.9 or higher) or your IBM service laptop.

Tip: If you connect to the RSA using your service laptop, you may need an extension cord to reach a standard power outlet, or a 240v to 110v step-down voltage converter to allow the laptop to run on a PDU in the server frame.

Note: Do not change the RSA IP address on a stand-alone server.

Procedure

- If you have a USB keyboard and graphics-capable monitor, go to “Using a USB keyboard and monitor to alter the IP address of the RSA on Server B in a cluster.”
- If you have to use the TSSC or your service laptop, go to “Using the TSSC or a service laptop” on page 156

Using a USB keyboard and monitor to alter the IP address of the RSA on Server B in a cluster

About this task

This procedure describes making a direct connection to the server's RSA using a USB keyboard and graphics-capable monitor.

Note: This is the preferred connection method. If you do not have access to a USB keyboard and monitor, you will need to connect to the RSA using the procedure in “Using the TSSC or a service laptop.”

Procedure

1. Connect a USB keyboard and graphics-capable monitor to Server B.
2. Log into the server with the ID: **root** and the password: **admin**.
3. From command line, type: **reboot <enter>**
4. When the IBM logo displays, press **F1** to enter **Setup** mode.
5. Select **Advanced Setup** → **RSA II Settings**.
6. At **DHCP Control**, select **Use Static IP**.
7. For the **Static IP Address**, change the last octet to an address value that is lower than the default of 254.
For example: 172.31.1.253.
8. For the **Netmask**, enter: 255.255.255.0.
9. Leave the **Gateway** field blank.
10. For the **OS USB** selection, choose: **Linux OS**.
11. Press the **down-arrow** key to highlight **Save Values and Reboot RSA** and then press **<enter>**.
The system will pause for a few moments while the RSA reboots. When the reboot completes, a pop-up message displays.
12. Press **Esc** three times.
You are returned to the **Configuration/Setup Utility** screen.
13. Select **Save Settings**.
14. When the save is complete, exit the **Configuration/Setup Utility** screen.
The server reboots and Server B's RSA IP address is now unique.
15. Return to the procedure that sent you here.

Using the TSSC or a service laptop

Procedure

1. If you are using the TSSC, skip ahead to step 10 on page 157. Otherwise, continue with step 2.
2. Connect an Ethernet cable from the Ethernet port on your laptop to the SYS MGMT (RSA port) on Server B. See Figure 49 on page 157.

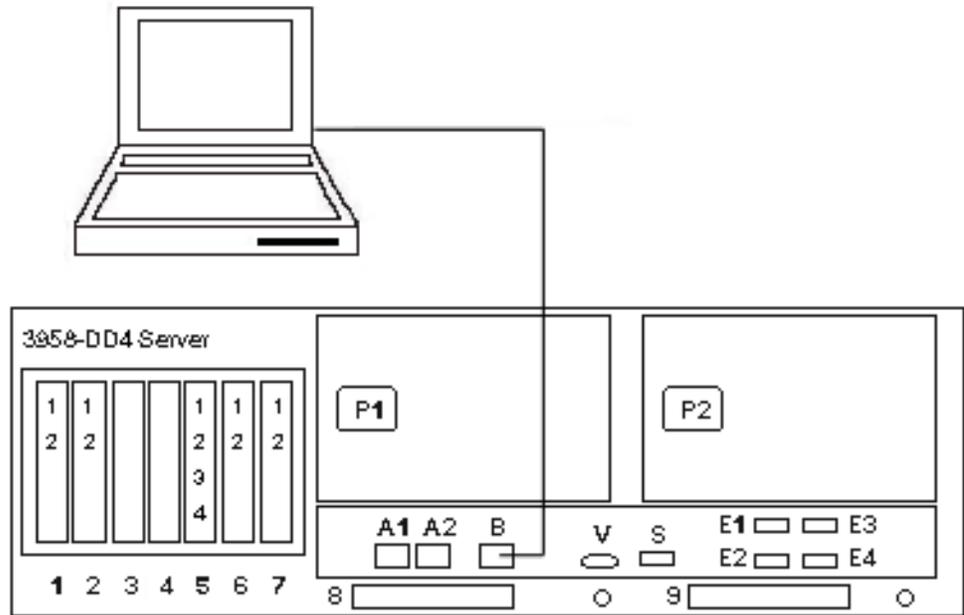


Figure 49. Service laptop to RSA connection

3. On the laptop, click **Start** → **Control Panel**.
4. Double-click **Network Connections**.
5. Right-click **Local Area Connection** → **Properties**. See Figure 50.

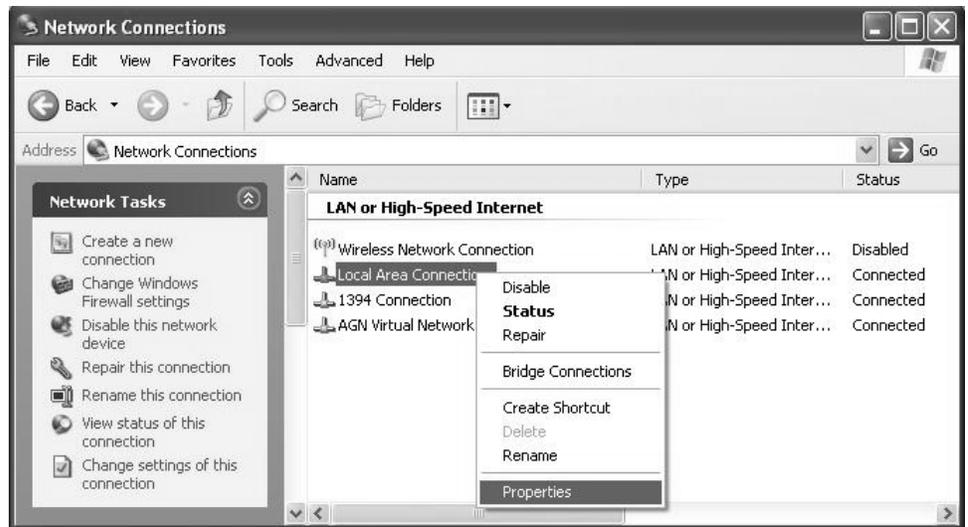


Figure 50. Local Area Connection Properties

6. From the list, select **Internet Protocol (TCP/IP)**, then click **Properties**.
7. Select **Use the following IP address**.
8. In the **IP Address** field, type: **172.31.1.14** (or **192.168.70.33** if the RSA is a new FRU), and in the **Subnet mask** field, type: **255.255.255.0**.
9. Click **OK** and then click **Close** to exit the **Local Area Connections Properties** window.
10. On the TSSC or service laptop, open a browser window.

11. In the **Address Bar** area of the browser window, type the default RSA port IP address: **172.31.1.254** (or **192.168.70.125** if the RSA is a new FRU), and then press **<enter>**.
12. In the **Login** window, enter **USERID** as the username and **PASSWORD** (with a zero) as the password, and then click **OK**.

Note: The username and password are case sensitive and must be entered in all uppercase.

The **Integrated Management Module Welcome** window opens.

13. In the **Integrated Management Module Welcome** window:
 - a. Use the **Inactive session timeout value** dropdown list to specify a reasonable amount of time which will keep your session active until you can complete your task. (Ten minutes should suffice.)
Do not select the **No Timeout** setting, as this will prevent anyone else from logging into the RSA until you have logged out.
 - b. Click **Continue**. See Figure 51.

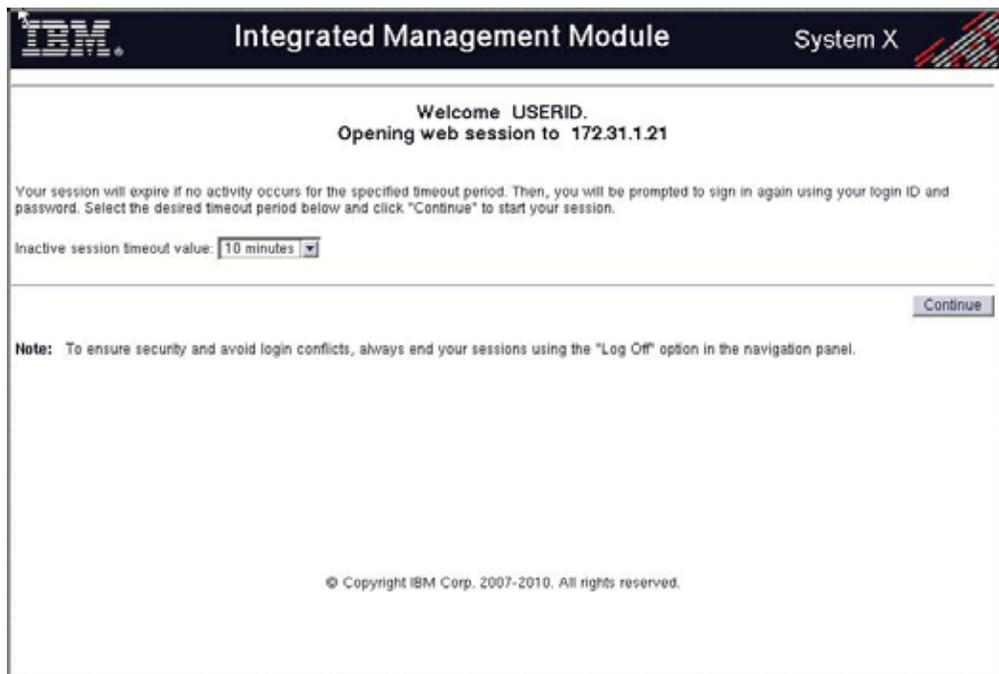


Figure 51. *Integrated Management Welcome window*

You are now logged into the server's RSA.

14. In the **ASM** section of the left-side navigation pane of the **Integrated Management Welcome** window, click **Network Interface**.
15. In the **Static IP Address** field, change the last octet to an address value that is lower than the default of 254.
For example: 172.31.1.253.
16. In the **Netmask** field, enter: 255.255.255.0.
17. Leave the **Gateway** field blank.
18. Click **Save**.
An **Alert** dialog opens.
19. Read the alert and then click **OK** to continue.

20. Close the **ASM** window.
The RSA IP address on Server B is now unique.
21. On the TSSC or service laptop, open a browser window.
22. In the **Address Bar** area of the browser window, type the unique RSA IP address that you set in step 15 on page 158 and then press <enter>.
23. In the **Login** window, enter **USERID** as the username and **PASSWORD** (with a zero) as the password, and then click **OK**.

Note: The username and password are case sensitive and must be entered in all uppercase.

The **Integrated Management Welcome** window opens.

24. In the **Integrated Management Welcome** window:
 - a. Use the **Inactive session timeout value** dropdown list to specify a reasonable amount of time which will keep your session active until you can complete your task. (Ten minutes should suffice.)
Do not select the **No Timeout** setting, as this will prevent anyone else from logging into the RSA until you have logged out.
 - b. Click **Continue**.
See Figure 51 on page 158.

Appendix E. Worldwide time zone codes

Use the information in the following table to help you set the system's time zone.

Time zone codes

The following table lists all of the worldwide time zone codes and the associated time zone descriptions. Additional information about the time zone is located in the Comments column.

| Code | Time zone | Comments |
|------|--------------------------------|---|
| AD | Europe/Andorra | |
| AE | Asia/Dubai | |
| AF | Asia/Kabul | |
| AG | America/Antigua | |
| AI | America/Anguilla | |
| AL | Europe/Tirane | |
| AM | Asia/Yerevan | |
| AN | America/Curacao | |
| AO | Africa/Luanda | |
| AQ | Antarctica/McMurdo | McMurdo Station, Ross Island |
| AQ | Antarctica/South_Pole | Amundsen-Scott Station, South Pole |
| AQ | Antarctica/Rothera | Rothera Station, Adelaide Island |
| AQ | Antarctica/Palmer | Palmer Station, Anvers Island |
| AQ | Antarctica/Mawson | Mawson Station, Holme Bay |
| AQ | Antarctica/Davis | Davis Station, Vestfold Hills |
| AQ | Antarctica/Casey | Casey Station, Bailey Peninsula |
| AQ | Antarctica/Vostok | Vostok Station, S Magnetic Pole |
| AQ | Antarctica/DumontDUrville | Dumont-d'Urville Station, Terre Adelie |
| AQ | Antarctica/Syowa | Syowa Station, E Ongul I |
| AR | America/Argentina/Buenos_Aires | Buenos Aires (BA, CF) |
| AR | America/Argentina/Cordoba | most locations (CB, CC, CN, ER, FM, LP, MN, NQ, RN, SA, SE, SF, SL) |
| AR | America/Argentina/Jujuy | Jujuy (JY) |
| AR | America/Argentina/Tucuman | Tucuman (TM) |
| AR | America/Argentina/Catamarca | Catamarca (CT), Chubut (CH) |
| AR | America/Argentina/La_Rioja | La Rioja (LR) |
| AR | America/Argentina/San_Juan | San Juan (SJ) |
| AR | America/Argentina/Mendoza | Mendoza (MZ) |
| AR | America/Argentina/Rio_Gallegos | Santa Cruz (SC) |
| AR | America/Argentina/Ushuaia | Tierra del Fuego (TF) |
| AS | Pacific/Pago_Pago | |

| Code | Time zone | Comments |
|------|-----------------------|--|
| AT | Europe/Vienna | |
| AU | Australia/Lord_Howe | Lord Howe Island |
| AU | Australia/Hobart | Tasmania - most locations |
| AU | Australia/Currie | Tasmania - King Island |
| AU | Australia/Melbourne | Victoria |
| AU | Australia/Sydney | New South Wales - most locations |
| AU | Australia/Broken_Hill | New South Wales - Yancowinna |
| AU | Australia/Brisbane | Queensland - most locations |
| AU | Australia/Lindeman | Queensland - Holiday Islands |
| AU | Australia/Adelaide | South Australia |
| AU | Australia/Darwin | Northern Territory |
| AU | Australia/Perth | Western Australia - most locations |
| AU | Australia/Eucla | Western Australia - Eucla area |
| AW | America/Aruba | |
| AX | Europe/Mariehamn | |
| AZ | Asia/Baku | |
| BA | Europe/Sarajevo | |
| BB | America/Barbados | |
| BD | Asia/Dhaka | |
| BE | Europe/Brussels | |
| BF | Africa/Ouagadougou | |
| BG | Europe/Sofia | |
| BH | Asia/Bahrain | |
| BI | Africa/Bujumbura | |
| BJ | Africa/Porto-Novo | |
| BL | America/St_Barthelemy | |
| BM | Atlantic/Bermuda | |
| BN | Asia/Brunei | |
| BO | America/La_Paz | |
| BR | America/Noronha | Atlantic islands |
| BR | America/Belem | Amapa, E Para |
| BR | America/Fortaleza | NE Brazil (MA, PI, CE, RN, PB) |
| BR | America/Recife | Pernambuco |
| BR | America/Araguaina | Tocantins |
| BR | America/Maceio | Alagoas, Sergipe |
| BR | America/Bahia | Bahia |
| BR | America/Sao_Paulo | S & SE Brazil (GO, DF, MG, ES, RJ, SP, PR, SC, RS) |
| BR | America/Campo_Grande | Mato Grosso do Sul |
| BR | America/Cuiaba | Mato Grosso |
| BR | America/Porto_Velho | W Para, Rondonia |
| BR | America/Boa_Vista | Roraima |

| Code | Time zone | Comments |
|------|-----------------------|---|
| BR | America/Manaus | E Amazonas |
| BR | America/Eirunepe | W Amazonas |
| BR | America/Rio_Branco | Acre |
| BS | America/Nassau | |
| BT | Asia/Thimphu | |
| BW | Africa/Gaborone | |
| BY | Europe/Minsk | |
| BZ | America/Belize | |
| CA | America/St_Johns | Newfoundland Time, including SE Labrador |
| CA | America/Halifax | Atlantic Time - Nova Scotia (most places), PEI |
| CA | America/Glace_Bay | Atlantic Time - Nova Scotia - places that did not observe DST 1966-1971 |
| CA | America/Moncton | Atlantic Time - New Brunswick |
| CA | America/Goose_Bay | Atlantic Time - Labrador - most locations |
| CA | America/Blanc-Sablon | Atlantic Standard Time - Quebec - Lower North Shore |
| CA | America/Montreal | Eastern Time - Quebec - most locations |
| CA | America/Toronto | Eastern Time - Ontario - most locations |
| CA | America/Nipigon | Eastern Time - Ontario & Quebec - places that did not observe DST 1967-1973 |
| CA | America/Thunder_Bay | Eastern Time - Thunder Bay, Ontario |
| CA | America/Iqaluit | Eastern Time - east Nunavut - most locations |
| CA | America/Pangnirtung | Eastern Time - Pangnirtung, Nunavut |
| CA | America/Resolute | Eastern Time - Resolute, Nunavut |
| CA | America/Atikokan | Eastern Standard Time - Atikokan, Ontario and Southampton I, Nunavut |
| CA | America/Rankin_Inlet | Central Time - central Nunavut |
| CA | America/Winnipeg | Central Time - Manitoba & west Ontario |
| CA | America/Rainy_River | Central Time - Rainy River & Fort Frances, Ontario |
| CA | America/Regina | Central Standard Time - Saskatchewan - most locations |
| CA | America/Swift_Current | Central Standard Time - Saskatchewan - midwest |
| CA | America/Edmonton | Mountain Time - Alberta, east British Columbia & west Saskatchewan |
| CA | America/Cambridge_Bay | Mountain Time - west Nunavut |
| CA | America/Yellowknife | Mountain Time - central Northwest Territories |
| CA | America/Inuvik | Mountain Time - west Northwest Territories |
| CA | America/Dawson_Creek | Mountain Standard Time - Dawson Creek & Fort Saint John, British Columbia |
| CA | America/Vancouver | Pacific Time - west British Columbia |
| CA | America/Whitehorse | Pacific Time - south Yukon |
| CA | America/Dawson | Pacific Time - north Yukon |
| CC | Indian/Cocos | |

| Code | Time zone | Comments |
|------|-----------------------|--|
| CD | Africa/Kinshasa | west Dem. Rep. of Congo |
| CD | Africa/Lubumbashi | east Dem. Rep. of Congo |
| CF | Africa/Bangui | |
| CG | Africa/Brazzaville | |
| CH | Europe/Zurich | |
| CI | Africa/Abidjan | |
| CK | Pacific/Rarotonga | |
| CL | America/Santiago | most locations |
| CL | Pacific/Easter | Easter Island & Sala y Gomez |
| CM | Africa/Douala | |
| CN | Asia/Shanghai | east China - Beijing, Guangdong, Shanghai, etc. |
| CN | Asia/Harbin | Heilongjiang (except Mohe), Jilin |
| CN | Asia/Chongqing | central China - Sichuan, Yunnan, Guangxi, Shaanxi, Guizhou, etc. |
| CN | Asia/Urumqi | most of Tibet & Xinjiang |
| CN | Asia/Kashgar | west Tibet & Xinjiang |
| CO | America/Bogota | |
| CR | America/Costa_Rica | |
| CU | America/Havana | |
| CV | Atlantic/Cape_Verde | |
| CX | Indian/Christmas | |
| CY | Asia/Nicosia | |
| CZ | Europe/Prague | |
| DE | Europe/Berlin | |
| DJ | Africa/Djibouti | |
| DK | Europe/Copenhagen | |
| DM | America/Dominica | |
| DO | America/Santo_Domingo | |
| DZ | Africa/Algiers | |
| EC | America/Guayaquil | mainland |
| EC | Pacific/Galapagos | Galapagos Islands |
| EE | Europe/Tallinn | |
| EG | Africa/Cairo | |
| EH | Africa/El_Aaiun | |
| ER | Africa/Asmara | |
| ES | Europe/Madrid | mainland |
| ES | Africa/Ceuta | Ceuta & Melilla |
| ES | Atlantic/Canary | Canary Islands |
| ET | Africa/Addis_Ababa | |
| FI | Europe/Helsinki | |
| FJ | Pacific/Fiji | |

| Code | Time zone | Comments |
|------|------------------------|---|
| FK | Atlantic/Stanley | |
| FM | Pacific/Truk | Truk (Chuuk) and Yap |
| FM | Pacific/Ponape | Ponape (Pohnpei) |
| FM | Pacific/Kosrae | Kosrae |
| FO | Atlantic/Faroe | |
| FR | Europe/Paris | |
| GA | Africa/Libreville | |
| GB | Europe/London | |
| GD | America/Grenada | |
| GE | Asia/Tbilisi | |
| GF | America/Cayenne | |
| GG | Europe/Guernsey | |
| GH | Africa/Accra | |
| GI | Europe/Gibraltar | |
| GL | America/Godthab | most locations |
| GL | America/Danmarkshavn | east coast, north of Scoresbysund |
| GL | America/Scoresbysund | Scoresbysund / Ittoqqortoormiit |
| GL | America/Thule | Thule / Pituffik |
| GM | Africa/Banjul | |
| GN | Africa/Conakry | |
| GP | America/Guadeloupe | |
| GQ | Africa/Malabo | |
| GR | Europe/Athens | |
| GS | Atlantic/South_Georgia | |
| GT | America/Guatemala | |
| GU | Pacific/Guam | |
| GW | Africa/Bissau | |
| GY | America/Guyana | |
| HK | Asia/Hong_Kong | |
| HN | America/Tegucigalpa | |
| HR | Europe/Zagreb | |
| HT | America/Port-au-Prince | |
| HU | Europe/Budapest | |
| ID | Asia/Jakarta | Java & Sumatra |
| ID | Asia/Pontianak | west & central Borneo |
| ID | Asia/Makassar | east & south Borneo, Celebes, Bali, Nusa Tenggara, west Timor |
| ID | Asia/Jayapura | Irian Jaya & the Moluccas |
| IE | Europe/Dublin | |
| IL | Asia/Jerusalem | |
| IM | Europe/Isle_of_Man | |

| Code | Time zone | Comments |
|------|--------------------|---|
| IN | Asia/Calcutta | |
| IO | Indian/Chagos | |
| IQ | Asia/Baghdad | |
| IR | Asia/Tehran | |
| IS | Atlantic/Reykjavik | |
| IT | Europe/Rome | |
| JE | Europe/Jersey | |
| JM | America/Jamaica | |
| JO | Asia/Amman | |
| JP | Asia/Tokyo | |
| KE | Africa/Nairobi | |
| KG | Asia/Bishkek | |
| KH | Asia/Phnom_Penh | |
| KI | Pacific/Tarawa | Gilbert Islands |
| KI | Pacific/Enderbury | Phoenix Islands |
| KI | Pacific/Kiritimati | Line Islands |
| KM | Indian/Comoro | |
| KN | America/St_Kitts | |
| KP | Asia/Pyongyang | |
| KR | Asia/Seoul | |
| KW | Asia/Kuwait | |
| KY | America/Cayman | |
| KZ | Asia/Almaty | most locations |
| KZ | Asia/Qyzylorda | Qyzylorda (Kyzylorda, Kzyl-Orda) |
| KZ | Asia/Aqtobe | Aqtobe (Aktobe) |
| KZ | Asia/Aqtau | Atyrau (Atirau, Gur'yev), Mangghystau (Mankistau) |
| KZ | Asia/Oral | West Kazakhstan |
| LA | Asia/Vientiane | |
| LB | Asia/Beirut | |
| LC | America/St_Lucia | |
| LI | Europe/Vaduz | |
| LK | Asia/Colombo | |
| LR | Africa/Monrovia | |
| LS | Africa/Maseru | |
| LT | Europe/Vilnius | |
| LU | Europe/Luxembourg | |
| LV | Europe/Riga | |
| LY | Africa/Tripoli | |
| MA | Africa/Casablanca | |
| MC | Europe/Monaco | |
| MD | Europe/Chisinau | |

| Code | Time zone | Comments |
|------|---------------------|--|
| ME | Europe/Podgorica | |
| MF | America/Marigot | |
| MG | Indian/Antananarivo | |
| MH | Pacific/Majuro | most locations |
| MH | Pacific/Kwajalein | Kwajalein |
| MK | Europe/Skopje | |
| ML | Africa/Bamako | |
| MM | Asia/Rangoon | |
| MN | Asia/Ulaanbaatar | most locations |
| MN | Asia/Hovd | Bayan-Olgii, Govi-Altai, Hovd, Uvs, Zavkhan |
| MN | Asia/Choibalsan | Dornod, Sukhbaatar |
| MO | Asia/Macau | |
| MP | Pacific/Saipan | |
| MQ | America/Martinique | |
| MR | Africa/Nouakchott | |
| MS | America/Montserrat | |
| MT | Europe/Malta | |
| MU | Indian/Mauritius | |
| MV | Indian/Maldives | |
| MW | Africa/Blantyre | |
| MX | America/Mexico_City | Central Time - most locations |
| MX | America/Cancun | Central Time - Quintana Roo |
| MX | America/Merida | Central Time - Campeche, Yucatan |
| MX | America/Monterrey | Central Time - Coahuila, Durango, Nuevo Leon, Tamaulipas |
| MX | America/Mazatlan | Mountain Time - S Baja, Nayarit, Sinaloa |
| MX | America/Chihuahua | Mountain Time - Chihuahua |
| MX | America/Hermosillo | Mountain Standard Time - Sonora |
| MX | America/Tijuana | Pacific Time |
| MY | Asia/Kuala_Lumpur | peninsular Malaysia |
| MY | Asia/Kuching | Sabah & Sarawak |
| MZ | Africa/Maputo | |
| NA | Africa/Windhoek | |
| NC | Pacific/Noumea | |
| NE | Africa/Niamey | |
| NF | Pacific/Norfolk | |
| NG | Africa/Lagos | |
| NI | America/Managua | |
| NL | Europe/Amsterdam | |
| NO | Europe/Oslo | |
| NP | Asia/Katmandu | |

| Code | Time zone | Comments |
|------|----------------------|------------------------------|
| NR | Pacific/Nauru | |
| NU | Pacific/Niue | |
| NZ | Pacific/Auckland | most locations |
| NZ | Pacific/Chatham | Chatham Islands |
| OM | Asia/Muscat | |
| PA | America/Panama | |
| PE | America/Lima | |
| PF | Pacific/Tahiti | Society Islands |
| PF | Pacific/Marquesas | Marquesas Islands |
| PF | Pacific/Gambier | Gambier Islands |
| PG | Pacific/Port_Moresby | |
| PH | Asia/Manila | |
| PK | Asia/Karachi | |
| PL | Europe/Warsaw | |
| PM | America/Miquelon | |
| PN | Pacific/Pitcairn | |
| PR | America/Puerto_Rico | |
| PS | Asia/Gaza | |
| PT | Europe/Lisbon | mainland |
| PT | Atlantic/Madeira | Madeira Islands |
| PT | Atlantic/Azores | Azores |
| PW | Pacific/Palau | |
| PY | America/Asuncion | |
| QA | Asia/Qatar | |
| RE | Indian/Reunion | |
| RO | Europe/Bucharest | |
| RS | Europe/Belgrade | |
| RU | Europe/Kaliningrad | Moscow-01 - Kaliningrad |
| RU | Europe/Moscow | Moscow+00 - west Russia |
| RU | Europe/Volgograd | Moscow+00 - Caspian Sea |
| RU | Europe/Samara | Moscow+01 - Samara, Udmurtia |
| RU | Asia/Yekaterinburg | Moscow+02 - Urals |
| RU | Asia/Omsk | Moscow+03 - west Siberia |
| RU | Asia/Novosibirsk | Moscow+03 - Novosibirsk |
| RU | Asia/Krasnoyarsk | Moscow+04 - Yenisei River |
| RU | Asia/Irkutsk | Moscow+05 - Lake Baikal |
| RU | Asia/Yakutsk | Moscow+06 - Lena River |
| RU | Asia/Vladivostok | Moscow+07 - Amur River |
| RU | Asia/Sakhalin | Moscow+07 - Sakhalin Island |
| RU | Asia/Magadan | Moscow+08 - Magadan |
| RU | Asia/Kamchatka | Moscow+09 - Kamchatka |

| Code | Time zone | Comments |
|------|-----------------------|--|
| RU | Asia/Anadyr | Moscow+10 - Bering Sea |
| RW | Africa/Kigali | |
| SA | Asia/Riyadh | |
| SB | Pacific/Guadalcanal | |
| SC | Indian/Mahe | |
| SD | Africa/Khartoum | |
| SE | Europe/Stockholm | |
| SG | Asia/Singapore | |
| SH | Atlantic/St_Helena | |
| SI | Europe/Ljubljana | |
| SJ | Arctic/Longyearbyen | |
| SK | Europe/Bratislava | |
| SL | Africa/Freetown | |
| SM | Europe/San_Marino | |
| SN | Africa/Dakar | |
| SO | Africa/Mogadishu | |
| SR | America/Paramaribo | |
| ST | Africa/Sao_Tome | |
| SV | America/El_Salvador | |
| SY | Asia/Damascus | |
| SZ | Africa/Mbabane | |
| TC | America/Grand_Turk | |
| TD | Africa/Ndjamena | |
| TF | Indian/Kerguelen | |
| TG | Africa/Lome | |
| TH | Asia/Bangkok | |
| TJ | Asia/Dushanbe | |
| TK | Pacific/Fakaofu | |
| TL | Asia/Dili | |
| TM | Asia/Ashgabat | |
| TN | Africa/Tunis | |
| TO | Pacific/Tongatapu | |
| TR | Europe/Istanbul | |
| TT | America/Port_of_Spain | |
| TV | Pacific/Funafuti | |
| TW | Asia/Taipei | |
| TZ | Africa/Dar_es_Salaam | |
| UA | Europe/Kiev | most locations |
| UA | Europe/Uzhgorod | Ruthenia |
| UA | Europe/Zaporozhye | Zaporozh'ye, E Lugansk / Zaporizhia, E Luhansk |
| UA | Europe/Simferopol | central Crimea |

| Code | Time zone | Comments |
|------|--------------------------------|---|
| UG | Africa/Kampala | |
| UM | Pacific/Johnston | Johnston Atoll |
| UM | Pacific/Midway | Midway Islands |
| UM | Pacific/Wake | Wake Island |
| US | America/New_York | Eastern Time |
| US | America/Detroit | Eastern Time - Michigan - most locations |
| US | America/Kentucky/Louisville | Eastern Time - Kentucky - Louisville area |
| US | America/Kentucky/Monticello | Eastern Time - Kentucky - Wayne County |
| US | America/Indiana/Indianapolis | Eastern Time - Indiana - most locations |
| US | America/Indiana/Vincennes | Eastern Time - Indiana - Daviess, Dubois, Knox & Martin Counties |
| US | America/Indiana/Knox | Eastern Time - Indiana - Starke County |
| US | America/Indiana/Winamac | Eastern Time - Indiana - Pulaski County |
| US | America/Indiana/Marengo | Eastern Time - Indiana - Crawford County |
| US | America/Indiana/Vevay | Eastern Time - Indiana - Switzerland County |
| US | America/Chicago | Central Time |
| US | America/Indiana/Tell_City | Central Time - Indiana - Perry County |
| US | America/Indiana/Petersburg | Central Time - Indiana - Pike County |
| US | America/Menominee | Central Time - Michigan - Dickinson, Gogebic, Iron & Menominee Counties |
| US | America/North_Dakota/Center | Central Time - North Dakota - Oliver County |
| US | America/North_Dakota/New_Salem | Central Time - North Dakota - Morton County (except Mandan area) |
| US | America/Denver | Mountain Time |
| US | America/Boise | Mountain Time - south Idaho & east Oregon |
| US | America/Shiprock | Mountain Time - Navajo |
| US | America/Phoenix | Mountain Standard Time - Arizona |
| US | America/Los_Angeles | Pacific Time |
| US | America/Anchorage | Alaska Time |
| US | America/Juneau | Alaska Time - Alaska panhandle |
| US | America/Yakutat | Alaska Time - Alaska panhandle neck |
| US | America/Nome | Alaska Time - west Alaska |
| US | America/Adak | Aleutian Islands |
| US | Pacific/Honolulu | Hawaii |
| UY | America/Montevideo | |
| UZ | Asia/Samarkand | west Uzbekistan |
| UZ | Asia/Tashkent | east Uzbekistan |
| VA | Europe/Vatican | |
| VC | America/St_Vincent | |
| VE | America/Caracas | |
| VG | America/Tortola | |
| VI | America/St_Thomas | |

| Code | Time zone | Comments |
|-------------|---------------------|-----------------|
| VN | Asia/Saigon | |
| VU | Pacific/Efate | |
| WF | Pacific/Wallis | |
| WS | Pacific/Apia | |
| YE | Asia/Aden | |
| YT | Indian/Mayotte | |
| ZA | Africa/Johannesburg | |
| ZM | Africa/Lusaka | |
| ZW | Africa/Harare | |

Appendix F. ProtecTIER Replication Network Performance Validation Utility for VTL Systems

The VTL `pt_net_perf_util` utility's objective is to test maximal replication performance between two future ProtecTIER VTL repositories by emulating the network usage patterns of ProtecTIER's Native Replication component. This utility will not predict replication performance, but it may discover performance bottlenecks.

Before you begin

The requirements of this utility are as follows:

- Red Hat Enterprise Linux 5.4
- Standard external utilities expected to be in the current path: ping, netstat, getopt, echo.

The `pt_net_perf_util` utility and the iperf tool it uses are installed as part of the ProtecTIER software installation. To test the replication performance, use the following tool:

- iperf 2.0.4
`/usr/local/bin/iperf`

This utility has two modes of operation, client and server. The server has to be started before the client. Before running the utility, shut down all other programs on both the client and server ProtecTIER systems. The **client** is the ProtecTIER system that transmits the test data and the **server** is the ProtecTIER system that receives the data (also known as the **target** server). Based on the data sent by the client and received by the server, the script outputs key network parameter values which indicate certain attributes of the network. The goal of these tests is to benchmark the throughput of the network. The most important benchmark is the direction that replication will actually take place, i.e. the target should be tested as the server since the flow of data will be **to** that server from the client. However, it is also important to also test the reverse direction to measure the bandwidth performance during disaster recovery failback. Network bandwidth is not always the same in both directions.

About this task

In the following procedure, the goal is to test network performance between two machines on a WAN, **server1** and **server2**. Each test will run for five minutes. Since there are five tests, the process will take a total of 25 minutes.

Procedure

1. Start the server mode of the utility on **server1** by entering the following commands on the command line:

```
cd /opt/dtc/app/sbin
./pt_net_perf_util -s
```

2. Start the client mode of the utility on **server2** by entering the following command on the command line:

```
./pt_net_perf_util -c server1 -t 300
```

3. The utility will automatically perform the tests in sequence. The **client** output (**server2** in the example below) will look similar to the following:

Note: In the sample output below the test ran for only 5 seconds instead of 300.

```
*** Latency
PING 9.5.53.33 (9.5.53.33) 56(84) bytes of data.

--- 9.5.53.33 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 4001ms
rtt min/avg/max/mdev = 0.257/0.406/0.484/0.079 ms

*** Throughput - Default TCP
[ 3] 0.0- 5.0 sec 56.6 MBytes 94.8 Mbits/sec

*** Throughput - 1 TCP stream(s), 1MB send buffer
[ 3] 0.0- 5.0 sec 57.0 MBytes 95.0 Mbits/sec

*** Throughput - 16 TCP stream(s), 1MB send buffer
[SUM] 0.0- 5.8 sec 65.0 MBytes 94.3 Mbits/sec

*** Throughput - 127 TCP stream(s), 1MB send buffer
[SUM] 0.0-11.3 sec 127 MBytes 94.1 Mbits/sec

Number of TCP segments sent: 230536
Number of TCP retransmissions detected: 21 (0%)

Done.
```

See the next section for information about interpreting the results of the tests.

Interpreting the results

The utility performs five foreground tests (Tests 1-5 below), and one background test (Test 6 below). The example outputs below are from the client side. Each of the first five tests below ran for 300 seconds (-t 300), while the last test monitored TCP performance during that time.

Test 1: Latency

This test checks the nominal network link latency and packet loss. Example result:

```
*** Latency
PING 10.0.13.194 (10.0.13.194) 56(84) bytes of data.

--- 10.0.13.194 ping statistics ---
120 packets transmitted, 120 received, 0% packet loss, time 119060ms
rtt min/avg/max/mdev = 57.403/78.491/104.451/9.872 ms
```

Interpreting the results:

- The average round-trip-time (rtt) was 78.4ms and there was 0% packet loss.
- The latency in WAN topologies may vary, but should never exceed 200ms. Contact your network administrator if latency reports more than 200ms, as it may significantly decrease replication throughput.
- Higher latency values will cause a major deterioration in replication throughput.
- Packet loss should be 0%. Any other value indicates a major network problem.

Test 2: Throughput - default settings

This test checks maximal TCP throughput using a single data stream with default TCP settings. Example result:

```
*** Throughput - Default TCP
[ 3] 0.0-120.1 sec 2.41 GBytes 173 Mbits/sec
```

Interpreting the results:

- The test ran for 120.1 seconds, transferred 2.41 GB (2.24 GiB), with an average throughput of 173 Mbits/sec.

Note: 1 MByte = 1,048,576 bytes. 1 Mbit/sec = 1,000,000 bits/sec.

Test 3: Throughput - single stream, 1MB send buffer

This test checks maximal TCP throughput using a single data stream with a 1MB (0.95 MiB) send buffer. Example result:

```
*** Throughput - 1 TCP stream(s), 1MB send buffer
[ 3] 0.0-120.0 sec 2.51 GBytes 180 Mbits/sec
```

Interpreting the results:

- The test ran for 120.0 seconds, transferred 2.51 GB (2.34 GiB), with an average throughput of 180 Mbits/sec.
- There may be an improvement here on high-latency links.

Test 4: Throughput - 16 streams, 1MB send buffer

Example result:

```
*** Throughput - 16 TCP stream(s), 1MB send buffer
[SUM] 0.0-121.4 sec 5.91 GBytes 418 Mbits/sec
```

Interpreting the results:

- The test ran for 121.4 seconds, transferred 5.91 GB (5.5 GiB), with an average throughput of 418 Mbits/sec.
- The extra streams yielded higher utilization of the connection.
- The Mbits/sec reported in this test is the maximum replication performance your system will achieve if your backup environment is using up to 2-3 cartridges in parallel.

Test 5: Throughput - 127 streams, 1MB send buffer

Example result:

```
*** Throughput - 127 TCP stream(s), 1MB send buffer
[SUM] 0.0-126.1 sec 8.08 GBytes 550 Mbits/sec
```

Interpreting the results:

- The test ran for 126.1 seconds, transferred 8.08 GB (7.53 Gb), with an average throughput of 550 Mbits/sec.
- TCP takes a while to reach its maximal throughput. Longer testing times, 300 seconds or more, will produce more accurate results.
- The throughput value given by this test is the potential physical replication throughput for this system. It is directly affected by the available bandwidth, latency, packet loss and retransmission rate.

- The Mbits/sec reported in this test is the maximum replication performance your system may achieve. If this number is lower than anticipated, contact your network administrator.

Test 6: TCP Retransmissions vs. Total TCP segments sent

Example result:

Number of TCP segments sent: 1619061
Number of TCP retransmissions detected: 201038 (12%)

Interpreting the results:

- A total of 1619061 TCP segments were sent during the five tests, out of which, 201038 were lost and retransmitted.
- The retransmission rate imposes a direct penalty on the throughput, as the retransmission of these packets take up bandwidth. The retransmission can be caused by the underlying network (e.g. packet dropping by an overflowed router) or by the TCP layer itself (e.g. retransmission due to packet reordering).
- Segment loss can be caused by each of the network layers.
- TCP retransmission larger than 2% may cause performance degradation and unstable network connectivity. Contact your network administrator to resolve this issue and reduce it to approximately 0%.

What to do next

You may want to run these tests again to test the reverse throughput in the network. To run the tests in reverse, change **server1** to the client and **server2** to the server and repeat the procedures.

Appendix G. ProtecTIER Network Performance Validation Utility for OpenStorage Systems

The OpenStorage **pt_net_perf_util** utility's objective is to test network performance between an OpenStorage host and a ProtecTIER server. This utility will not predict backup and restore performance, but it may discover performance bottlenecks.

Before you begin

The requirements of this utility are as follows:

- Red Hat Enterprise Linux 5.4 or any other platform officially supported by the OpenStorage plug-in
- Standard external utilities expected to be in the current path such as ping and netstat

About this task

The **pt_net_perf_util** utility and the **iperf** tool it uses are installed as part of the ProtecTIER software installation. The location of the utility varies according to the platform:

- Windows plug-in: %PROGRAMFILES%\IBM\ost_plugin_tools
- AIX plug-in: /opt/IBM/ost_plugin_tools
- ProtecTIER server: /opp/dtc/app/sbin

This utility has two modes of operation, client and server. The server has to be started before the client. Before running the utility, shut down all other programs on both the client and server systems. The client is the system that transmits the test data and the server is the system that receives the data (also known as the target server). Based on the data sent by the client and received by the server, the script outputs key network parameter values which indicate certain attributes of the network. The goal of these tests is to benchmark the throughput of the network. It is important to test both OpenStorage host-to-ProtecTIER server and ProtecTIER server-to-OpenStorage host directions to measure the bandwidth performance during both backup and restore activities. Network bandwidth is not always the same in both directions. In addition, if an OpenStorage host or a ProtecTIER server uses more than one IP address for OpenStorage operation, it is essential to test each IP address separately.

In the following procedure, the goal is to test network performance between two machines **server1** and **server2**. Each test will run for five minutes. Since there are five tests, the process will take a total of 25 minutes.

Procedure

1. Start the server mode of the utility on **server1** by entering the following commands on the command line:

```
./pt_net_perf_util -s
```
2. Start the client mode of the utility on **server2** by entering the following command on the command line:

```
./pt_net_perf_util -c server1_ip_address -t 300
```

where **server1_ip_address** is one of the IP addresses to be tested for server1. The default size of a buffer used for sending data is 1024KB. To override this size to another value, for example 256KB, use the **-l** parameter as follows:

```
./pt_net_perf_util -c server1_ip_address -t 300 -l 256
```

Note: If server1 is a Windows system, use following command:

```
pt_net_perf_util.bat -c server1_ip_address -t 300 --win-server
```

where **server1_ip_address** is one of the IP addresses to be tested for server1. The same buffer override command can also be used to change the size of the buffer.

3. The utility will automatically perform the tests in sequence. The client output (server2 in the example below) will look similar to the following:

Note: In the sample output below the test ran for only 5 seconds instead of 300.

```
*** Latency
PING 9.5.53.33 (9.5.53.33) 56(84) bytes of data.
--- 9.5.53.33 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 4001ms
rtt min/avg/max/mdev = 0.257/0.406/0.484/0.079 ms
*** Throughput - Default TCP
[ 3] 0.0- 5.0 sec 56.6 MBytes 94.8 Mbits/sec
*** Throughput - 1 TCP stream(s), 1MB send buffer
[ 3] 0.0- 5.0 sec 57.0 MBytes 95.0 Mbits/sec
*** Throughput - 16 TCP stream(s), 1MB send buffer
[SUM] 0.0- 5.8 sec 65.0 MBytes 94.3 Mbits/sec
*** Throughput - 127 TCP stream(s), 1MB send buffer
[SUM] 0.0-11.3 sec 127 MBytes 94.1 Mbits/sec
Number of TCP segments sent: 230536
Number of TCP retransmissions detected: 21 (0%)
Done.
```

4. See the next section for information about interpreting the results of the tests.

Interpreting the results

The utility performs five foreground tests (Tests 1-5 below), and one background test (Test 6 below). The example outputs below are from the client side. Each of the first five tests below ran for 300 seconds (**-t 300**), while the last test monitored TCP performance during that time.

Test 1: Latency

This test checks the nominal network link latency and packet loss. Example result:

```
*** Latency
PING 10.0.13.194 (10.0.13.194) 56(84) bytes of data.

--- 10.0.13.194 ping statistics ---
120 packets transmitted, 120 received, 0% packet loss, time 119060ms
rtt min/avg/max/mdev = 57.403/78.491/104.451/9.872 ms
```

Interpreting the results:

- The average round-trip-time (rtt) was 78.4ms and there was 0% packet loss.
- The round-trip-time in network topologies may vary, but should never exceed 200ms on WAN. Contact your network administrator if round-trip-time reports more than 200ms on WAN or 6ms on LAN, as it may significantly decrease throughput.

- Higher latency values will cause a major deterioration in throughput.
- Packet loss should be 0%. Any other value indicates a major network problem.

Test 2: Throughput - default settings

This test checks maximal TCP throughput using a single data stream with default TCP settings. Example result:

```
*** Throughput - Default TCP
[ 3] 0.0-120.1 sec 2.41 GBytes 173 Mbits/sec
```

Interpreting the results:

- The test ran for 120.1 seconds, transferred 2.41 GB (2.24 Gb), with an average throughput of 173 Mbits/sec.

Note: 1 MByte = 1,048,576 bytes. 1 Mbit/sec = 1,000,000 bits/sec.

Test 3: Throughput - single stream, 1MB send buffer

This test checks maximal TCP throughput using a single data stream with a 1MB (0.95 MiB) send buffer. Example result:

```
*** Throughput - 1 TCP stream(s), 1MB send buffer
[ 3] 0.0-120.0 sec 2.51 GBytes 180 Mbits/sec
```

Interpreting the results:

- The test ran for 120.0 seconds, transferred 2.51 GB (2.34 GiB), with an average throughput of 180 Mbits/sec.
- There may be an improvement here on high-latency links.

Test 4: Throughput - 16 streams, 1MB send buffer

Example result:

```
*** Throughput - 16 TCP stream(s), 1MB send buffer
[SUM] 0.0-121.4 sec 5.91 GBytes 418 Mbits/sec
```

Interpreting the results:

- The test ran for 121.4 seconds, transferred 5.91 GB (5.5 Gb), with an average throughput of 418 Mbits/sec.
- The extra streams yielded higher utilization of the connection.

Test 5: Throughput - 127 streams, 1MB send buffer

Example result:

```
*** Throughput - 127 TCP stream(s), 1MB send buffer
[SUM] 0.0-126.1 sec 8.08 GBytes 550 Mbits/sec
```

Interpreting the results:

- The test ran for 126.1 seconds, transferred 8.08 GB (7.53 Gb), with an average throughput of 550 Mbits/sec.
- TCP takes a while to reach its maximal throughput. Longer testing times, 300 seconds or more, will produce more accurate results.
- The throughput value given by this test is the potential physical throughput for this system. It is directly affected by the available bandwidth, latency, packet loss and retransmission rate.

- The Mbits/sec reported in this test is the maximum throughput your system may achieve. If this number is lower than anticipated, contact your network administrator.

Test 6: TCP Retransmissions vs. Total TCP segments sent

Example result:

Number of TCP segments sent: 1619061
Number of TCP retransmissions detected: 201038 (12%)

Interpreting the results:

- A total of 1619061 TCP segments were sent during the five tests, out of which, 201038 were lost and retransmitted.
- The retransmission rate imposes a direct penalty on the throughput, as the retransmission of these packets take up bandwidth. The retransmission can be caused by the underlying network (e.g. packet dropping by an overflowed router) or by the TCP layer itself (e.g. retransmission due to packet reordering).
- Segment loss can be caused by each of the network layers.
- TCP retransmission larger than 2% may cause performance degradation and unstable network connectivity. Contact your network administrator to resolve this issue and reduce it to approximately 0%.

What to do next

You may want to run these tests again to test the reverse throughput in the network. To run the tests in reverse, change server1 to the client and server2 to the server and repeat the procedures.

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