

IBM VSE/Enterprise Systems Architecture



VSE/ESA Release Guide

Version 2 Release 6

IBM VSE/Enterprise Systems Architecture



VSE/ESA Release Guide

Version 2 Release 6

Note!

Before using this information and the product it supports, be sure to read the general information under "Notices" on page vii.

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This edition applies to Version 2 Release 6 of IBM Virtual Storage Extended/Enterprise Systems Architecture (VSE/ESA), Program Number 5690-VSE, and to all subsequent releases and modifications until otherwise indicated in new editions.

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Contents

Figures	v
--------------------------	----------

Notices	vii
Trademarks and Service Marks	vii
Year 2000 Ready	viii

About This Book.	ix
Who Should Use This Book	ix
How to Use This Book	ix
Where to Find More Information	ix

Chapter 1. VSE/ESA 2.6 Overview. **1**

VSE/ESA 2.6.1 Enhancements	1
Hardware Support	1
Installation Support	1
SSL Client Authentication Enhancements	1
TCP/IP Enhancements	1
Optional Program Changes	2
Shipment and Installation of VSE/ESA 2.6	2
Shipment of VSE/ESA 2.6	2
Installation of VSE/ESA 2.6	2
Base Program Changes	3
Optional Program Changes	3
System Layout Changes	3
New and Enhanced System Functions	4
Initial Installation	4
IPL Enhancements	4
JCL Enhancements	4
Librarian Enhancements	4
Interactive Interface Enhancements	4
VSE/ESA e-business Connectors	5
VSE/VSAM Redirector Connector	5
Enhancements for Java-based (and DB2-based) Connectors	5
Security Enhancements	5
Secure Sockets Layer (SSL) Support	5
DTSECTXN Enhancement	6
CICS External Call Interface (ECI) over TCP/IP	7
OSA Express Support	7
Virtual Tape Support	7
Utility Support	7
FastCopy Exploitation of FlashCopy and SnapShot	7
SDAID Enhancements	7
TERSE Utility	7
Hardware Support	7
New and Enhanced Functions of VSE/ESA Base Programs	8
VSE/VSAM 6.6	8
VSE/POWER 6.6	8
REXX/VSE 6.6	8
LE/VSE 1.4.2	9
TCP/IP 1.4.0	10
CICS TS 1.1.1	10
DB2 Server for VSE 7.2	10
Updates to Existing Documentation	10

Chapter 2. Basic System

Enhancements **11**

Initial Installation	11
Checking for NOPDS during Initial Installation	11
IPL Enhancements	11
Enhancement to the IPL SVA Command	11
Enhancement to the IPL ADD Command	12
Deleting Unexpired Secured System Files during IPL	12
Sensing More Than 1024 Devices during IPL	12
JCL Enhancements	13
VTAPE Command/Statement	13
Enhancement to the SET SDL Command	13
Enhancement to the EXEC Statement	13
JCL Enhancements Introduced with VSE/ESA 2.5	13
MSHP Enhancements	14
Librarian Enhancements	14

Chapter 3. Interactive Interface and VSE/ICCF Enhancements. **15**

Interactive Interface Enhancements	15
VSE/ESA 2.6 Dialog Enhancements	15
VSE/ESA 2.5 Dialog Enhancements	21
VSE/ICCF Enhancements	26
Introduction	26
Invoking the Commands	26

Chapter 4. VSE/VSAM and VSE/POWER Enhancements **29**

VSE/VSAM Enhancements	29
VSE/VSAM Support of Large DASD	29
IXFP/SnapShot Support for VSE/VSAM Datasets	32
VSE/VSAM Buffer Hashing	36
VSE/POWER Enhancements (VSE/ESA 2.6)	37
Data File Extension During Warm Start	37
Enhanced Networking Capabilities	37
Additional Enhancements Implemented through Field APARs	38
VSE/POWER Enhancements (VSE/ESA 2.5)	39
Relief for Access to Queue Entries	39
Extension of Functional Support	40
Extension of Networking Capabilities	40
Additional Improvements Implemented through Field APARs	41

Chapter 5. IXFP/SnapShot and FlashCopy Support **43**

Introduction	43
VSE/ESA 2.6 Enhancement	43
Shipment and Installation of FlashCopy and IXFP/SnapShot Support	43
Fast Service Upgrade (FSU) Considerations	44
Hardware Prerequisites	44
Operation	45

IXFP Command	45
Command Syntax	46
SNAP (RVA and ESS)	46
DDSR (RVA only)	48
REPORT (RVA only)	49
IXFP Report Data Sample.	50
IXFP Report Data	50
Usage of IXFP/SnapShot with VM Minidisks	52
Operating in Batch	53
More Information	53
RAMAC Virtual Array (RVA) Storage	
Publications	53
Redbooks	54
WSC Flashes	54
RVA and VSE/ESA Performance Considerations	54
Chapter 6. OSA Express Support	55
Introduction	55
Invoking the Support	55
IOCP Configuration	56
OSA Express Definition in VSE/ESA	56
OSA Express Definition in TCP/IP	56
Documentation Available	57
Chapter 7. Virtual Tape Support	59
Introduction	59
VSE/VSAM or Remote Virtual Tape	59
Defining the Tape Device.	59
VTAPE Command	59
Functional Components of the Virtual Tape Support	59
Establishing the Virtual Tape Environment	60
Startup of the Virtual Tape Data Handler	60
Installing the Virtual Tape Server	61
Important Considerations When Using Virtual Tapes	64

Working with VSE/VSAM Virtual Tapes.	65
VSE/VSAM ESDS File Definition (Skeleton SKVTAPE).	65
Writing to VSE/VSAM Virtual Tapes	66
Working with Remote Virtual Tapes	67
File Names and other Considerations.	67
Further Documentation	68
Examples of Using Virtual Tapes	68
Backing Up and Restoring Data	68
Transferring Virtual Tape Files	68
Installing Optional Programs	69
The VTAPE Command/Statement.	70

Chapter 8. Utility Enhancements. 73

VSE/Fast Copy Exploitation of FlashCopy and SnapShot	73
Job Stream Example	74
SDAID Enhancements	74
Getvis/Freevis Trace	74
Initializing the Trace with Procedure SDGETV.	75
Trace Output Example.	75
TERSE Utility.	76

Chapter 9. Publication Updates 79

VSE/ESA System Macros Reference	79
VSE/ESA System Utilities	79
VSE/VSAM Commands	79
VSE/ICCF User's Guide	80
LE/VSE Customization Guide	80
VSE/ESA Library Control Device Driver for IBM 3494	80

Index 81

Figures

1. Selecting the FlashCopy VSAM Catalog/Files Dialog	16	15. Display CICS TS Storage Dialog.	25
2. FlashCopy VSAM Catalog/Files Dialog - Catalog Definitions	16	16. Syntax of /LISTP Command	26
3. FlashCopy VSAM Catalog/Files Dialog - Volume Definitions	17	17. Syntax of /SKIP ACTIVE Command	27
4. TCP/IP Configuration Dialog	17	18. Syntax for Calling GETx Procedure	28
5. Define a Library Dialog	18	19. Internal Structure of Synonym List.	35
6. Selection Panel for OSAX	19	20. IXFP Command Syntax	46
7. Define Transaction Security Panel	20	21. Skeleton SKVTASTJ (for Starting the Virtual Tape Data Handler).	61
8. Define Transaction Security/Add Entries Panel	20	22. Selecting the Components of the Virtual Tape Server	63
9. Compile Job Generation Panel	21	23. Skeleton SKVTAPE	65
10. Manage Batch Queue Dialog.	21	24. Job Stream Example for Backing Up a VSE/ESA Library	68
11. In-Creation Queue Dialog.	22	25. Prepare for Installation Dialog	69
12. Primary Library Dialog with SIZE Display	23	26. Panel for Defining Virtual Tape Details	70
13. Specify CICS Version	24	27. Syntax of VTAPE START and VTAPE STOP Command/Statement	71
14. Specify Dump Levels	24		

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About This Book

This manual provides an overview of the enhancements and changes implemented with IBM Virtual Storage Extended/Enterprise Systems Architecture, Version 2, Release 6 (VSE/ESA 2.6). The manual provides a detailed description of those new functions that are not described in other manuals.

Who Should Use This Book

This manual is intended for those VSE/ESA users who have a need to understand and get familiar with the new functions and the VSE/ESA 2.6 changes in general.

How to Use This Book

The book includes the following chapters:

- Chapter 1, "VSE/ESA 2.6 Overview" on page 1.
- Chapter 2, "Basic System Enhancements" on page 11.
- Chapter 3, "Interactive Interface and VSE/ICCF Enhancements" on page 15.
- Chapter 4, "VSE/VSAM and VSE/POWER Enhancements" on page 29.
- Chapter 5, "IXFP/SnapShot and FlashCopy Support" on page 43.
- Chapter 6, "OSA Express Support" on page 55.
- Chapter 7, "Virtual Tape Support" on page 59.
- Chapter 8, "Utility Enhancements" on page 73.
- Chapter 9, "Publication Updates" on page 79.

Where to Find More Information

Whenever appropriate, the book refers to other VSE/ESA manuals that provide further details on a specific topic.

The VSE/ESA home page provides additional VSE/ESA information:

VSE/ESA Home Page

VSE/ESA has a home page on the World Wide Web, which offers up-to-date information about VSE-related products and services, new VSE/ESA functions, and other items of interest to VSE users.

You can find the VSE/ESA home page at:

<http://www.ibm.com/servers/eserver/zseries/os/vse/>

Chapter 1. VSE/ESA 2.6 Overview

This chapter provides an overview of the changes and enhancements introduced with VSE/ESA 2.6.

VSE/ESA 2.6.1 Enhancements

This section describes the latest VSE/ESA enhancements, available for the first time with VSE/ESA 2.6.1, June 2002. The remainder of this chapter reflects the 2.6.0 status of VSE/ESA.

Hardware Support

The IBM **zSeries 800** processors were announced after the availability of VSE/ESA 2.6.0. VSE/ESA can run on a zSeries 800 processor in 31-bit mode only. An exception is the Linux-only model 0LF which is not supported by VSE/ESA. Refer to the *VSE/ESA Planning* manual for further details on VSE/ESA processor support (Chapter 1: How to Run VSE/ESA).

Installation Support

In addition to IBM 3480 cartridges and 4MM-DAT tapes, VSE/ESA 2.6.1 is also delivered on IBM **3590** cartridges.

SSL Client Authentication Enhancements

The security support available through the Secure Sockets Layer (SSL) provided by TCP/IP has been further enhanced in the client authentication area.

Client authentication means the use of client certificates to enable the VSE/ESA host to verify that a particular client is really the user he or she claims to be. In SSL, the server certificate is mandatory but the client certificate is optional.

The following client authentication functions are new with VSE/ESA 2.6.1:

- The procedure you have to follow to implement client authentication for VSE Connector Clients has been simplified. The procedure is documented in "Chapter 12. Configuring for Client Authentication" in the manual *VSE/ESA e-business Connectors User's Guide*.
- A new dialog (*Maintain Certificate - User ID List*, Fastpath 29) and various service functions have been introduced to help you manage client certificates and the related user IDs. The dialog and the service functions are available for the CICS Web Support (CWS) but not for the VSE Java-based Connector. The support is documented in a new chapter: "Chapter 13. Service Functions for Client Authentication" in the manual *VSE/ESA e-business Connectors User's Guide*.

TCP/IP Enhancements

Various TCP/IP enhancements are introduced with VSE/ESA 2.6.1. The major changes are:

- Enhancement of the *TCP/IP Configuration* dialogs on the host (Interactive Interface) and the client (PC-based) side.

The Interactive Interface dialog on the host side (Fastpath 246) allows to add VTAM application definitions for Telnet daemons in VTAM book TCPAPP00.B by using the panel function PF9=VTAM.

Overview

The description of the PC-based dialog has been updated to reflect the latest changes in installing and using the dialog on your PC.

Both dialogs are described in detail in "Chapter 3. TCP/IP for VSE/ESA Configuration Dialogs" in the manual *TCP/IP for VSE/ESA IBM Program Setup and Supplementary Information*.

- Enhancement of security exit *BSSTISX*.

An exception list (*BSSTIXE*) for security exit *BSSTISX* has been introduced to allow the specification of access requests that are not to be rejected.

The *SET SECURITY* command offers the parameter *ONX*. Specify *ONX* if the security exit *BSSTISX* is to be used for *FTP BATCH*.

"Chapter 4. Security Manager Exploitation by TCP/IP for VSE/ESA" in the manual *TCP/IP for VSE/ESA IBM Program Setup and Supplementary Information* describes the security exit and its enhancements in detail.

Optional Program Changes

The following optional programs have been upgraded for VSE/ESA 2.6.1:

- *MQSeries for VSE/ESA 2.1.1* which includes now SSL (Secure Sockets Layer) support (APAR PQ54579).
- *QMF for VSE 7.2* which includes key enhancements for the end user, administrator, and developer. *QMF for VSE* is a feature of *DB2 for VSE*.

Shipment and Installation of VSE/ESA 2.6

Shipment of VSE/ESA 2.6

VSE/ESA 2.6 is shipped on **four** tapes as follows:

- Two **base tapes**.
- One **extended base tape**.
- One **extra tape** for the *DB2 Server for VSE Help* component.

The distribution tapes you receive are IBM 3480 cartridges.

For users of the *IBM PC Server 500 System/390*, the *IBM RS/6000 with S/390 Server-on-Board Feature*, and the *IBM S/390 Integrated Server*, VSE/ESA is shipped on 4MM-DAT tapes.

Refer to the *VSE/ESA Planning* manual for further details (Chapter 8. Installing VSE/ESA).

Installation of VSE/ESA 2.6

The following IBM disk devices are supported for the initial installation of VSE/ESA 2.6:

3380 (except Model A)
3390
9336
9345

The device types 3380 and 3390 can also be devices of the IBM RAMAC Array family, or of the IBM Enterprise Storage Server, or can be the Internal Disk of the IBM Multiprise 2000/3000 processors.

If you install VSE/ESA for the first time, you must perform an **initial installation**.

If you have already installed a VSE/ESA 2.4.x or VSE/ESA 2.5.x system, you can perform a *Release Upgrade* through an FSU (Fast Service Upgrade). Older releases of VSE/ESA cannot be upgraded via FSU and VSE/ESA 2.6 must then be installed via initial installation.

Refer to the *VSE/ESA Planning* manual for further details (Chapter 8. Installing VSE/ESA).

Base Program Changes

The following base programs have been upgraded with VSE/ESA 2.6:

- VSE/Central Functions 6.6
- CICS Transaction Server for VSE/ESA 1.1.1
- TCP/IP for VSE/ESA 1.4.0
- DB2 Server for VSE 7.2
- LE/VSE 1.4.2

Support details are provided under “New and Enhanced Functions of VSE/ESA Base Programs” on page 8.

Optional Program Changes

The following optional program changes are introduced with VSE/ESA 2.6.

1. The following programs have been **upgraded**:
 - ACF/NCP 7.8.1
 - ACF/SSP 4.8.1
2. The following program has been **removed**:
 - Opti-Audit for VSE

Refer to the *VSE/ESA Planning* manual for further details (Chapter 2. VSE/ESA Base and VSE/ESA Optional Programs).

System Layout Changes

The following enhancements and changes have been implemented for VSE/ESA 2.6:

- Automatic checking of processor storage size during initial installation. If the processor storage size is sufficient, a NOPDS (no page data set) system is created. Refer to “Checking for NOPDS during Initial Installation” on page 11 for further details.
- With the help of skeleton SKWRKFIL workfiles can be defined to reside on a Virtual Disk. Refer to “Chapter 6: Planning for Files and Libraries” in the *VSE/ESA Planning* manual for details.
- New library CRYPTO.KEYRING in VSE/VSAM master catalog for protecting SSL (Secure Sockets Layer) keys and certificates. Refer to “Chapter 9: Configuring Your VSE/ESA Host for SSL” in the *VSE/ESA e-business Connectors User’s Guide* for details.
- New sublibrary PRD2.DFHDOC for storing maps of type HTML. Refer to “Chapter 6: Planning for Files and Libraries” in the *VSE/ESA Planning* manual for further details.

New and Enhanced System Functions

Initial Installation

The following support is new:

Improved NOPDS (no page data set) handling; refer to “Checking for NOPDS during Initial Installation” on page 11 for details.

IPL Enhancements

The following support is new:

- The maximum number of SDL entries in the IPL SVA command has been increased from 1021 to 32765. Refer to “Enhancement to the IPL SVA Command” on page 11 for further details.
- New device type OSAX in IPL ADD command. Refer to “Enhancement to the IPL ADD Command” on page 12 for further details.
- Improved system file deletion; refer to “Deleting Unexpired Secured System Files during IPL” on page 12 for details.

JCL Enhancements

The following support is new:

- New VTAPE command/statement for virtual tape support. Refer to “The VTAPE Command/Statement” on page 70 for details.
- Improved usage of SET SDL command; refer to “Enhancement to the SET SDL Command” on page 13 for details.
- New SIZE=* operand for EXEC statement; refer to “Enhancement to the EXEC Statement” on page 13 for details.

Librarian Enhancements

The following dialog support is new:

- The maximum number of VSAM extents for a library has been increased from 16 to 32. Refer to the dialog “Define a Library (Fastpath 223)” on page 18 for details.

Interactive Interface Enhancements

The following dialogs are new or have been enhanced:

- New dialog for a VSE/VSAM catalog and the files defined in it as described under “FlashCopy VSAM Catalog/Files (Fastpath 3719)” on page 15.
- New dialog for configuring TCP/IP on the host side as summarized under “TCP/IP Configuration (Fastpath 246)” on page 17. A detailed description is provided in the manual *TCP/IP for VSE/ESA IBM Program Setup and Supplementary Information*.
- Enhanced dialog “Define a Library” (maximum of VSAM extents increased from 16 to 32) as described under “Define a Library (Fastpath 223)” on page 18.
- Enhanced dialog “Configure Hardware” (new device type OSAX) as described under “Configure Hardware (Fastpath 241)” on page 19.
- Enhanced dialog “Define Transaction Security” (new keyword TYPE=GENERIC) as described under “Define Transaction Security (Fastpath 28)” on page 19.
- Enhanced dialog “Compile Job Generation” (new parameter TEMPLATE) as described under “Compile Job Generation (Fastpath 51)” on page 20.

VSE/ESA e-business Connectors

In addition to the Java-based connector and the DB2-based connector introduced with VSE/ESA 2.5, VSE/ESA 2.6 provides further connector enhancements as follows:

VSE/VSAM Redirector Connector

The VSE/VSAM Redirector processes requests to VSE/VSAM datasets and redirects them, for example, to Linux. Using the Redirector, existing programs on the VSE/ESA host can access data stored, for example, in a Linux file system. Such a VSE/ESA host program can be written in any programming language, can run in batch or as CICS transaction and requires no recompilation. The Redirector evaluates each VSE/VSAM request according to the values specified in its properties file.

Refer to the *VSE/ESA e-business Connectors User's Guide* for further details.

Enhancements for Java-based (and DB2-based) Connectors

- Enhancements and adaptations for the **Java-based connector**:
 - Support of Java 2 platform (JDK1.2 and JDK 1.3).
 - Migration of VSE Connector Client and VSE Navigator from JDK 1.1.8 to JDK 1.3 which is the recommended Java level for WebSphere 4.0.
 - Support of WebSphere 4.0 which runs on JDK 1.2 and JDK 1.3. Other versions of WebSphere supported are 2.0, 3.0, and 3.5.
 - JDBC support which provides access to VSE/VSAM datasets through the standard JDBC (Java Database Connectivity) interface.
 - SSL enhancements for Java-based connector as introduced under “Java-based Connector” on page 6.
- VSE/VSAM access through CICS TS for **Java-based** and **DB2-based connectors**.

Refer to the manual *VSE/ESA e-business Connectors User's Guide* for a detailed description of these enhancements.

Security Enhancements

The following security enhancements are introduced with VSE/ESA 2.6.

Secure Sockets Layer (SSL) Support

TCP/IP for VSE/ESA 1.4.0 as part of VSE/ESA 2.6 provides SSL (Secure Sockets Layer) support. SSL is a security protocol and allows Internet servers and clients to authenticate each other and to encrypt the data flowing between them. When a server uses SSL, it must hold three pieces of data: a private key, a public key, and a server certificate. This allows server authentication.

There are several ways for a TCP/IP application to exploit the SSL support. Besides the native C interface and the LE/VSE C socket interface, the EZASMI macro and the EZASOKET call interfaces have also been extended to support SSL. For further details refer to the manual *TCP/IP for VSE/ESA IBM Program Setup and Supplementary Information*.

To use SSL functions in general, the VSE/ESA host must first be configured for SSL support. This is described in detail in the *VSE/ESA e-business Connectors User's Guide* (Chapter 9: Configuring Your VSE/ESA Host for SSL).

Overview

The following VSE/ESA 2.6 components and programs make use of SSL:

- CICS Web Support (CWS)
- Java-based Connector
- VSE/POWER PNET

CICS Web Support (CWS)

The CWS of the *CICS Transaction Server for VSE/ESA* provides SSL support as described in detail in the manual *CICS Transaction Server for VSE/ESA, Enhancements Guide*. "Part 3: Using Secure Sockets Layer (SSL)" introduces SSL and its basic functions and describes in detail how to configure your CICS system to use SSL. Before performing the tasks for configuring CICS, be aware that you must first configure your VSE/ESA host as stated in the introductory paragraphs.

Refer to the *CICS Transaction Server for VSE/ESA, Enhancements Guide* for further details.

Java-based Connector

The VSE Connector Server has been enhanced to accept secure SSL connections from the VSE Connector Client. The server can be started either in secure or non-secure mode. The VSE Connector Client has been enhanced to support secure SSL connections to the VSE Connector Server. This closes the gap in security between the middle tier and VSE/ESA.

The manual *VSE/ESA e-business Connectors User's Guide* has the following chapters for configuring the server and the clients:

- Chapter 10: Configuring the VSE Connector Server for SSL
- Chapter 11: Configuring VSE Connector Clients for SSL
- Chapter 12: Configuring for Client Authentication

Again, you must first configure your VSE/ESA host before you can configure the Connector Server and the Connector Client. This is described in "Chapter 9: Configuring Your VSE/ESA Host for SSL" in the *VSE/ESA e-business Connectors User's Guide*.

VSE/POWER PNET SSL

VSE/POWER networking has been enhanced to use SSL for TCP/IP connections. Data which is sent between two VSE/POWER nodes via a TCP/IP connection is encrypted according to the private key of the customer. The usage of the SSL feature is optional and is selected for each node separately.

Refer to "Enhanced Networking Capabilities" on page 37 for further details or to the manual *VSE/POWER Networking* for a complete description.

DTSECTXN Enhancement

For security table DTSECTXN it is possible to specify generic names for CICS transactions. The new keyword is TYPE=GENERIC. Refer to "Define Transaction Security (Fastpath 28)" on page 19 for further details.

For a complete description of the VSE/ESA security support, refer to "Chapter 6: Protecting Resources" in the *VSE/ESA Administration* manual.

CICS External Call Interface (ECI) over TCP/IP

This support allows customers to define and manage large networks of clients much more easily than it is possible when using SNA connected clients. The *CICS Transaction Server for VSE/ESA* provides a new TCPIPSERVICE. Clients are to be configured via TCP/IP (instead of SNA). The support mainly consists of TCPIPSERVICE extensions (ATTACHSEC) and the Asynchronous Receive Support. Refer to the *CICS Transaction Server for VSE/ESA, Enhancements Guide* for further details.

OSA Express Support

The OSA Express support is provided as integrated hardware feature (OSA Express adapter) for IBM G5, G6, and zSeries 900 processors. The support provides direct connectivity between VSE/ESA applications and other platforms on the attached network. It is based on the Queued Direct Input/Output (QDIO) architecture which allows a highly efficient data transfer and results in an accelerated TCP/IP data packet transmission. Refer to Chapter 6, “OSA Express Support” on page 55 for further details.

Virtual Tape Support

In VSE/ESA, a virtual tape is a file containing a tape image. A virtual tape can be a VSE/VSAM file on the VSE/ESA host or a remote file located on a server. For a detailed description of this support, refer to Chapter 7, “Virtual Tape Support” on page 59.

Utility Support

FastCopy Exploitation of FlashCopy and SnapShot

The VSE/Fast Copy utility program exploits FlashCopy (for ESS disk devices) and SnapShot (for RVA disk devices) for full volume backup from disk to disk (does not work on file or extent level). Refer to “VSE/Fast Copy Exploitation of FlashCopy and SnapShot” on page 73 for a detailed description.

SDAID Enhancements

The SDAID program includes a new trace for GETVIS/FREEVIS requests. The trace is described in detail under “SDAID Enhancements” on page 74.

TERSE Utility

TERSE is a cross-platform utility for compressing and decompressing files. Refer to “TERSE Utility” on page 76 for a detailed description of this support.

Hardware Support

The following hardware support is new with VSE/ESA 2.6:

- IBM **zSeries 900** processors which were announced after the availability of VSE/ESA 2.5. VSE/ESA can run on a zSeries 900 processor in 31-bit mode only. Refer to the *VSE/ESA Planning* manual for further details (Chapter 1: How to Run VSE/ESA).

Overview

- OSA Express support for TCP/IP.
This support is provided via the OSA Express adapter which is available on IBM G5, G6, and zSeries 900 processors. Refer to Chapter 6, “OSA Express Support” on page 55 for details.
- FICON channel support.
FICON (Native Fiber CONnection) support enables VSE/ESA customers to access through their S/390 system FICON-attached devices such as tapes (IBM 3590–A60, for example) or disks (IBM Enterprise Storage Server, for example).
- IBM 2074 Console Support Controller.
The new 2074 Console Support Controller eliminates the requirement for a non-SNA 3174 controller.
- VSE/VSAM support of large DASD.
Currently, this support is for the IBM 3390 Model 9 disk device and is described in detail under “VSE/VSAM Support of Large DASD” on page 29.

New and Enhanced Functions of VSE/ESA Base Programs

VSE/VSAM 6.6

The following VSE/VSAM or VSE/VSAM-related functions are new:

- VSE/VSAM support of large disk devices such as the IBM 3390-9. Refer to “VSE/VSAM Support of Large DASD” on page 29 for details.
- VSE/VSAM file access from REXX/VSE. Refer to “REXX/VSE 6.6” for details.
- VSE/VSAM access through CICS for Java/DB2 connectors. Refer to “Chapter 8. Configuring the VSAM-Via-CICS Service” in the *VSE/ESA e-business Connectors User's Guide* for details.
- New dialog *FlashCopy VSAM Catalog/Files*. Refer to “FlashCopy VSAM Catalog/Files (Fastpath 3719)” on page 15 for details.
- Enhanced dialog *Define a Library*. Refer to “Define a Library (Fastpath 223)” on page 18 for details.

VSE/POWER 6.6

VSE/POWER 6.6 provides new and changed functions such as

- Enhanced Networking Capabilities (PNET SSL), and
- Data File Extension During Warm Start.

Refer to “VSE/POWER Enhancements (VSE/ESA 2.6)” on page 37 for further details.

REXX/VSE 6.6

The new REXX command VSAMIO allows to access VSAM data from REXX/VSE. VSAMIO belongs to the host command environment ADDRESS VSE and supports KSDS, ESDS, and RRDS data sets. Supported operations are READ, WRITE, DELETE, and UPDATE. VSAMIO can read or write data from/to REXX stem variables.

The manual *REXX/VSE Reference* describes the support in detail.

LE/VSE 1.4.2

LE/VSE 1.4.2 provides C run-time socket API enhancements, new and changed capabilities in the areas of dump processing and storage management in a CICS environment, as well as further common and language specific enhancements.

- C Run-Time Socket API Enhancements

TCP/IP call-level functions have been included that support SSL security. These functions have the prefix `gsk`. For details, refer to the *LE/VSE C Run-Time Library Reference* manual.
- LE/VSE Dump under CICS sent directly to VSE/POWER LSTQ

This facility is an alternative to transient data destinations and utilizes the VSE/POWER LSTQ to store LE/VSE dump output. The overall purpose is to eliminate message mixing problems associated with CICS transaction dump data compared to LE/VSE transient data output on CESE (this is the default destination queue pre-customized with the `MSGFILE` run-time option). This support is present via sub-options of the `TERMTHDACT` run-time option.

In addition, the amount of storage dumped around registers during dump processing can now be tailored. This is done by using a new sub-option of the `TERMTHDACT` option, and a new option of the `CEE5DMP` service.

Refer to the *LE/VSE Customization Guide* for further details.
- Optimized CICS storage at LE/VSE enclave initialization time accounting for SAA lengths

When an LE-conforming MAIN program is started under CICS, LE/VSE will request an associated initialization amount of storage (to execute the program) from CICS. Before VSE/ESA 2.6, this storage amount was rounded to be on a 4K page boundary without considering that CICS added some extra bytes to this total which negated LE/VSE rounding. Now LE/VSE rounding code will take into account this CICS behaviour ensuring that the requested storage sizes actually fit on a page boundary (when allocated by CICS).

This enhancement is only available to CICS/VSE 2.3 users. Due to the storage history recording done by CICS TS, a single `GETMAIN` is issued only upon second and subsequent executions of an LE-enabled application for the total storage requirements of the transaction.
- C-Runtime Writable Static Support for Subroutines invoked using `CEEPIPI CALL_SUB`

With the new REXX/VSE socket support there is a requirement for REXX to invoke C programs to provide the TCP/IP access. This is accomplished using LE/VSE `CEEPIPI` services. Before VSE/ESA 2.6, there was no LE/VSE support to call C subroutines that were re-entrant (`RENT`). Therefore, REXX/VSE had to exploit `CALL_MAIN` to circumvent this restriction. With the support for `CEEPIPI CALL_SUB`, REXX/VSE gets performance relief against usage of `CALL_MAIN`.

Refer to the *LE/VSE Programming Guide* for further details.
- New LE/VSE Callable Service to simulate `DELAY`

This new LE/VSE service, named `CEE5DLY`, provides COBOL and C with an enclave level delay function similar to that available to PL/I users via the PL/I `DELAY` language verb. Its purpose is to complement batch functionality and make the service available to all LE/VSE Conforming Languages. There will be examples in the product ship library. The equivalent under CICS is `EXEC CICS DELAY`.

Refer to the *LE/VSE Programming Reference* manual for further details.

Overview

TCP/IP 1.4.0

TCP/IP for VSE/ESA 1.4.0 is licensed from Connectivity Systems Incorporated and is available as Application Pak. Many of the new functions of VSE/ESA 2.6 are based on TCP/IP 1.4.0 enhancements:

- Secure Sockets Layer support (refer to “Secure Sockets Layer (SSL) Support” on page 5 for more information).
- CICS External Call Interface over TCP/IP (refer to “CICS External Call Interface (ECI) over TCP/IP” on page 7 for more information).
- OSA Express support (refer to Chapter 6, “OSA Express Support” on page 55 for more information).

VSE/ESA 2.6 provides also a new dialog for configuring TCP/IP. Refer to “TCP/IP Configuration (Fastpath 246)” on page 17 for further details and to the manual *TCP/IP for VSE/ESA IBM Program Setup and Supplementary Information* for a complete description of the dialog and the other TCP/IP functions.

CICS TS 1.1.1

Major new functions of CICS TS 1.1.1 are:

- Secure Sockets Layer (SSL) for CICS Web Support (refer also to “CICS Web Support (CWS)” on page 6).
- CICS ECI over TCP/IP (refer also to “CICS External Call Interface (ECI) over TCP/IP” on page 7).

These functions are described in detail in the *CICS Transaction Server for VSE/ESA, Enhancements Guide*.

DB2 Server for VSE 7.2

The VSE/ESA base programs *DB2 Server for VSE* and *DB2 Server for VSE Help* have been upgraded from 7.1 to 7.2. All other DB2-related programs are still at the 7.1 level: the base program *DataPropagator Relational Capture*, and the optional programs *Control Center VSE*, *Data Restore VSE*, and *QMF for VSE*.

The *DB2 Server for VSE 7.2* is supported by the compile dialog.

Consult also the latest DB2 documentation for 7.2 new and changed functions.

The *VSE/ESA Planning* manual has further details on the DB2 and DB2-related programs concerning shipment and installation (Chapter 2: VSE/ESA Base and VSE/ESA Optional Programs, and Chapter 8: Installing VSE/ESA).

Updates to Existing Documentation

Refer to Chapter 9, “Publication Updates” on page 79 for VSE/ESA 2.6 updates and corrections of the manuals *VSE/ESA System Macros Reference*, *VSE/ESA System Utilities*, *VSE/VSAM Commands*, *VSE/ICCF User’s Guide*, *LE/VSE Customization Guide*, and *VSE/ESA Library Control Device Driver for IBM 3494*.

Chapter 2. Basic System Enhancements

This chapter documents enhancements concerning **initial installation**, **IPL**, **JCL**, **MSHP**, and the **Librarian**.

Initial Installation

Checking for NOPDS during Initial Installation

This enhancement (introduced with VSE/ESA 2.6) is related to large processors that provide sufficient storage so that no page data set (NOPDS) is required. However, if VSE/ESA is installed on such a large processor, there was (up to VSE/ESA 2.5) no way to prevent the system from formatting the page data set even if it was never used. Only after initial installation was it possible to tailor VSE/ESA as a NOPDS system.

For this reason, the initial installation process has been modified for VSE/ESA 2.6 in order to check whether the processor storage size is sufficient to accommodate in real storage all the virtual storage as well as the real storage required by the system. The virtual storage size is the sum of the specified values for VSIZE and VIO.

If the processor storage available is sufficient, the DPD commands are ignored and no page data set is created. In addition, message 0I35I is issued:

```
0I35I  PROCESSOR STORAGE LARGER THAN VIRTUAL STORAGE - DPD COMMAND IGNORED
```

IPL Enhancements

The following sections introduce IPL enhancements that are new with VSE/ESA 2.6:

- Enhancement to IPL SVA Command
- Enhancement to IPL ADD Command
- Deleting Unexpired Secured System Files during IPL

Enhancement to the IPL SVA Command

The possible maximum number of SDL (System Directory List) entries has been increased from 1021 to 32765. This number includes system and user SDL entries. The SDL is still located in the SVA 24. Therefore, do not specify a value much larger than actually needed. The maximum number of SDL entries will occupy more than 2 MB of SVA 24 storage. The dialog *Tailor IPL Procedure* reflects the new SDL value.

For a complete description of the SDL parameter, refer to the IPL SVA command in the manual *VSE/ESA System Control Statements*.

Basic System Enhancements

Enhancement to the IPL ADD Command

The IPL ADD command supports a new device type: OSAX (Open Systems Adapter Express). This support is described in detail in Chapter 6, “OSA Express Support” on page 55. Refer also to “Configure Hardware (Fastpath 241)” on page 19.

For a complete description of the IPL ADD command refer to the manual *VSE/ESA System Control Statements*.

Deleting Unexpired Secured System Files during IPL

If during IPL the page data set to be defined overlapped an existing secured page data set, up to VSE/ESA 2.5 the operator did not have the option to delete these files and reuse the space directly. The same applied to a secured label area. In order to reuse a secured page data set or a secured label area, the operator had to:

- Initialize the system with temporary extents for the page data set or the label area.
- Use a utility to delete the secured system files.
- Re-IPL the system with the original DPD or DLA specifications.

Starting with VSE/ESA 2.6, the IPL process been changed to allow the deletion of a secured page data set and to allocate a new page data set during IPL. The same applies to the label area. Message 0I99D is issued if such a condition exists:

```
0I99D system-file ON cuu: OVERLAP ON UNEXPIRED SECURED FILE
```

Sensing More Than 1024 Devices during IPL

This support is available since VSE/ESA 2.5.

Up to VSE/ESA 2.5, VSE/ESA supported a maximum of 1024 devices. If more devices were operational at IPL, the system terminated. Starting with VSE/ESA 2.5, the VSE/ESA limitation of 1024 devices still exists but IPL is able to sense as many devices as the ESA I/O architecture allows: 65535 devices. This enables the installation of a VSE/ESA system in an environment with an I/O configuration of more than 1024 devices which cannot be detached or set offline by the operator. The enhancement is required in view of disk storage subsystems such as the IBM RAMAC Virtual Array Model X82 which supports up to 1024 host volumes.

The support allows the sensing of all operational devices. Later during the initialization process the device number can be reduced to the supported maximum number by using IPL DEL commands. To help identify the devices which are not actually needed, IPL offers the new **DEV** command which displays all I/O devices that have been sensed and added to the I/O configuration.

If the system detects that more devices were sensed and added than VSE/ESA supports, message 0J74D is issued. This message has been extended and shows the complete I/O configuration. This allows the operator to DELETE devices not needed for this session. This is especially helpful if the problem occurs during installation, because in stand-alone mode no IPL commands are accepted except DEL. The message will be repeated until the device number is as low as supported by VSE/ESA.

Details on the IPL **DEV** command are provided in the Initial Program Load chapter of the *VSE/ESA System Control Statements* manual.

JCL Enhancements

The following JCL support is new with VSE/ESA 2.6:

VTAPE Command/Statement

For the virtual tape support, VSE/ESA provides a new command/statement: VTAPE. You find an overview under “The VTAPE Command/Statement” on page 70. The manual *VSE/ESA System Control Statements* provides a detailed description of the VTAPE parameters and the VTAPE command syntax.

Enhancement to the SET SDL Command

The restriction that the SET SDL command can be issued from the BG partition only has been removed. Like the commands STDOPT and SETPARM SYSTEM since VSE/ESA 2.5, SET SDL can now be issued from any partition.

Enhancement to the EXEC Statement

Two new SIZE operands are available for the EXEC statement:

```
SIZE=*  
SIZE=(*,{nK|mM})
```

For a detailed description of their meaning, refer to the *VSE/ESA System Control Statements* manual.

JCL Enhancements Introduced with VSE/ESA 2.5

- Increase of dynamic classes per dynamic class table from 10 to 23. This affects the PRTY and the MAP command.
- The STDOPT command can now be given in any partition (not only BG), but the values specified apply to all partitions.
- The OPTION statement has been extended with the options SLISKIP and NOSLISKIP.

For further details refer to the Job Control and Attention Routine chapter in the *VSE/ESA System Control Statements* manual.

The “Background Information for Label Area Size” (Chapter 13: Planning for Extended Addressability) in the *VSE/ESA Planning* manual has been updated and extended.

MSHP Enhancements

The following enhancements were introduced with VSE/ESA 2.5.

VSE/ESA provides MSHP support for Librarian member type PROC, where PROC is a new parameter value for the TYPE parameter. Also, the new keyword MEMBER(S) is provided in addition to the keyword MACRO(S). The syntax of the following MSHP commands has been changed:

AFFECTS
INFLUENCES
COMPRISES
GENERATE
LOOKUP
REMOVE
TAILOR

Refer to the MSHP chapter in the *VSE/ESA System Control Statements* manual for further details.

Librarian Enhancements

The following Librarian enhancement is new with VSE/ESA 2.6:

The dialog *Define a Library* has been enhanced to support up to 32 VSE/VSAM extents. This is the dialog implementation of the EXTENTS (MAX16, MAX32) parameter of the Librarian DEFINE command introduced with VSE/ESA 2.5. Refer also to “Define a Library (Fastpath 223)” on page 18.

The following Librarian enhancements and changes were introduced with VSE/ESA 2.5:

- More than 16 VSAM extents for libraries.
The Librarian DEFINE command has a new parameter: EXTENTS (MAX16, MAX32). This enhancement also affects the Librarian LD (List Directory) and TEST command.
- The output of the Librarian commands LIBR LIST and COMPARE has changed.
- The OLDLIB parameter of the Librarian RESTORE command has been removed.

Details on these enhancements and changes are provided in the Librarian chapter of the *VSE/ESA System Control Statements* manual.

Chapter 3. Interactive Interface and VSE/ICCF Enhancements

Interactive Interface Enhancements

VSE/ESA 2.6 Dialog Enhancements

The following sections discuss VSE/ESA 2.6 dialog changes. The dialogs *FlashCopy VSAM Catalog/Files* and *TCP/IP Configuration* are new.

FlashCopy VSAM Catalog/Files (Fastpath 3719)

This dialog provides a fast backup function from disk to **tape** for VSE/VSAM files. You can either copy a whole catalog and all its related files or select individual files from the catalog for backup (IDCAMS BACKUP). VSE/ESA 2.6 includes the FlashCopy support for Enterprise Storage Server (ESS) devices. The SnapShot support for RAMAC Virtual Array 2 (RVA) devices requires the additional installation of the optional feature *IXFP/SnapShot for VSE/ESA*. The dialog makes use of the support described under "IXFP/SnapShot Support for VSE/VSAM Datasets" on page 32. Note that the terms "file" and "dataset" in this context have the same meaning.

The jobstream generated by the dialog will include three IDCAMS commands:

- **IDCAMS SNAP** with a synonym list to control the source and snapped volumes for the *SnapShot or FlashCopy* function. The snapped volumes created are not available for normal VSAM access.
- **IDCAMS IMPORT CONNECT** to inform the VSE/ESA system that a copy of the user catalog now exists on the snapped volume and that this copy of the user catalog has a synonym name.
- **IDCAMS BACKUP** for backing up the snapped volumes using the synonym list.

Refer also to "Example of Running IDCAMS SNAP/BACKUP (Using a Synonym List)" on page 35.

Note that a backup of snapped VSAM files requires the availability of the catalog and of **all** the related disk volumes holding data of the VSAM files owned by the catalog.

Interactive Interface Enhancements

```
IESADMSL.IESEVSAM          BACKUP/RESTORE VSAM OBJECTS          APPLID: DBDCCICS
Enter the number of your selection and press the ENTER key:

  1 Export VSAM File
  2 Import VSAM File
  3 Backup VSAM File
  4 Restore VSAM File
  5 Export-Disconnect a User Catalog
  6 Import-Connect a User Catalog
  7 Copy In Catalog
  8 Copy Out Catalog
  9 FlashCopy VSAM Catalog/Files

PF1=HELP          3=END          4=RETURN          6=ESCAPE(U)
                  9=Escape(m)

==>                                                    Path: 371
```

Figure 1. Selecting the FlashCopy VSAM Catalog/Files Dialog

```
DSF$SNP1          FLASHCOPY VSAM CATALOG/FILES
Enter the required data and press ENTER.

CATALOG TYPE..... 2          Enter 1 for MASTER catalog, or
                               2 for USER catalog.

Enter the identification of the user catalog if you specify 2 for USER in
the CATALOG TYPE field.
_____

Enter a synonym name for the snapped catalog.
_____

BACKUP WHOLE CATALOG..... 1          Enter 1 to backup EVERYTHING in
                                       your catalog, or 2 to backup
                                       SELECTED files.

Only backup to tape is supported.

PF1=HELP          2=REDISPLAY 3=END
```

Figure 2. FlashCopy VSAM Catalog/Files Dialog - Catalog Definitions

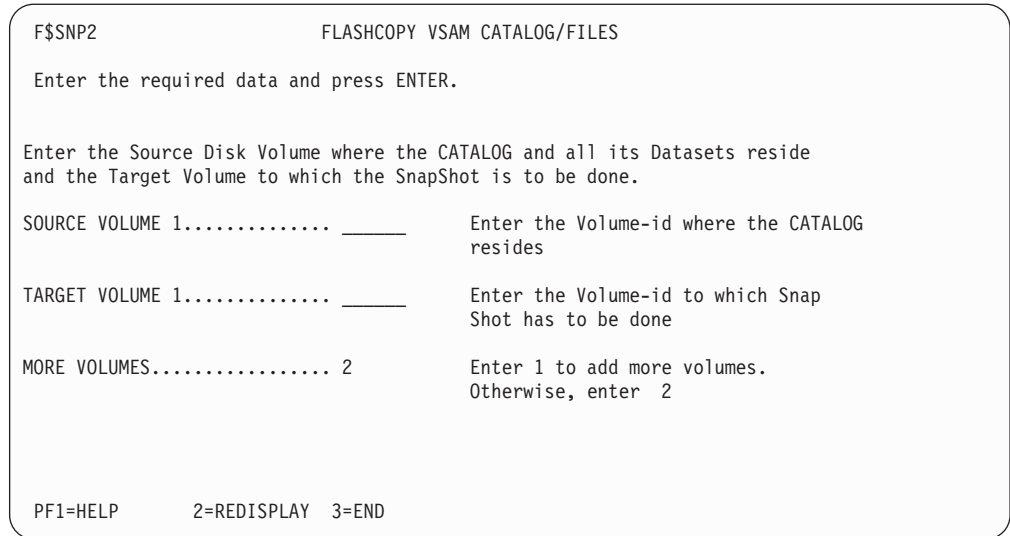


Figure 3. FlashCopy VSAM Catalog/Files Dialog - Volume Definitions

TCP/IP Configuration (Fastpath 246)

The TCP/IP Configuration dialog is new and helps you configure your TCP/IP environment. After completing your definitions for the TCP/IP parameters shown in the panel below, you must press PF5 (PROCESS) to include your definitions in member IPINIT00.L. Member IPINIT00.L is saved in system library PRD2.CONFIG. If no member exists in PRD2.CONFIG, the system default member IPINIT00 from PRD1.BASE is used. When pressing PF9 (VTAM), member TCPAPP00.B is updated.

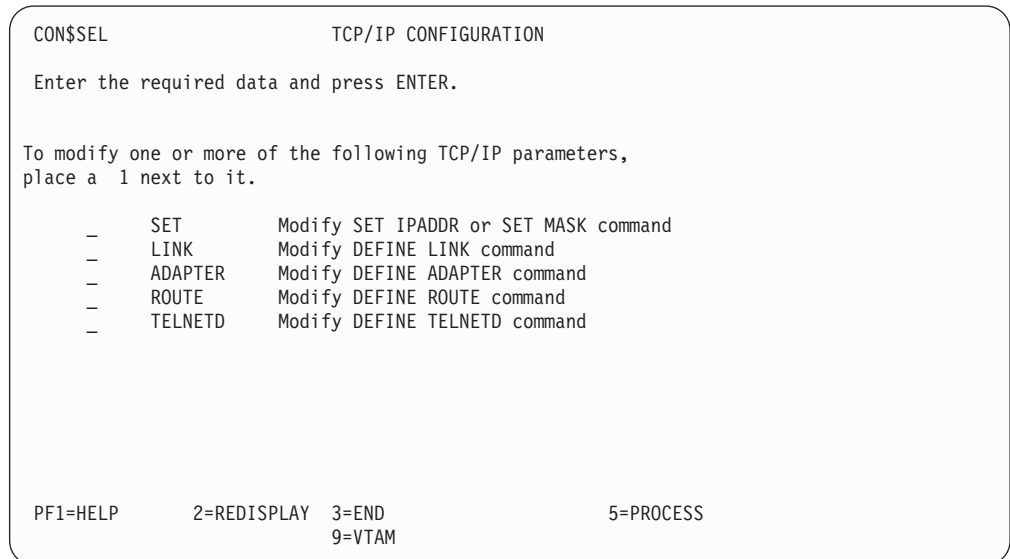


Figure 4. TCP/IP Configuration Dialog

Refer to the manual *TCP/IP for VSE/ESA IBM Program Setup and Supplementary Information* for a detailed description of the dialog.

Interactive Interface Enhancements

Define a Library (Fastpath 223)

The *Define a Library* dialog offers the new parameter EXTENTS which was introduced with VSE/ESA 2.5 for the Librarian DEFINE command described in the manual *VSE/ESA System Control Statements*. EXTENTS allows to specify a new maximum of 32 extents in case the library is a multi-volume file and is defined in space managed by VSE/VSAM. A selection of MAX32 requires that on the following panel named *Select Space* SECONDARY ALLOCATION must be selected.

For shared libraries, the following restriction applies:

More than 16 extents can only be used if all the VSE/ESA systems accessing a library are capable of the new function. This means that you can use the new function with VSE/ESA 2.6 and VSE/ESA 2.5 systems but not with earlier systems.

IESFILDEFL		DEFINE A LIBRARY	
CATALOG NAME:	IJSYSCT		
LIBRARY NAME.....	_____		
PRIMARY ALLOCATION.....	_____	Number of Library Blocks (1K)	
SECONDARY ALLOCATION...	_____	Number of Library Blocks (1K)	
EXTENTS.....	1	1 = MAX16	2= MAX32
PF1=HELP		3=END	4=RETURN

Figure 5. Define a Library Dialog

Following is a job stream example created by the dialog:

```
* $$ JOB JNM=DEFLIB,CLASS=0,DISP=D,NTFY=YES
// JOB HSCZ DEFINE FILE
// EXEC IDCAMS,SIZE=AUTO
DEFINE CLUSTER ( -
    NAME (VSE.MYTEST.LIBRARY ) -
    TRACKS (00000004 00000001 ) -
    SHAREOPTIONS (3) -
    RECORDFORMAT (NOCIFORMAT ) -
    VOLUMES (DOSRES SYSWK1 ) -
    NOREUSE -
    NONINDEXED -
    TO (99366 ) -
    DATA (NAME (VSE.MYTEST.LIBRARY.@D@ ) ) -
    CATALOG (VSESP.USER.CATALOG )
IF LASTCC NE 0 THEN CANCEL JOB
/*
// OPTION STDLABEL=ADD
// DLBL MYTEST,'VSE.MYTEST.LIBRARY',,VSAM, X
    CAT=VSESPUC,DISP=(OLD,KEEP)
/*
```

```
// EXEC IESVCLUP,SIZE=AUTO
A VSE.MYTEST.LIBRARY MYTEST VSESPUC OLD KEEP
/*
// EXEC LIBR,PARM='MSHP'
      DEFINE LIB=MYTEST REPLACE=YES EXTENTS=MAX32
/*
/&
* $$ E0J
```

Configure Hardware (Fastpath 241)

When selecting 3 *Telecom. Devices (NCP, CTCA)* from the *Hardware Configuration: Device Group* panel, you get the panel SELECTION LIST: DEVICES as shown below. The panel offers a new device for selection: OSAX (Open Systems Adapter Express). Refer to Chapter 6, "OSA Express Support" on page 55 for a detailed description of this support.

ADM\$DEVL SELECTION LIST: DEVICES

Select one of the entries by entering 1.

Address of the device to be defined:

SEL	DEVICE	DESCRIPTION
-	3745-130	Communications Controller configurable with NCP
-	3745-170	Communications Controller configurable with NCP
-	3745-210	Communications Controller configurable with NCP
-	3745-310	Communications Controller configurable with NCP
-	3745-410	Communications Controller configurable with NCP
-	3745-610	Communications Controller configurable with NCP
-	3791	Local Communication Controller
-	CTCA	Channel-to-Channel Adapter
-	3172	Interconnect Controller
-	OSAD	Open System Adapter Feature
-	OSA	Open System Adapter Port
-	OSAX	Open Systems Adapter Express

PF1=HELP 2=REDISPLAY 3=END
PF7=BACKWARD

Figure 6. Selection Panel for OSAX

Define Transaction Security (Fastpath 28)

The macro DTSECTXN, which is described in detail in the manual *VSE/ESA Administration*, offers a new optional keyword: TYPE=GENERIC. GENERIC means that a CICS transaction name (the 1 to 4-character transid) is interpreted as a generic name. Any abbreviation is accepted (TYPE=G, TYPE=GE, and so on).

GENERIC is also reflected in the *Define Transaction Security* dialog as shown in Figure 7 on page 20 and Figure 8 on page 20. The information from the dialog is stored in table TAS\$SEC which has the following column layout:

```
TRANSID REGION CLASS CHANGED SUBTYPE GENERIC
```

The column GENERIC shows 1 for generic entries and 2 for non-generic entries. In the dialog panels, GENERIC is indicated or specified by an X.

Interactive Interface Enhancements

```

TAS$SEC1          DEFINE TRANSACTION SECURITY

Enter the required data and press ENTER.

OPTIONS: 1 = ADD   2 = ALTER   5 = DELETE

OPT      TRANSACTION NAME  CICS REGION  SECURITY CLASS  GENERIC
-        -                -          -            -          -
-        XPK0              -          -            -          -
-        XPLA              -          -            -          -
-        XSPR              -          -            -          -
-        XXX               -          -            -          X
-        XXX1              -          -            -          -
-        XXX2              -          -            -          -
-        XYY               DBDCCICS     20           -          X
-        XYY1              DBDCCICS     10           -          -
-        XYY2              DBDCCICS     12           -          -
-        -                -          -            -          -

LOCATE TRANSACTION NAME == > _____
PF1=HELP      2=REDISPLAY  3=END          5=PROCESS
  
```

Figure 7. Define Transaction Security Panel

```

TAS$SEC2          DEFINE TRANSACTION SECURITY: ADD ENTRIES

Enter the required data and press ENTER.

TRANSACTION NAME  CICS REGION  SECURITY CLASS  GENERIC
xxx1              _____  10             -
xxx2              _____  12             -
xxx_              _____  20             X
xyy1              dbdccics  10             -
xyy2              dbdccics  12             -
xyy_              dbdccics  20             X
_____          _____  7              -
_____          _____  7              -
_____          _____  7              -
_____          _____  7              -

PF1=HELP      2=REDISPLAY  3=END
  
```

Figure 8. Define Transaction Security/Add Entries Panel

Compile Job Generation (Fastpath 51)

The dialog *Compile Job Generation* described in the manual *VSE/ESA Programming and Workstation Guide* has been enhanced with the new parameter `TEMPLATE` as shown below. You reach this dialog by selecting option 8 (COMPILE) from the *Primary Library* or *Secondary Library* panel.

By specifying 1 (valid only for 3=Map Definition), you request the creation of a HTML template from a BMS map. This makes the compile output suitable for a Web browser environment. Maps of type HTML are stored in library PRD2.DFHDOC.


```

IESLIBM                COMPILE JOB GENERATION

SOURCE MEMBER:        DTR$NASS

SOURCE TYPE..... 1          1=Online Program    2=Batch Program
                        3=Map Definition        4=Batch Subroutine

LANGUAGE..... 1          1=HLASM      2=PL/I VSE   3=COBOL VSE
                        4=C VSE      5=RPG II    6=FORTRAN

TEMPLATE..... 2          1=Yes, 2=No

DB2 SERVER..... 2          1=Yes, 2=No

CATALOG..... 2          1=Yes, 2=No

JOBNAME..... COMNASS      Name of the job to generate

OUTPUT MEMBER..... _____ Leave blank to submit the job immediately.
                        Enter a name and a password (optional) to
PASSWORD.....           save it (existing member is overwritten).

PF1=HELP                3=END          4=RETURN
    
```

Figure 9. Compile Job Generation Panel

VSE/ESA 2.5 Dialog Enhancements

The following sections discuss VSE/ESA 2.5 dialog changes. The *In-Creation Queue* dialog and the *Display CICS TS Storage* dialog were new with VSE/ESA 2.5.

MANAGE BATCH QUEUES (Fast Path 32)

This dialog has been updated to enable the selection of the new VSE/POWER *In-Creation Queue* dialog. See also "IN-CREATION QUEUE (Fast Path 326)" on page 22.

```

IESBQUI                MANAGE BATCH QUEUES

SELECT one of the following:

  QUEUE..... 6          1 = List Queue
                        2 = Reader Queue
                        3 = Punch Queue
                        4 = Transmit Queue
                        5 = Wait for Run Subqueue
                        6 = In-Creation Queue
                        (Only for selections 1 to 5)

SPECIFY optionally:

  PREFIX..... _____ To list only jobs whose names begin
                        with certain characters
                        (Only valid for selections 1 to 4 above)

  CLASS..... _         To list only jobs in a certain class

  USER..... _____ To list only this user's jobs

PF1=HELP                3=END          4=RETURN
    
```

Figure 10. Manage Batch Queue Dialog

Interactive Interface Enhancements

IN-CREATION QUEUE (Fast Path 326)

This dialog is new and shows queue entries which are currently being created (in-creation) by VSE/POWER tasks. In current VSE/POWER releases, similar output is displayed when using the DISPLAY ACTIVE command on the console. When completed, an in-creation queue entry is moved into its corresponding VSE/POWER queue.

```
IESBQUC                IN-CREATION QUEUE                Page 1 of 1

OPTIONS:  1 = DISPLAY      8 = SEGMENT

OPT JOBNAME NUMBER SFX CLASS LINES ID PART DEV ORIGINATOR FROM
- PAUSEBG  00308      A    260 P  BG  FED  PAUSEBG  .SYSA
- PAUSEBG  00308      A     7 L  BG  FEE  PAUSEBG  .SYSA
- CICSICCF 00242      A   1497 L F2  FEE  CICSICCF .SYSA
- VTAMSTRT 00020      A    19 L  F3  FEE  VTAMSTRT .SYSA

PF1=HELP      2=REFRESH      3=END      4=RETURN

LOCATE JOBNAME ==> _____
```

Figure 11. In-Creation Queue Dialog

With OPTION 8 you can segment the job output at the current position (Type=List output is segmented at the next page boundary). The completed output is transferred into the corresponding output queue. A new entry is created for any subsequent output (with an incremented job suffix). Column SFX will show the job suffix (segment) number.

Interactive Interface Enhancements

PRIMARY LIBRARY and SECONDARY LIBRARY (Fast Path 51)

These dialogs offer a new function: 11=SORT.SIZE. When pressing PF-Key 11, the members of the ICCF fulist shown are sorted by size in descending order. The heading line for LAST ACCESSED is changed into SIZE and in this column the member size is displayed as shown in Figure 12.

Option 9 (DISPLAY) is new and can be used to display a member's content.

```
IESLIBP                PRIMARY LIBRARY                PAGE 1 of 2
PRIMARY (READ/WRITE):  16                                PREFIX:
OPTIONS:  1 = EDIT    2 = CHANGE    3 = PRINT    4 = COPY    5 = DELETE
          6 = RENAME  7 = SUBMIT   8 = COMPILE 9 = DISPLAY

OPT  MEMBER NAME  NEW NAME  NEW LIB  SIZE  OWNER  PASSW  PRIVATE
-   APPLYALL     _____  _____  001475  AUGU
-   DMPINF1      _____  _____  000029  JOHN
-   DTRIJB LD    _____  _____  000028  PET3
-   DMPINF2      _____  _____  000027  SUE1
-   CATAPPL      _____  _____  000022  RAIN
-   DTR$ELKE     _____  _____  000019  ELKE
-   A            _____  _____  000001  HERB
-   B            _____  _____  000001  PAUL
-   C            _____  _____  000001  DESP
-   DTRLELKE     _____  _____  000001  ELKE

PF1=HELP    2=REFRESH  3=END    4=RETURN    6=ADD MEMBER
            8=FORWARD  9=SORT.DATE 10=SORT.NAME 11=SORT.SIZE 12=LIST QUEUE

LOCATE MEMBER/LIST QUEUE PREFIX ==> _____ MEMBER PREFIX (PF2) ==> _
```

Figure 12. Primary Library Dialog with SIZE Display

STORAGE DUMP MANAGEMENT (Fast Path 43)

With VSE/ESA 2.5, the *Storage Dump Management* dialog has been enhanced for CICS TS dumps and supports also CICS/VSE 2.3 dumps.

When selecting Option 9 (ANALYZE CICS DUMP) on the *Storage Dump Management* panel, VSE/ESA recognizes if a CICS coexistence environment is installed and displays the panel shown in Figure 13 on page 24 to select either CICS TS or CICS/VSE 2.3. In case of CICS TS, further panels (such as Figure 14 on page 24) are displayed to specify CICS TS dump levels.

In case of CICS/VSE, the *Storage Dump Management* panel is redisplayed for selecting the CICS/VSE dump.

Interactive Interface Enhancements

```
PRB$IDHA          SPECIFY CICS VERSION

Enter the required data and press ENTER.

      Dump-Name:  SYSDUMP. FB. DFB00004

You have a coexistence system with CICS 2.3 and CICS TS installed.
Please specify the CICS version with which the selected dump was produced.

CICS VERSION..... 1          Enter 1 if the dump was produced by
                                CICS TS, enter 2 if the dump was
                                produced by CICS 2.3.

                                2=REDISPLAY  3=END
```

Figure 13. Specify CICS Version

```
PRB$IDH9          SPECIFY DUMP LEVELS

Enter the required data and press ENTER.

      Dump-Name:  SYSDUMP. FB. DFB00004

Enter the dump level (0, 1, 2, or 3) for the following CICS component
identifiers.

AP..... _          Application domain
DS..... _          Dispatcher domain
KE..... _          CICS kernel
LD..... _          Loader domain
TR..... _          Trace domain
OTHER PARAMETERS..... 2      Enter 1 to specify any other dump
                                option, otherwise enter 2.

PF1=HELP          2=REDISPLAY  3=END
```

Figure 14. Specify Dump Levels

Dump levels identify the level of detail for the dump report where 0 means "none" and 3 "all details and summary". Dump levels are passed on to the CICS dump utility.

When selecting 1 for OTHER PARAMETERS, three more panels are displayed for specifying dump levels for further CICS components.

DISPLAY CICS TS STORAGE (Fast Path 364)

For tuning and debugging purposes, a detailed display of the CICS TS partition layout may be required. VSE/ESA 2.5 provides such a display via fast path 364. The display provides detailed information about storage allocation and usage as shown in Figure 15. The help text (PF1) provides a description of the information shown.

For a detailed discussion of CICS TS virtual storage refer to the *CICS Performance Guide*.

Instead of using the dialog, it may be sometimes more convenient entering the command **IEDC** on the CICS TS command line to get the same display.

```

IESADMD CST                DISPLAY CICS TS STORAGE                Time: 09:40:19
  Applid: DBDCCICS        Sysid: C1C1        Jobname: CICSICCF        CICS TS Level: 110

Storage Protection ..... INACTIVE          Reentrant Programs ..... PROTECT
                                           CICS Trace Table size..      80
Extended DSA:                            (All sizes in kbyte)  LIMIT 25600
                                           ECDSA  EUDSA  ESDSA  ERDSA  Totals
Current DSA Size .....                2048   1024   1024   6144  10240
Current DSA used .....                1876    64     8     5220  7168
*Peak DSA used .....                 1884    64     8     5220
Peak DSA Size .....                 2048   1024   1024   6144  10240
Largest free area/Free Storage.       0.95   1.00   1.00   0.94
Times short-on-storage (SOS)..        0      0      0      0      0

DSA:                                       CDSA  UDSA  SDSA  RDSA  Totals
Current DSA Size .....                512    256    512    512   1792
Current DSA used .....                344     8     456    344   1152
*Peak DSA used .....                 352    28     456    344
Peak DSA Size .....                 512    256    512    512   1792
Largest free area/Free Storage.       0.88   1.00   0.86   0.86
Times short-on-storage (SOS)...        0      0      0      0      0
PF1=HELP        2=REFRESH  3=END        4=RETURN
  
```

Figure 15. Display CICS TS Storage Dialog

TAILOR IPL PROCEDURE (Fast Path 243)

On DOSRES and SYSWK1, the space needed for the default system layout is marked as "system use" and is not accessible for dialogs. However, the space occupied by the **page data set** is treated differently. If a user moves the page data set from DOSRES to a different volume, the *Tailor IPL Procedure* dialog offers a function to free this space for reuse by the dialogs.

When you select the DPD statement (panel TAS\$MAS2) you get panel TAS\$ICM3. This panel offers **PF6=FREE**. When pressing PF6, you get panel TAS\$FRE1 to free the space (by pressing ENTER) originally occupied by the page data set.

MAINTAIN DYNAMIC PARTITIONS (Fast Path 27)

This dialog has been updated to reflect that the number of dynamic classes that can be specified in a dynamic class table has been increased from 10 to 23.

The dialogs *Display System Activity* and *Display Storage Layout* have also been updated to reflect the increase in dynamic classes.

Interactive Interface Enhancements

DISPLAY CHANNEL AND DEVICE ACTIVITY (Fast Path 362)

The layout of the display has changed. The columns CHANNEL I/O REQUESTS and CONTROL UNIT I/O REQUESTS have been removed since they are no longer meaningful in an ESA architecture environment. The display shows now the following columns:

DEVICE PARTITION ID JOB NAME DEVICE I/O REQUESTS

VSE/ICCF Enhancements

Introduction

VSE/ICCF has been enhanced to improve the access to VSE/POWER queue entries as follows:

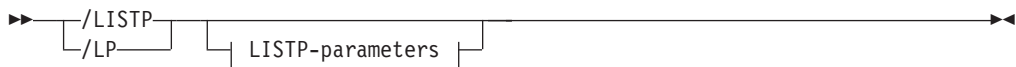
- Direct access to queue entries.
- Access to active queue entries.
- Access to in-creation queue entries.

For this purpose the VSE/ICCF commands **/LISTP** and **/SKIP** and the VSE/ICCF program **DTSGETQ** have been changed. The commands are used by the Interactive Interface to access and browse queue entries. They can be used in VSE/ICCF command mode as well, although the use of the Interactive Interface dialogs is recommended. **DTSGETQ** is also used by the Interactive Interface.

Invoking the Commands

/LISTP Command

The **/LISTP** command has new operands for browsing of the XMT queue, browsing of in-creation queue entries, and to specify the queue entry number for direct access to queue entries. Browsing of the PUN and RDR queues was introduced with VSE/ESA 2.3 (VSE/ICCF 6.3) but its use was limited to the Interactive Interface.



LISTP-parameters:

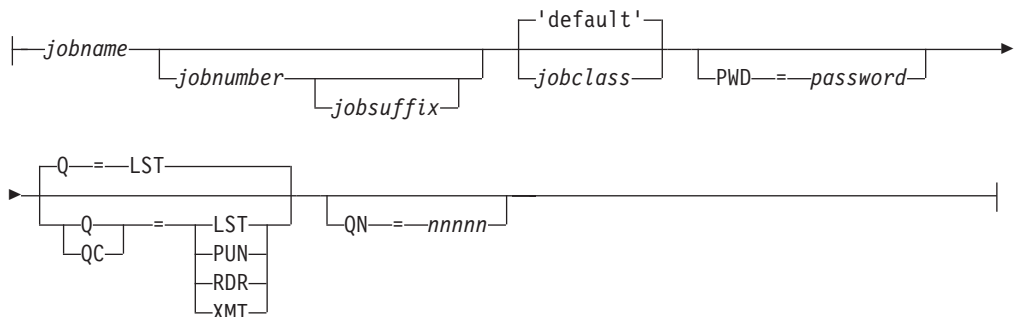


Figure 16. Syntax of **/LISTP** Command

Q= or QC= Specifies one of the following queues:
 LST list queue (default)
 PUN punch queue
 RDR reader queue
 XMT transmission queue

QC= must be specified for queue entries in-creation. There is no queue type XMT for in-creation queue entries.

QN= Specifies the queue entry number. It is mandatory for browsing the XMT queue and for accessing in-creation queue entries.

/SKIP Command

VSE/POWER active and in-creation queue entries require a command which displays the currently active line and the currently latest spooled record/line. The new command is called /SKIP ACTIVE.



Figure 17. Syntax of /SKIP ACTIVE Command

• **/SKIP ACTIVE for Active Queue Entries**

Issuing a /SKIP ACTIVE command while browsing an active queue entry will result in an restart-to-active request to VSE/POWER asking for the currently active line/record. VSE/ICCF will display the active line followed by message *ACTIVE OR LATEST (similar to the /SKIP BOTTOM command).

Further characteristics:

- The whole queue entry can be browsed using all the /SKIP and /LOCP commands provided by VSE/ICCF.
- Issuing a /SKIP ACTIVE command again means refreshing.
- Issuing a /SKIP ACTIVE command to a queue entry which in the meantime has completed or was complete from the beginning results in message:
 *QUEUE ENTRY NEITHER ACTIVE NOR IN-CREATION, PRESS ENTER TO RESUME

• **/SKIP ACTIVE for In-Creation Queue Entries**

Issuing a /SKIP ACTIVE command while browsing an in-creation queue entry will result in a QUIT request to VSE/POWER followed by GET BROWSE OPEN. VSE/ICCF will display the latest line/record followed by message *ACTIVE OR LATEST (similar to the /SKIP BOTTOM command).

Further characteristics:

- The queue entry from top to the latest line/record can be browsed using all the /SKIP and /LOCP commands provided by VSE/ICCF.
- Issuing a /SKIP ACTIVE command again means refreshing.
- Issuing a /SKIP ACTIVE command to a queue entry which in the meantime has completed results in message:
 *QUEUE ENTRY COMPLETE IN xxx QUEUE (where xxx=LST/PUN/RDR/XMT)

• **PF-Key for /SKIP ACTIVE**

PF keys for browsing VSE/POWER queue entries are assigned by the Interactive Interface. This also applies for /SKIP ACTIVE.

VSE/ICCF Enhancements

DTSGETQ Program (GETR,GETP and GETL Procedures)

Program DTSGETQ copies selected VSE/POWER queue entries to the VSE/ICCF DTSFILE and is used by the Interactive Interface function 'COPY TO PRIMARY' and the VSE/ICCF procedures **GETR**, **GETP** and **GETL**.

The new functions provided are the copying of active queue entries and the new operand **QN=nnnnn**, which denotes the VSE/POWER queue entry number. An invalid **QN=nnnnn** specification causes end-of-keyword processing. DTSGETQ continues with positional parameters. Processing sequence is first keyword parameters then positional parameters.

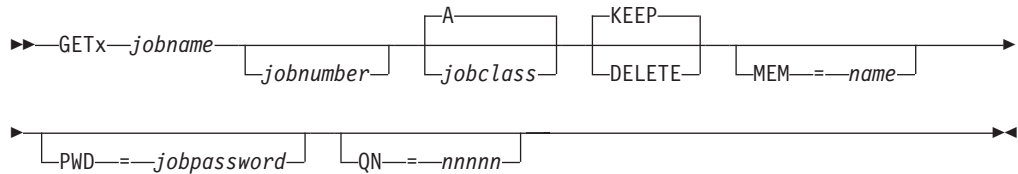


Figure 18. Syntax for Calling GETx Procedure

QN= Specifies the queue entry number.

Chapter 4. VSE/VSAM and VSE/POWER Enhancements

VSE/VSAM Enhancements

This chapter documents the following VSE/VSAM support:

- VSE/VSAM Large DASD Support (**VSE/ESA 2.6**)
- IXFP/SnapShot Support for VSE/VSAM Datasets (VSE/ESA 2.5)
Refer to “IXFP/SnapShot Support for VSE/VSAM Datasets” on page 32 for details.
- VSE/VSAM Buffer Hashing (VSE/ESA 2.5)
Refer to “VSE/VSAM Buffer Hashing” on page 36 for details.

VSE/VSAM support documented in other chapters:

- FlashCopy VSAM Catalog/Files Dialog (**VSE/ESA 2.6**)
Refer to “FlashCopy VSAM Catalog/Files (Fastpath 3719)” on page 15 for details.

VSE/VSAM Support of Large DASD

Starting with VSE/ESA 2.6, VSE/VSAM supports disk devices with a large capacity of **up to 65535 cylinders** (64K-1) instead of 65535 tracks. This support applies to disk devices (here referred to as large DASD) such as the **IBM 3390 Model 9** which has a capacity of 10.017 cylinders.

If a logical disk is using 15 tracks per cylinder, as the IBM 3380 and 3390 disk devices do, these disks could have up to 65535 cylinders x 15 tracks = 983025 tracks. The maximum capacity of a large DASD device (with 64K-1 cylinders, 15 tracks per cylinder and 64K-1 bytes per track) can be up to 64 gigabytes, supported by VSE/VSAM.

If the future DASD device architecture may change and one disk would support 64K-1 cylinders with 64K-1 tracks per cylinder and 64K-1 bytes per track, the maximum capacity of one DASD device can be 281.462.092.005.375 bytes, which are about 280 terabytes per volume, supported by VSE/VSAM.

The index allocation of a catalog will be increased for all DASDs, for a large DASD and for “small” DASDs. The index portion will be at least 4% of the primary catalog allocation, the index secondary allocation will have the same size as the index primary allocation.

The space map in the catalog, mapping the free and used tracks, will be kept. The number of space map segments and the number of used catalog records will increase with large DASD. One catalog record (one CI of 512 bytes) can keep one segment of the space map describing 3520 tracks. Currently, the maximum number of space map segments is 19. 19 catalog records are required to map 65535 tracks on one disk.

The **IBM 3390 Model 9** has 10.017 cylinders and 150.255 tracks. The catalog will map the tracks of this disk device type within 43 catalog records.

VSE/VSAM Enhancements

Invoking the Support

This support has no new parameters and is invoked by the system itself.

IDCAMS DEFINE processing with space allocation, that is

```
DEFINE MASTERCATALOG
DEFINE USERCATALOG
DEFINE SPACE
DEFINE CLUSTER UNIQUE
DEFINE ALTERNATEINDEX UNIQUE
```

is checking internally the disk capacity and is using either the old support with up to **65535 tracks** of the disk, when

- the disk has up to 65535 tracks, or
- the current catalog is owning VSAM space on that disk defined before VSE/ESA 2.6.

or is using the new support with up to **65535 cylinders** of the disk, when

- the disk has more than 65535 tracks, and
- the current catalog is **not** owning VSAM space on that disk defined before VSE/ESA 2.6.

This means in case of an IBM 3390-9, either VSAM space was already allocated on this disk for the current catalog from a previous VSE/ESA release - then this disk will be supported as "64K-Track-Disk" only - or it was not used by VSE/VSAM before VSE/ESA 2.6, - then a new flag bit in the Catalog Volume Record will indicate a "Large DASD" and the whole volume can be used by VSE/VSAM.

- Allocations other than CYLINDERS (TRACKS or RECORDS, for example) will be translated internally to multiples of CYLINDERS, if possible, respectively to multiples of tracks-per-cylinder, if track allocation was required by VSE/VSAM for large DASD. Example: a VSE/VSAM cluster with a primary (and secondary) allocation of one track will have a primary (and secondary) allocation of one cylinder.
- Track boundaries of extents will be rounded to cylinder boundaries.
- If a catalog resides on a large DASD, the minimum allocation for the catalog has to be 5 cylinders - 4 cylinders for the data component and 1 cylinder for the index component.

Performance Considerations (KSDS Only)

The performance of KSDS access may change if the data control area size (data CA) changes. One index control interval (index CI) controls one data control area. The larger the data control area together with a large index control interval, the better the keyed access performance, because less index I/O operations are required for keyed direct and for keyed sequential access. Control area size will be calculated by VSE/VSAM from the smaller of the primary or secondary allocation. Minimum is one track, maximum is one cylinder. A control area size of one cylinder is recommended.

A VSE/VSAM KSDS on a large DASD will have a control area size of one cylinder, whenever possible. Primary and secondary allocations are rounded upward to cylinder multiples and to cylinder boundaries, even if defined as TRACKS or as RECORDS. To get a control area size of one cylinder also for long keys (up to 255 bytes), the minimum data control interval size (CI size) of a KSDS will be calculated by VSE/VSAM and (this is new) increased, if necessary.

The following key lengths require the following minimum control interval sizes:

- A key length between 7 and 35 bytes requires at least 1024 bytes CI size.
- A key length between 36 and 55 bytes requires at least 2048 bytes CI size.
- A key length greater than 55 bytes requires at least 4096 bytes CI size.

If a data control area size of one cylinder is not possible (see `BUFFERSPACE` Parameter below), a data control area size of one track will be allocated, because all, the data control area size, the primary and the secondary allocation must fit into the "Large DASD" cylinder allocation.

BUFFERSPACE Parameter: The `BUFFERSPACE` parameter (not recommended at `DEFINE CLUSTER` time), which must be at least as long as two data control intervals and one index control interval, can force a smaller data control area size. If the `BUFFERSPACE` value is smaller than twice the required data control interval size plus once the required index control interval size, the index control interval size has to be decreased to fit into the bufferspace. This may result in a smaller data control area size - less than a cylinder for a traditional DASD, but always one track for a large DASD.

Increased Size of the Catalog Index

The index primary allocation of a catalog will be at least 4% of the primary catalog data allocation. The catalog index secondary allocation will have the same size as the index primary allocation.

Restrictions

- Drop Imbedded Index - Keyword `IMBED`

The definition of imbedded indices for catalogs, alternate indices and clusters will not be supported any longer. However, if used in existing `IDCAMS DEFINE` jobs, the keyword `IMBED` will be simply ignored to keep old jobs running.

Imbedded indices in existing VSE/VSAM datasets defined prior to VSE/ESA 2.6 with the `IMBED` option will be accepted and used. Imbedded index means that always the first track of each data control area has been filled with replicated index records, indexing that control area.

- Catalog Default is `NOIMBED`

The default value for `DEFINE MASTERCATALOG` and `DEFINE USERCATALOG` has changed from `IMBED` to `NOIMBED` (for all DASD). This means, newly defined catalogs (`MASTERCATALOG`, `USERCATALOG`) will never have an imbedded index.

- No CRA on Large DASD

The support of the CRA (Catalog Recovery Area), keyword `RECOVERABLE` will be dropped for `SPACE` on large DASD. Existing recoverable catalogs and CRAs on "small" DASD will be accepted and supported, new CRAs on "small" DASD could be defined, but no CRA must be defined on a large DASD. That means, recoverable catalogs cannot reside on a large DASD and cannot own space on a large DASD.

- No Large DASD on FBA

FBA disks are not supported as large DASD.

New or Changed Fields in LISTCAT Output

The large DASD support is reflected in the `LISTCAT` output as follows:

- The field `DEVTYPE`, either in the Volume Group (`DATA`, `INDEX`) or in the Volume Entry will show a prefix "BIG-" in case of a large DASD (Example: `DEVTYPE----BIG-3390`).

VSE/VSAM Enhancements

- The field "TRACKS" in the Volume Group (DATA, INDEX) will show "CYLINDERS" in case of a large DASD.
- The field "SPACE-MAP" in the Volume Entry will show CYL-SPC-MAP" and cylinder mapping instead of track mapping in case of a large DASD.

IXFP/SnapShot Support for VSE/VSAM Datasets

Background

Previous to VSE/ESA 2.5, the IXFP/SnapShot feature could not be used for backing up VSE/VSAM datasets because in the *snapped volume* (the target volume) that is produced by IXFP/SnapShot:

1. At DEFINE time of a VSAM dataset, all information about the dataset is saved in the catalog (dataset name, dataset attributes, VOLIDs, extent information, and so on).
2. Any access to a VSAM dataset is directed via:
 - a. the name of its owning catalog
 - b. the VOLID of the affected DASD volume, found in the catalog
 - c. the name of the dataset, found in the catalog
 - d. the extents of the dataset, found in the catalog
 - e. certain dataset attributes (such as "indexed", for example).

Or in other words:

1. VSAM dataset names, VOLIDs, and extent information are saved in the catalog.
2. Access to a VSAM dataset requires the correct name of the catalog, the correct name of the dataset, and the correct VOLID.

In addition, duplicate VOLIDs cannot be used within the same VSE/ESA system, especially where VSE/VSAM datasets are accessed.

To overcome these limitations, VSE/ESA 2.5 supports a new IDCAMS **SNAP** command, which you must use together with IDCAMS BACKUP and a new *synonym list*. Run the following IDCAMS commands:

1. IDCAMS SNAP with a *synonym list* (similar to that used for the IDCAMS BACKUP) to control the source and snapped (target) volumes for the IXFP/SnapShot program. Snapped volumes are created. These snapped volumes are not available for normal VSAM access: they are therefore *very safe*.
2. IDCAMS IMPORT CONNECT to inform the VSE/ESA system that a copy of the User Catalog now exists on the *snapped volume*, and that this copy of the User Catalog now has a *synonym name*.
3. IDCAMS BACKUP against the snapped volumes, using the *synonym list*.

Note: This sequence of steps works for both, VSAM datasets residing on the IBM RAMAC Virtual Array (RVA) or on the IBM Enterprise Storage Server (ESS). Refer also to Chapter 5, "IXFP/SnapShot and FlashCopy Support" on page 43.

Prerequisites

To use IDCAMS SNAP together with the synonym list, the following is required when your datasets reside on an RVA:

The optional program IXFP/SnapShot for VSE/ESA (5686-066). Its phase \$IJBIXFP must reside in the SVA. Refer also to Chapter 5, "IXFP/SnapShot and FlashCopy Support" on page 43.

Advantages in Creating a SnapShot of Entire Disk Volumes

These are the advantages in using IDCAMS SNAP together with a synonym list, to produce *SnapShots* of volumes:

1. After a SnapShot of disk volumes is complete, backup processing *can be started immediately* and can run *during online processing*.
2. During the very short “copy-time” of the SnapShot (which may be minutes, or even **seconds**), online systems only have to be shut down for a very short time.
3. There is no risk of losing data.
4. There is faster access to the snapped (target) datasets.
5. There are no catalog changes on the snapped (target) catalog.
6. Error-prone and time-consuming catalog changes are not required on the snapped catalog. The snapped catalogs remains 100% unchanged. The snapped catalogs and the datasets could then be used for disaster recovery (for example, to replace one or more complete disk volumes).
7. When the SnapShot is made, the contents of the snapped (target) volumes remain identical to the contents of the source volumes. This is very important if you must carry out a disaster recovery.
8. Any BACKUP jobs that you run after the SnapShot, will use “frozen” data on the snapped volumes. This data is independent of any data changes that take place on the online systems.
9. Running IDCAMS SNAP and IDCAMS BACKUP using a synonym list significantly reduces the time during which your system is unavailable.

Running IDCAMS SNAP and IDCAMS BACKUP (Using a Synonym List)

These are the steps you should follow:

1. **Run IDCAMS SNAP using the Synonym List.**

Use the IDCAMS SNAP to create a SnapShot of all entire disk volumes where the catalog and all its datasets reside. Give the snapped (target) volumes different VOLIDs than the source volumes. **Note:** The snapped (target) volumes will then be online after the IDCAMS SNAP has run.

This is the syntax of the IDCAMS SNAP command:

```
SNAP
    SOURCEVOLUMES(volser[ volser...])
    TARGETVOLUMES(volser[ volser...])
    [NOPROMPT|PROMPT]
```

where:

SOURCEVOLUMES(volser[volser...])

TARGETVOLUMES(volser[volser...])

Are a pair of lists indicating from which volumes, and to which volumes, the SnapShot is to be done.

Abbreviations: SVOLUME or SVOL, TVOLUME or TVOL

NOPROMPT This keyword prevents decision-type messages from being issued.

PROMPT This keyword allows decision-type messages to be issued.

VSE/VSAM Enhancements

2. Run IDCAMS IMPORT CONNECT.

You run IDCAMS IMPORT CONNECT to inform the VSE/ESA system that a copy of the User Catalog now exists on the *snapped (target) volume*, and that this copy of the User Catalog now has a *synonym name*.

Notes:

- a. The catalog that has a synonym name now exists (including its datasets), but *cannot be accessed* by normal applications.
- b. You use a snapped (target) Master Catalog in the same way as you use a snapped (target) User Catalog.

3. Run IDCAMS BACKUP using the Synonym List.

IDCAMS BACKUP uses the new parameters contained in the synonym list:

- The synonym list is used to route the VSAM OPEN and BACKUP functions to the snapped (target) volumes.
- The BACKUP works in the same way as previously, *except* that it uses the synonym list to access the snapped volumes. Therefore, you can use all features of IDCAMS BACKUP.
- You can use the output from this IDCAMS BACKUP (that uses a synonym list) in the same way as before (for IDCAMS RESTORE).

This is the syntax of the IDCAMS BACKUP command:

```
BACKUP .....
      SYNONYMLIST(                               -
      SOURCEVOLUMES(volser[ volser...]) -
      TARGETVOLUMES(volser[ volser...]) -
      CATALOG(catname[/password])           -
      SYNONYMCATALOG(catname[/password]) )
```

where:

SYNONYMLIST

Indicates that this backup uses a synonym list of "snapped" VSAM volumes.

Abbreviations: SYNLIST or SYNL

SOURCEVOLUMES(volser[volser...])

TARGETVOLUMES(volser[volser...])

Are a pair of lists indicating from which volumes, and to which volumes, SnapShot has to be done.

Abbreviations: SVOLUME or SVOL, TVOLUME or TVOL

CATALOG(catname[/password])

Specifies the name and the password of the source catalog, which is the original catalog from which a SnapShot was done.

Abbreviation: CAT

SYNONYMCATALOG(catname[/password])

Specifies the synonym name and password of the snapped (target) catalog which was copied (using SnapShot) to the snapped (target) volume. You must ensure that the synonym name of the catalog has been imported using IMPORT CONNECT, before running the IDCAMS BACKUP. The password is identical to the password of the source catalog. **Note:** You must provide the synonym name of the catalog in a DLBL statement containing filename IJSYSUC.

Abbreviation: SYNCAT

For reference purposes, Figure 19 shows the internal structure of the synonym list:

Offset	Source	Target
0	Header with Eye Catcher	
8	Source Catalog / Source Password	Target Catalog / Target Password
112	Source Volume 1	Target Volume 1
124	Source Volume 2	Target Volume 2
...
	End of List	

Figure 19. Internal Structure of Synonym List

Example of Running IDCAMS SNAP/BACKUP (Using a Synonym List)

The following jobstream example shows how to:

1. Create a SnapShot of the *source* volumes *SYSWK1* and *DOSRES* to the *snapped* (*target*) volumes *VOLSN1* and *VOLSN2*.
2. Run an IDCAMS IMPORT CONNECT to inform the VSE/ESA system that a copy of the User Catalog (VSESP.USER.CATALOG on SYSWK1 and DOSRES) now exists on the snapped (target) volume, and that this copy of the User Catalog now has a *synonym name* (VSESP.SNAP.CATALOG).
3. Run an IDCAMS BACKUP that uses the new parameters contained in the synonym list.

Input:

```
// JOB SNAP and BACKUP from snapped Volumes
// ASSGN SYS005,180
// DLBL IJSYSUC,'VSESP.SNAP.CATALOG',,VSAM
// EXEC IDCAMS,SIZE=AUTO
/* First: do the SNAPSHOT */      -
  SNAP
  SOURCEVOLUMES(SYSWK1,DOSRES)  -
  TARGETVOLUMES(VOLSN1,VOLSN2)
/* Second: Synonym Name for the snapped Catalog */-
IMPORT CONNECT OBJECTS((VSESP.SNAP.CATALOG -
  VOLUMES(VOLSN1) DEVT(3390)))      -
  CATALOG(VSAM.MASTER.CATALOG)
/* Third: Backup from snapped volumes */-
BACKUP (*)                          -
  SYNONYMLIST (                      -
  SOURCEVOLUMES(SYSWK1,DOSRES)      -
  TARGETVOLUMES(VOLSN1,VOLSN2)      -
  CATALOG(VSESP.USER.CATALOG)       -
  SYNCATALOG(VSESP.SNAP.CATALOG)    )
/*
/ &
```

Output:: The output of the IDCAMS BACKUP (using a synonym list) is any normal backup media (tape or disk). This is the same as any other IDCAMS BACKUP output.

VSE/VSAM Enhancements

VSE/VSAM Buffer Hashing

Large VSAM LSR (Local Shared Resources) buffer pools can improve response time and reduce I/O operations. However, until now searching the pool to find the right buffer took time. Benefits were often reduced due to the increased CPU time needed to search large buffer pools. To overcome this reduction in performance, *VSAM Buffer Hashing* has been implemented in which a VSAM hashing algorithm allows direct access to the required buffer.

Using VSAM Buffer Hashing, you can take advantage of using very large buffer pools, without the disadvantage of additional processor load.

What Is Buffer Hashing?

VSAM buffer hashing is a function introduced with VSE/ESA 2.5. It replaces the current buffer management for applications that use the LSR (Local Shared Resources) option. This new buffer management technique provides the following improvements over the existing sequential buffer management:

- The time required to perform buffer searches is reduced, since the need to do sequential searches through the buffer pool is removed. The new search technique uses a hashing algorithm. Using this hashing algorithm, the path length of the search is significantly shortened. The I/O rate is therefore reduced.
- The path length does not depend upon the number of buffers (therefore the search time is independent of the buffer pool size).

How Does Buffer Hashing Work?

VSAM Buffer Hashing uses a:

- Hash Table – A table in main storage in which each table entry is used as a pointer to a BCB (Buffer Control Block). A BCB contains the address of the buffer (for data or index), and information about the buffer itself. There is one BCB for each buffer in the LSR buffer pool.
- Synonym – When using a hashing technique, synonyms may occur when two or more entities hash to the same anchor point. In VSAM Buffer Hashing, synonyms are chained together in the BCB. However, the possibility that synonyms occur is very small, and the chain is usually very short.
- Hash Algorithm, which is calculated as follows:

$$X = \text{remainder of } (RBA/2 + DSID1/2 + DSID2/2) / DIM$$

where:

X The remainder of the above calculation, and is used as the index to the hash table.

RBA The Relative Byte Address, used by VSAM to identify a certain buffer in the LSR buffer pool.

DSID1 and DSID2

The Data Set Identifiers (DSIs), which are unique identifications of a certain opened VSAM data set component, either a data or an index component.

DIM The number of entries in the Hash Table. $DIM = (2N-1)$.

N The number of buffers in the subpool.

Here is a "simple" example:

"Simple" in this case means that the values of this example were simplified to decimal values (not hexadecimal) to give a better understanding of the technique.

1. Let us assume that we have an LSR pool with 10 buffers. The Hash Table will have $(2 * 10 - 1) = 19$ entries. Therefore:
DIM = 19
2. A VSAM GET operation reads a data record from a certain VSAM data set with the internal data set identifications DSD1 and DSD2 into a data buffer. Therefore:
DSID1 = 220, DSID2 = 32
The BCB pointing to that data buffer is at storage location '640000'. The RBA (Relative Byte Address) of the VSAM data buffer is 800. Therefore:
RBA = 800
3. The hash algorithm $X = \text{remainder of } (RBA/2 + DSID1/2 + DSID2/2) / DIM$ therefore calculates the following index for the hash table:
 $(800/2 + 220/2 + 32/2) / 19 = 27$, **remainder = 13 = X**
"13" will be used as index into the hash table.
4. The BCB pointer '640000' will be stored in the **13th position** of the hash table.
5. Whenever another request is searching for a data buffer with RBA 800 from this certain dataset, the hash algorithm can calculate easily the index of 13 into the hash table and use the BCB at address '640000' and its related data buffer without a long pool search. This hashing technique also works, of course, with very large buffer pools (for example, 32767 buffers).

VSE/POWER Enhancements (VSE/ESA 2.6)

The support described in this section is introduced with VSE/ESA 2.6.

Data File Extension During Warm Start

To minimize the long system downtime (caused by formatting all extents of the data and queue files during a VSE/POWER cold start), VSE/POWER now offers extension of the data file during a warm start. The data file extension will not affect already spooled data and is triggered when VSE/POWER detects that one more extent has been appended to the existing IJDFILE DLBL/EXTENT statements in the label procedure (STDLABEL.PROC) of a VSE/POWER warm start. After operator prompting and file verification, the formatting of the additional extent is done in parallel with ongoing spooling.

Along with this new function, the PDISPLAY Q command has been enhanced to present all currently used extents of the queue, data, and account files and their detailed physical locations.

For further details, refer to "Extending Existing VSE/POWER Spool Files" and "Format 6: PDISPLAY Q" in the *VSE/POWER Administration and Operation* manual.

Enhanced Networking Capabilities

VSE/POWER networking has been enhanced to use the **Secure Sockets Layer (SSL)** feature for TCP/IP connections. Data (jobs, list and punch output, messages and commands) which is sent between two VSE/POWER nodes via a TCP/IP connection is encrypted according the private key of the customer. Network control records, which contain for example a node password, are encrypted as well. This support is referred to as "PNET SSL". The usage of the SSL feature is optional and is selected for each node separately, which means that there are henceforth

- SSL nodes using a TCP/IP connection with the SSL feature
- TCP nodes using a TCP/IP connection without the SSL feature.

VSE/POWER Enhancements

For this purpose, VSE/POWER initiates an application interface to the local TCP/IP host partition and communicates via Assembler asynchronous EZASMI SOCKET requests that enter the LE environment for C-SOCKET calls to the 'TCP/IP for VSE/ESA' host partition. This application interface is established in addition to an application interface used for TCP nodes.

The following enhancements, changes, and rules accompany this networking enhancement:

- The PNODE macro offers new operands to define an SSL node by specifying the dotted decimal IP address or the symbolic IP address of the remote node, and optionally a port number. In addition, new operands are available to specify the private key of the customer.
- A Network Definition Table (NDT) is generated from PNODE assemblies. PLOADing an NDT with at least one SSL node will immediately open VSE/POWER's TCP/IP interface, so that any incoming CONNECT request can be responded to, although no PSTART command was given for the connecting node.
- The new PNODE macro generates a Version 06.0 NDT, which is incompatible with NDTs (Version 05.0) generated by previous VSE/POWER releases.

Note: Existing NDTs must be re-assembled under VSE/POWER 6.6.

- The display of a Version 06.0 NDT has a new arrangement.
- The PSTART PNET command for an SSL node has the same format as used for TCP nodes. All other PSTOP, PDRAIN, PACT, PFLUSH, and PINQUIRE networking commands are independent of the node type and therefore transparent.
- The PINQUIRE command has been enhanced for
 - subselection via PNETSSL
 - new display of local node attributes
 - improved display of remote nodes.
- The so-called PNET Console trace of BSC/CTC/TCP/SSL communications has been extended for
 - subselection of PNETSSL
 - comprehensive trace information for SSL node.

For further details, refer to the *VSE/POWER Networking* manual.

Additional Enhancements Implemented through Field APARs

The following changes have been implemented through field APARs:

- Request confirmation for critical VSE/POWER commands
Use the new SET CONFIRM=power-command to request confirmation of the command. For example, SET CONFIRM=PEND will then prompt the operator with the new message 1QZ3D.
- Request identical separator pages
Use the new SET DLSEP=YES|FORCE command to force identical separator pages and drop the 'last' separator page for *all* list tasks to be started. This is similar to the existing "DLSEP" operand of the PSTART LST command.
- Ignore SET NORUN=YES for selected jobs
For CICS and VTAM startup jobs, which should come up in any case, it may not be desirable to enter DISP=X at VSE/POWER recovery due to SET

NORUN=YES. The new * \$\$ JOB operand NORUN=IGN allows ignoring such general SET NORUN processing. This special job attribute is reflected

- during PDISPLAY RDR,...,FULL=YES by NORUN=IGN
- via Spool Access GET-OPEN reply SPL by SPLDFLG.SPLDFRUN X'08'
- via Spool Access CTL (Fixed Format) Display Request by PXFMFLG2.PXFM2RUN X'01'.

- Search for U='user_information'

The user information as specified by the UINF= (or USER=) operand of a * \$\$ JOB/LST/PUN statement or of the PALTER command is displayed (with FULL=YES) via the U=' 16 bytes ' field. It is used by TCP/IP for VSE/ESA to contain the dotted decimal or symbolic IP address of the IP host owning the target printer or the name of a script file. Use the new CUINF='...' search operand of the queue manipulation or display commands to select queue entries according to Current User Information content.

- Verify successful command processing

Existing message 1R88I OK, issued for completed central operator queue manipulation commands (PALTER, PDELETE, PHOLD, PRELEASE), has been extended to identify the number of processed queue entries together with the repeated command; for example:

```
1R88I OK : 6 ENTRIES PROCESSED BY PALTER,LST,*SSL,DISP=K
```

These enhancements are described in detail in the *VSE/POWER Administration and Operation* manual.

VSE/POWER Enhancements (VSE/ESA 2.5)

The enhancements described in this section were introduced with VSE/ESA 2.5.

Relief for Access to Queue Entries

The following describes how limitations to access queue entries in a critical state have been removed:

Access to Active Queue Entries

For Spool Access GET-BROWSE requests, even an active (DISP='*') entry can be browsed for viewing while an 'update' task processes this entry (see "Parallel Browsing and Tracking of Multiple Access" in *VSE/POWER Administration and Operation*). The following enhancements and changes accompany this extended functionality:

- GET-BROWSE no longer sets a selected entry to DISP='*'
- PDISPLAY output lines are extended by the "B" ('being browsed') column (see "Format 1-1: PDISPLAY RDR" in *VSE/POWER Administration and Operation*).
- GET browsing on active entries can request 'Restart to Active Record' in order to be positioned on the last record that was processed by the 'update' task, for example, on the last statement executed by an active partition (see "GET Service" in *VSE/POWER Application Programming*).
- Browsed entries that have been deleted by a command or the 'update' task are preserved in the Deletion Queue until the last browser terminates. Entries in the delayed deletion state can be made visible by the PDISPLAY DEL or PDISPLAY TOTAL commands. See also "Delaying the Deletion of Browsed Queue Entries" in *VSE/POWER Administration and Operation*.

VSE/POWER Enhancements

Access to In-Creation Queue Entries

For Spool Access GET-BROWSE requests, even an (output) entry in creation (as indicated from the output of PDISPLAY A) may be browsed for viewing while the creating task continues to spool data for the entry. The following enhancements and rules accompany this extended functionality:

- In-creation entries are no longer only shown by the PDISPLAY A command as attributes of creating tasks but now also as entries of the Create Queue by the PDISPLAY CRE or PDISPLAY TOTAL commands (see "Format 3: PDISPLAY CRE" in *VSE/POWER Administration and Operation*).
- When visible in the Create Queue, output of jobs in execution can be selected for GET-BROWSE viewing, for example, to find out how far the execution of a certain job has proceeded by viewing its output (see "GET Service" in *VSE/POWER Application Programming*).
- GET-BROWSE in-creation simulates the existence of a quasi-complete queue entry at the size of its spooling progress at GET-OPEN time. Further spooling progress is made visible only after a GET-QUIT followed by another GET-OPEN request.

Extension of Functional Support

This section summarizes the changes made to provide enhanced functionality for local processing.

Support More Than 10 Dynamic Classes

Together with other VSE components, VSE/POWER now allows the specification of a dynamic class table with 23 alphabetic classes (except A, B, and F) and makes the extension transparent for:

- PLOADing the class table with enhanced messages for surplus or duplicate class entries.
- PVARying the class state.
- Scheduling dispatchable jobs according to class.

Command-Driven Output Segmentation

This dynamic method of requesting RBS-like segmentation of output of an active job whenever necessary or desired has two variations:

- Via the PALTER queue,jnm,jnb,CQNUM=nnnnn,SEGMENT=PAGE|IMM command (made available to previous releases as a field APAR)
- Via the PSEGMENT partition,cuu,PAGE|IMM command, which is more natural when addressing output in creation.

For operand specification in VSE/POWER 6.5, both commands can refer to both PDISPLAY Active and PDISPLAY CRE command displays.

Extension of Networking Capabilities

With the support for VSE/POWER networking via TCP/IP, referred to as 'PNET TCP', the existing PNET Network Job Entry (NJE) communication facilities based on BSC, CTC, or SNA links have been extended by the TCP/IP link medium, through which NJE data exchange becomes possible to other VSE/POWER 6.5 or RSCS V3.2 and later releases. For this purpose, VSE/POWER initiates an application interface to the local TCP/IP host partition and communicates via Assembler asynchronous EZASMI SOCKET requests that enter the LE environment for C-SOCKET calls to the 'TCP/IP for VSE' host partition. The following enhancements, changes, and rules accompany this networking enhancement:

- For better usability, the PNODE macro is offered in different specification formats according to the BSC, CTC, SNA, or TCP link type of a node to be contacted.
- PNODE specifications identifying a TCP/IP linked remote node are either the dotted decimal IP address or the symbolic IP address of the foreign TCP/IP host, which is in contact with the remote node through a selectable port.
- A Network Definition Table (NDT) is generated from PNODE assemblies. PLOADing an NDT with at least one TCP/IP linked node will immediately open VSE/POWER's TCP/IP interface, so that any incoming CONNECT request can be responded to reasonably, although no PSTART command has been given for the connecting node.
- The new PNODE macro generates a Version 05.0 NDT, which is incompatible with NDTs (Version 03.0) generated by previous VSE/POWER releases.

Note: Existing NDTs must be re-assembled under VSE/POWER 6.5.

- The display of a Version 05.0 NDT has a new arrangement.
- The PSTART PNET command for a TCP/IP linked node has the same format as used for SNA linked nodes. All other PSTOP, PDRAIN, PACT, PFLUSH, and PINQUIRE networking commands are independent of link type and therefore transparent.

Additional Improvements Implemented through Field APARs

The following changes have been implemented through field APARs:

- Schedule job more than once a day
Use the new DUEFRQ operand in the * \$\$ JOB statement to run a job, for example, every 30 minutes between 8 a.m. and 5 p.m. (see "Scheduling a Job More than Once a Day" in *VSE/POWER Administration and Operation*).
- New QNUM and CQNUM for uniqueness of queue entry handling
PDISPLAY ...FULL=YES displays the VSE/POWER internal queue entry number by QNUM=nnnnn (decimal format) to allow unique access via new CQNUM operand for the PALTER, PDELETE, PHOLD, and PRELEASE commands (see *VSE/POWER Administration and Operation*).
- Show the partition that processes an active job
Active reader entries show the processing partition ID in the output of a PDISPLAY RDR command if they are active on the same SYSID where the command is executed (see "Format 1-1: PDISPLAY RDR" in *VSE/POWER Administration and Operation*).
- Disallow short POWER commands
Use SET LONGCMD=*power-cmd* to disallow the short form of a VSE/POWER command. For example, SET LONGCMD=PDELETE will accept only 'PDELETE' but not 'L' (see the "SET" command in *VSE/POWER Administration and Operation*).
- Answer JECL correction message 1R33D automatically
Use SET 1R33D=FLUSH|IGNORE to replace message 1R33D CORRECT FULL STATEMENT by message 1R33A, which informs the operator that a job with incorrect JECL has been flushed or that incorrect JECL has been ignored within the job (see the "SET" command in *VSE/POWER Administration and Operation*).
- Enable reading of \$CANCEL label
Use SET INTFLUSH=OPER to allow detection of \$CANCEL label in an "internally" flushed job, as if the operator had flushed the job (see the "SET" command in *VSE/POWER Administration and Operation*).

VSE/POWER Enhancements

- Command-driven segmentation
In order to segment the output of an active job dynamically, use the SEGMENT=PAGE|CARD|IMM operand of the PALTER command to create an RBS-like output segment in the list, punch, or transmit queue. For example,

```
PALTER LST,CICSICCF,359,CQNUM=574,SEGMENT=IMM
```


See "Format 3: Altering to Segment Job Output in Creation" in *VSE/POWER Administration and Operation*.
- Conditional Job Control and SLI resolution
When Job Control is in skip mode, VSE/POWER also skips most of its own * \$\$ JECL statements but does resolve * \$\$ SLI statements. With the extended support triggered by the VSE Job Control specification "// OPTION SLISKIP" (see VSE/AF APAR DY45423), VSE/POWER will also skip * \$\$ SLI statements (see "Interaction with VSE/ESA Conditional Job Control Language" in *VSE/POWER Administration and Operation*).
- RJE,SNA request unit size increased
With APAR DY45464, VSE/POWER has extended the maximum request unit size from 256 to 4096 bytes. See "PRMT Generation Macro" in *VSE/POWER Administration and Operation*.

Chapter 5. IXFP/SnapShot and FlashCopy Support

Introduction

The following support was introduced with VSE/ESA 2.5:

- **FlashCopy Support for the IBM Enterprise Storage Server (ESS).**

The FlashCopy Support provides high-speed copying support for the Enterprise Storage Server similar to the support provided by IXFP/SnapShot for the IBM RAMAC Virtual Array (RVA).

- **IXFP/SnapShot Support Enhanced for VSE/VSAM Datasets.**

The IXFP/SnapShot support for the IBM RAMAC Virtual Array (RVA) has been enhanced. The high-speed copying of volumes also supports VSE/VSAM datasets. This is achieved by providing a new IDCAMS command (SNAP). Refer also to “IXFP/SnapShot Support for VSE/VSAM Datasets” on page 32.

Note: The IDCAMS SNAP support for VSAM datasets is also available with the FlashCopy Support for the IBM Enterprise Storage Server (ESS).

VSE/ESA 2.6 Enhancement

The *VSE/Fast Copy* utility program exploits the FlashCopy and SnapShot (if *IXFP/SnapShot for VSE/ESA* is installed) functions for a full volume backup from disk to disk.

Refer to “VSE/Fast Copy Exploitation of FlashCopy and SnapShot” on page 73 for details.

Shipment and Installation of FlashCopy and IXFP/SnapShot Support

FlashCopy Support:

The FlashCopy support for IBM Enterprise Storage Server (ESS) disk devices is part of VSE/ESA as shipped. The name of the phase including this support is **\$IJBIXFP** residing in sublibrary IJSYSRS.SYSLIB. This phase is automatically loaded into the SVA during startup. The FlashCopy support is provided (as for SnapShot) via the IXFP command as described under “Operation” on page 45.

IXFP/SnapShot (and FlashCopy) Support:

The SnapShot support for IBM RAMAC Virtual Array (RVA) disk devices requires the installation of IXFP/SnapShot for VSE/ESA. IXFP/SnapShot for VSE/ESA is a priced feature and available as VSE/ESA optional program. The phase name is also **\$IJBIXFP**. Once installed, phase **\$IJBIXFP** includes both, the SnapShot and the FlashCopy support. You must install IXFP/SnapShot for VSE/ESA separately from the optional program tape after completing the initial installation of VSE/ESA. IXFP/SnapShot is installed per default into sublibrary PRD2.PROD. Refer also to “Fast Service Upgrade (FSU) Considerations” on page 44.

Phase **\$IJBIXFP** is SVA eligible and requires about 50KB. To enable the system to automatically load the phase, you must add PRD2.PROD and parameter SDL (via LIBRP/LIBRC) to the // LIBDEF statement of the LIBSDL.PROC. When changed, the // LIBDEF statement in LIBSDL.PROC looks as follows:

SnapShot/FlashCopy Support

```
// LIBDEF PHASE,SEARCH=(PRD1.BASE,PRD2.SCEEBASE,PRD2.PROD,SDL)
```

Note: IXFP/SnapShot requires the SDL parameter in the LIBDEF chain. Otherwise, phase \$IJBIXFP is loaded from IJSYSRS.SYSLIB, the version of the phase which supports FlashCopy only.

Instead of having phase \$IJBIXFP loaded automatically by the system, you can use the following job to load the phase into the SVA when needed:

```
// LIBDEF *,SEARCH=(PRD2.PROD,SDL)
SET SDL
$IJBIXFP,SVA
/&
```

Fast Service Upgrade (FSU) Considerations

If you upgrade your system via FSU from VSE/ESA 2.4.x or 2.5.x to VSE/ESA 2.6 and you have IXFP/SnapShot already installed on your old system, phase \$IJBIXFP still exists after the FSU in the sublibrary into which it was installed. An exception are the sublibraries IJSYSRS.SYSLIB, PRD1.BASE, and PRD2.SCEEBASE whose contents are replaced by the FSU.

To get the latest version of IXFP/SnapShot including the FlashCopy support, you must order it separately and reinstall the program.

Hardware Prerequisites

The SnapShot and FlashCopy support have the following hardware requirements:

- IBM RAMAC Virtual Array (RVA) Storage (9393) or StorageTek Iceberg 9200.
 - RAMAC Virtual Array Licensed Internal Code (LIC) 03.00.00 or higher (equivalent microcode level required for StorageTek Icebergs)
 - SnapShot requires Feature 6001 for each existing 9393 system or RPQ 8S0421 for a StorageTek Iceberg.
- IBM Enterprise Storage Server (ESS).

Operation

IXFP Command

The AR (Attention Routine) command IXFP enables VSE/ESA users to exploit the main facilities of the **RVA (RAMAC Virtual Array)** and the **ESS (Enterprise Storage Server)** subsystems. The main functions of the IXFP command include:

SNAP Take a **SnapShot** (RVA) or **FlashCopy** (ESS) copy of:

- a total VOLUME,
- a range of CYLINDERS, or
- a non-VSAM FILE.

DDSR (available for RVA only)

Deleted Data Space Release causes the release of the physical storage space associated with:

- expired FILES residing on **all** VSE-managed RVA volumes whose **expiration date has been reached; and, if specified explicitly, the following resources:**
- a total VOLUME,
- a range of CYLINDERS, or
- a specified FILE.

REPORT (available for RVA only)

Provides information about the space utilization of a single or a range of RVA devices, and/or provides information about the space utilization of all devices (that have been added during IPL) of an RVA subsystem as well as important summary information on subsystem utilization.

The RVA subsystem provides a set of control and monitoring functions that extend the set of IBM 3990 control functions. Many of these functions may be invoked either from the host (for example, with IXFP/SnapShot for VSE/ESA) or directly from the RVA subsystem itself. This Extended Control and Monitoring (ECAM) interface is the protocol for communications between the host CPU and the Disk-Array-Controller. The usage of the ECAM interface by IXFP/SnapShot is generally transparent to the user.

SnapShot/FlashCopy Support

Command Syntax

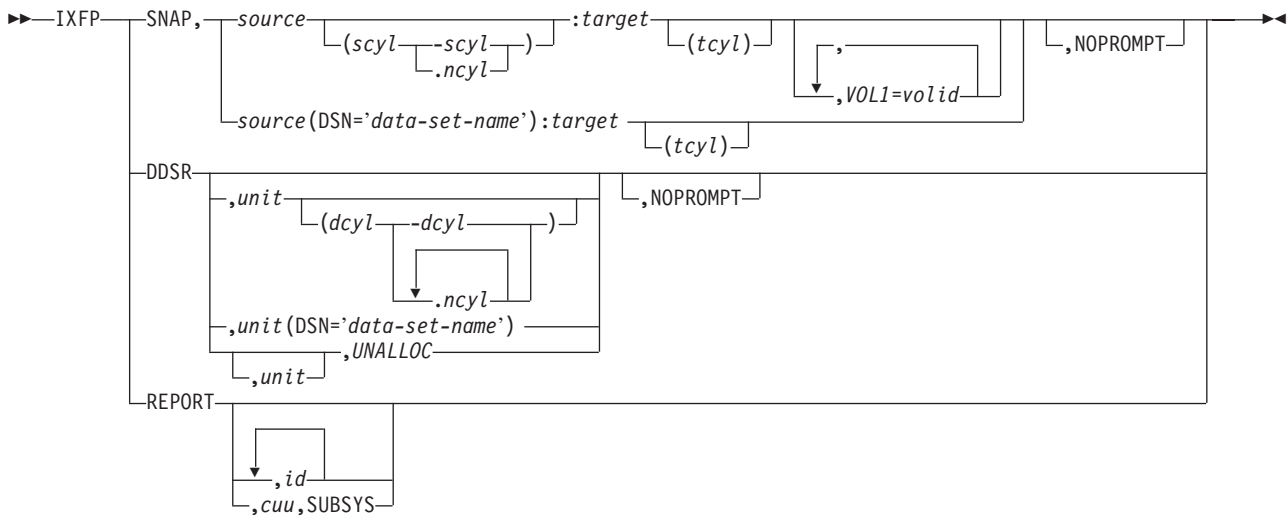


Figure 20. IXFP Command Syntax

SNAP (RVA and ESS)

SNAP Copies data from a source device to a target device. This function is called **SnapShot** for RVA and **FlashCopy** for ESS.

source This is the Device-ID (cuu) or the VOL1 label of the SOURCE device required when copying data from it onto a TARGET device. If the SOURCE device is identified by its VOLID, it must be either the only volume with that VOLID, or it must be the only VOLUME with that VOLID which is up (DVCUP), otherwise an error message will be issued. The whole VOLUME will normally be copied unless the operator has provided additional information that either identifies a cylinder range or a Data-Set-Name (DSN) contained on the source device that is to be copied.

scyl-scyl

This specifies the decimal start- and end-cylinder range where copying is to start and where it is to end on the source device. Cylinder is the smallest entity that can be specified for any SNAP command function. The highest (end) cylinder number must not exceed the device's primary number of cylinders and the start cylinder number must not be higher than the end cylinder number.

scyl.ncyl

This specifies the decimal start-cylinder where copying is to start on the source device and provides the number of cylinders (ncyl) that should be copied. Cylinder is the smallest entity that can be specified for any SNAP command function. The highest resulting cylinder number must not exceed the device's number of primary cylinders.

DSN= DSN is the data-set-name, identifying the file on the source device, which must be a **non-VSAM** file, that the operator wants to be copied onto the target device. The file will be copied into the exact extent boundaries where it was

SnapShot/FlashCopy Support

located on the source device. SAM (Sequential Access Method) files, however, can be relocated (for **ESS** only: assuming that the level of the hardware support used provides this function) to a different, single extent disk location on the target device. In this case, the **tcyl** operand must be supplied but the device must **not** be a **VM-partial minidisk**. The proper label information (single FORMAT-1 label) will be created and added to the target VTOC. Processing multi-volume-files is the responsibility of the operator, such that the SNAP command should be repeated for all the source volumes containing file extents. The number of extents to be copied is limited by the limits existing for the source device. Copying will only be performed if the appropriate extent boundaries on the TARGET device are available or have already expired, otherwise an error message will be provided. (Refer to the DDSR function in case the overlaid file should be deleted and released).

target This is the Device-ID (cuu) or the VOL1 label of the TARGET device required when copying data to it from a SOURCE device. The target device must be set DOWN (DVCDN command) prior to initiating the SNAP function, except the source and the target device are the same device (user is copying data from one location of a disk into another location on the same disk), or except a file (DSN=data-set-name) is being copied. If the TARGET device is identified by its VOLID, it must either be the only volume with that VOLID, or it must be the only VOLUME with that VOLID which is DOWN (DVCDN), otherwise an error message will be issued. As many extents as allocated on the SOURCE device will be used for file copying onto the target device (DSN=data-set-name), otherwise as many cylinders as specified for the SOURCE device, or the whole SOURCE volume will be copied onto the TARGET device. Relocation of data records will be assumed if the specified cylinder range does not match the cylinder range that was given for the source device (for **ESS** only: assuming that the level of the hardware support used provides this function). If the cylinder range does not match the cylinder range of the source device and the target device is a **VM partial-pack minidisk**, the command will be rejected because VM uses virtual cylinder values for partial-pack minidisks and the cylinder ranges must match for VM partial-pack minidisks. For the limitations that exist when running under VM, refer to "Usage of IXFP/SnapShot with VM Minidisks" on page 52. The source and the target device must be of the same type and must be in the same subsystem.

tcyl This is the decimal specification of where copying is to start on the target device. Cylinder is the smallest entity that can be specified for any SNAP command function. The target cyl specification (tcyl) added to the specified or calculated ncyl-1 value for the source device is the resulting target end cylinder address and it must not exceed the device's primary number of cylinders.

VOL1=valid

This operand specifies the VOL1 label that the TARGET device is to receive after the source volume has been

SnapShot/FlashCopy Support

copied. This operand is required if unique VOLIDs are to be maintained, otherwise the source and the target device would have the same VOL1 label after the copy function has completed. The VOL1 label specification for a target device will only be accepted when both, the cyl and the DSN= specification have been omitted (which means copying a full VOLUME).

NOPROMPT

This keyword will prevent decision-type messages to be issued. Some messages require an operator reply before the specified function is going to be initiated. The specification of the NOPROMPT keyword will cause the system to bypass this decision-type message and will initiate the function without any additional notice.

Note: With the only exception of **FILE SNAPping** (DSN=data-set-name), VSE will not perform any VTOC checking on the specified target device and will thus not provide any warning message of any kind, be it overlapping extents, secured- or unexpired files or anything else. Cylinder or volume copying will be done **unconditionally** within the specified or assumed boundaries.

DDSR (RVA only)

DDSR Deleted Data Space Release is a function that ensures that the “logical” deletion of a dataset by the VSE system results in the “physical” deletion of the data on the RVA subsystem. DDSR, if specified without any additional operand allows the operator to delete the VTOC entries and all physical space for **all non-secured** files residing on VSE managed RVA devices whose associated expiration date has been reached and which have been created by VSE. A request will be sent to the subsystem causing the subsystem to release the physical extents that VSE considers as free space. Once released, these extents are reclaimed for free space allocation. In case a **unit** parameter has been provided without any additional operands, the data on the **total volume** will be deleted (including VTOC and the VOL1 label), which requires this volume to be re-initialized (ICKDSF) before using it as a regular data-pack again (assuming it is not going to be used as a SNAP target device in which case no initialization is required). VSE requires the volume to be **DOWN** (DVCDN command) if the whole volume or a range of cylinder is to be deleted.

unit This is the Device-ID (cuu) or the VOL1 label of the device that should either be totally released, or, in case a data-set-name (DSN=data-set-name) or a cylinder range has been specified, should be released partially. The VTOC on this device will remain unchanged except a **file** was **released** in which case the appropriate labels will be deleted from the VTOC (assuming that **not** the whole volume is released and further assuming that the VTOC extent itself is not within the specified cylinder boundaries that have been released).

dcyl-dcyl

This specifies the decimal start- and end-cylinder where deletion is to start and where it is to end. Cylinder is the smallest entity that can be specified for any DDSR command function. The highest (end) cylinder number

must not exceed the device's primary number of cylinders and the start cylinder number must not be higher than the end cylinder number.

dcyl.ncyl

This specifies the decimal start-cylinder where deletion is to start and provides the number of cylinders (ncyl) that should be released. Cylinder is the smallest entity that can be specified for any DDSR command function. The highest resulting cylinder number must not exceed the device's number of primary cylinders.

DSN= This is the data-set-name, identifying the file on the specified unit, which must be a **non-VSAM** file, that the operator wants to be deleted. If the specified unit is in the **UP** (DVCUP) state, then the file will be deleted **unconditionally** and the space is returned to the RVA free-space. If the device is **DOWN** (DVCDN), the command will be rejected and an error message provided. Processing multi-volume-files is the responsibility of the operator, such that the DDSR command must be repeated for all the volumes containing file extents.

UNALLOC

This operand specifies that all extents for either the specified unit, or for all units attached to an RVA subsystem which are currently **UNALLOCATED**, are to be freed. In order to determine unallocated space, the VTOC of the device(s) will be scanned and all tracks which are found to be **NOT** allocated to any File ID contained in the VTOC(s) will be released. This feature has been added to allow work files that were allocated temporarily and have been released afterwards to be also released from the backend storage and be allocated to the free-space pool again.

NOPROMPT

This keyword will prevent decision-type messages to be issued. Some messages require an operator reply before the specified function is going to be initiated. The specification of the **NOPROMPT** keyword will cause the system to bypass this decision-type message and will initiate the function without any additional notice.

REPORT (RVA only)

REPORT

Provides information about the utilization of the RVA device(s) or, in case the **id** parameter has been omitted, of the whole subsystem including all the devices which are known (**ADDED**) to the VSE system.

id This is the id of the device or the scope of devices for which detailed device utilization information is requested. The id can be a VOL1 label, or a Channel-ID, or a Channel+CU-ID, or it is the Device-ID. "IXFP REPORT,1F" will thus provide report information for all capable devices (full-pack RVA) in the device-ID range X'1F0' through X'1FF' that have been **ADDED** to the VSE/ESA system during IPL.

SnapShot/FlashCopy Support

cuu The optional operand cuu must be used together with SUBSYS to correctly identify an RVA subsystem if more than one subsystem exists.

SUBSYS

Provides summary information about the utilization of an RVA subsystem.

Note: The REPORT function, if used under VM, only works for full-pack minidisks or dedicated devices. Refer also to "Usage of IXFP/SnapShot with VM Minidisks" on page 52.

IXFP Report Data Sample

```
ixfp report
AR 0015 SUBSYSTEM D401
AR 0015 *** DEVICE   DETAIL REPORT ***
AR 0015 <---FUNC. CAPACITY (MB)---> <---CAPACITY (%)--->  PHYS.  COMP.
AR 0015 CUU  DEF  ALLOC STORED UNUSED  ALLOC STORED UNUSED USED(MB)  RATIO
AR 0015 128 1890.7  N/A    1.0 1889.6  N/A    0.06 99.94   0.1   8.20
AR 0015 129 1890.7  N/A    1890.7  0.0  N/A    100.00  0.00   81.6  23.16
AR 0015
AR 0015 *** DEVICE   SUMMARY REPORT
AR 0015 CAPACITY    <-----TOTAL-----> <-----TOTALS %------>  COMP.
AR 0015  DEFINED                3781.463 MB  100.00                    RATIO
AR 0015  STORED                1891.823 MB                    50.03
AR 0015  PHYS.USED              81.756 MB                    2.16   23.13
AR 0015  UNUSED                1889.639 MB                    49.97
AR 0015
AR 0015 *** SUBSYSTEM SUMMARY REPORT ***
AR 0015 SYSTEM  DEFINED-CAPACITY  DISK-ARRAY-CAP  FREE-DISK-ARRAY-CAP
AR 0015  PROD    605279.761 MB    117880.209 MB    23646.525 MB
AR 0015
AR 0015 NET-CAPACITY-LOAD(%)  COLL.-FREE-SPACE(%)  UNCOLL-FREE-SPACE(%)
AR 0015 TEST  PROD  OVERALL  TEST  PROD  OVERALL  TEST  PROD  OVERALL
AR 0015  0.00  79.94  79.94  0.00  16.18  16.18  0.00  3.88  3.88
AR 0015 1140I  READY
```

IXFP Report Data

Definition of Field Names

The following list defines the field names and column headings of the reports provided by the REPORT function (see also the above sample).

*** DEVICE DETAIL REPORT ***

cuu This is the Device-ID of the device to which the data applies.

<---FUNC. CAPACITY (MB)--->

This heading covers the fields that provide information about the functional capacity in megabytes for a certain device. Functional capacity in this sense is the capacity that would exist on traditional CKD or ECKD devices.

DEF This field contains the **functional capacity** in megabytes **DEF**ined to the subsystem for this specific device.

ALLOC

This field is the **functional space ALLOC**ated by the **VTOC**. This data is Not (yet) Available for VSE/ESA, but might be added later.

STORED

This field contains the **functional capacity** in megabytes **STORED** (occupying Disk-Array-Storage) for the device or subsystem.

UNUSED

This field contains the part of the **functional capacity** defined for the device or subsystem that is **not mapped** and thus **UNUSED** (that is, not occupying Disk-Array-Storage).

<--- CAPACITY (%)--->

This heading covers the fields that provide information about the percentage of the **DEFined functional capacity** assigned to the individual groups below this heading.

ALLOC

This field is the percentage of **functional space ALLOCated** by the **VTOC**. This data is Not (yet) Available for VSE/ESA, but might be added later.

STORED

This field contains the percentage of the **DEFined functional capacity** that contains **STORED** data (occupying Disk-Array-Storage) for the device or subsystem.

UNUSED

This field contains the percentage of the **DEFined functional capacity** for the device or subsystem that does not yet contain data and is thus **UNUSED** (that is, not occupying Disk-Array-Storage).

PHYS USED(MB)

This heading covers the field containing the **real capacity** in megabytes, as opposed to the functional capacity, that is occupying Disk-Array-Storage. The difference between the **STORED** and the **PHYSical USED** capacity is the savings due to compression and compaction performed by the RVA subsystem for this device.

COMP RATIO

This heading covers the field containing the **real Compaction Ratio** which is the quotient of Functional-capacity-STORED/PHYSicalUSED capacity.

*** DEVICE SUMMARY REPORT ***

CAPACITY

This column covers the capacity groups that are being differentiated.

<-----TOTAL----->

This column covers the **TOTAL** capacity in megabytes that has been allocated to the appropriate group in that line. The capacity is the sum of all the devices that had been selected for the report.

<-----TOTALS %----->

This column shows the percentage of capacity that the group in the appropriate line is occupying, always compared to the 100% **DEFINED functional capacity** in the first row. The percentage is based on **all** the devices that had been selected for the report.

COMP. RATIO

This column shows the **real Compaction Ratio** which is the quotient of the **TOTAL-Functional-capacity-STORED/TOTAL-PHYSicalUSED** capacity and is a measure for the overall **COMPACTION** for the devices selected for the report.

SnapShot/FlashCopy Support

*** SUBSYSTEM SUMMARY REPORT ***

SYSTEM

This column identifies the system to which the capacity, outlined in the appropriate line applies. In case a **TEST** system has not been configured, only the **PROD** system information will be provided.

DEFINED-CAPACITY

This column contains the **Functional Capacity** in MegaBytes for the whole subsystem, as it has been configured.

DISK-ARRAY-CAP

This column contains the total **Disk Array Capacity** in MegaBytes for the whole subsystem, that has been installed.

FREE-DISK-ARRAY-CAP

This column contains the current **Free-Disk-Array-Capacity** in MegaBytes which is still available for **allocation** by the RVA subsystem.

NET-CAPACITY-LOAD(%)

This column contains the percentage of the **Disk-Array-Capacity** which is currently being occupied by the **TEST**, the **PROD** or by both (**OVERALL**) systems. This is probably the most important value and has been placed at the beginning of the very last report line to make it easy to find.

COLL.-FREE-SPACE(%)

This column contains the percentage of the **ARRAY-CYLINDERS** in the subsystem that are **free** array cylinders (that is, the total space that can be written to).

UNCOLL.-FREE-SPACE(%)

This column contains the percentage of the **ARRAY-CAPACITY** originally occupied when a functional track has been re-written to a new location in the disk array.

Usage of IXFP/SnapShot with VM Minidisks

The IXFP REPORT function, if used on a VSE/ESA system running under VM, only works (and will only be accepted as a valid command) for full-pack minidisks or dedicated devices. Partial minidisks cannot be used with the REPORT function.

The IXFP SNAP function, if used on a VSE/ESA system running under VM, does not allow volume or cylinder relocation for **partial minidisks**.

You have to consider that for minidisks which are using MDC (Mini Disk Caching) the MDC buffer must be flushed before performing a SNAP or DDSR function, otherwise data can be incomplete. The MDC problem is solved by VM APAR VM61486.

Note: Other host caching products (for example, Cache Magic) will have the same requirements.

Operating in Batch

A small REXX/VSE procedure can be used to issue IXFP commands from a batch job. The following example shows such a procedure:

```
* $$ JOB JNM=IXFPREXX,CLASS=0,DISP=D
// JOB IXFPREXX
// EXEC LIBR
ACC S=PRD2.CONFIG
CAT IXFPREXX.PROC R=Y
/* rexx/vse procedure */
/* to issue console commands */
trace off
rc = SENDCMD('your-console-cmd-1') /* enter your 1st IXFP cmd here */
call sleep 5 /* wait for 5 seconds */
rc = SENDCMD('your-console-cmd-2') /* enter your 2nd IXFP cmd here */
exit rc
/+
/*
// LIBDEF *,SEARCH=(PRD2.CONFIG,PRD1.BASE)
// EXEC REXX=IXFPREXX
/&
* $$ E0J
```

More information on the REXX/VSE Console Automation Capability can be found in the *REXX/VSE Reference* manual, SC33-6642.

More Information

This section lists additional sources where related information can be found.

RAMAC Virtual Array (RVA) Storage Publications

IBM RVA (9393) hardware books are available on the Hardware Collection CD-ROM (SK2T-5843-16) or at the following Internet/Intranet addresses:

- **Internet:**

<http://www.s390.ibm.com/bookmgr-cgi/bookmgr.cmd/Shelves/CP6BKS00>

- **IBM Intranet:**

<http://w3.enterlib.ibm.com/cgi-bin/bookmgr/shelves/CP6BKS00>

The following RVA (9393) manuals are available at these addresses:

```
9393 General Information, GC26-7167
9393 Introduction, GC26-7168
9393 Physical Planning, GC26-7169
9393 Planning, Implementation and Usage, GC26-7170
9393 Operation and Recovery, GC26-7171
9393 Reference, GC26-7172
```

SSD News/Flashes can be received from the **Internet** at <http://www.storage.ibm.com/> or the **IBM Intranet** at <http://w3.ssd.ibm.com/lss>.

SnapShot/FlashCopy Support

Redbooks

Redbooks can be read/received from the following Internet/Intranet addresses:

- **Internet:**

<http://www.redbooks.ibm.com/> under "Redbooks Online", for example.

- **IBM Intranet:**

<http://w3.itso.ibm.com/> using "Find Redbooks", for example.

Redbooks specially related to the RVA are:

- *RAMAC Virtual Array*, SG24-4951
- *Implementing SnapShot*, SG24-2241

WSC Flashes

Washington Systems Center (WSC) Flashes can be received from the following Internet/Intranet addresses:

- **Internet:**

<http://domino.www.ibm.com/Support//> (enter **flash** in the search field).

- **IBM Intranet:**

<http://w3.ibm.com/support/techdocs/wscflash.nsf>

WSC Flashes specially related to the usage of the RVA are, for example:

WSC Flash 98-037

IBM Announces Enhanced VSE/ESA Support for the RAMAC Virtual Array

WSC Flash 98-026

Net Capacity Load Concerns with RVA

WSC Flash 98-026

RVA Considerations for running VM/ESA and OS/390

WSC Flash 97-038

SQL/DS Considerations with RAMAC Virtual Array Storage

WSC Flash 97-028

Operational Considerations for the RVA in a VM Environment.

RVA and VSE/ESA Performance Considerations

VSE/ESA related performance considerations when using the RVA are provided via the VSE/ESA home page at

<http://www.ibm.com/servers/eserver/zseries/os/vse/>

in the document *VSE/ESA I/O Subsystem Performance Considerations*.

Chapter 6. OSA Express Support

The Open Systems Adapter (OSA) Express support is provided via the OSA Express adapter available for **IBM G5, G6, and zSeries 900** processors.

Introduction

The OSA Express adapter is based on the QDIO (Queued Direct I/O) architecture and provides direct connectivity between VSE/ESA applications and other platforms on the attached network. The QDIO architecture allows a highly efficient data transfer since it eliminates the need for conventional I/O and interrupt processing. This results in accelerated TCP/IP data packet transmission. The OSA Express adapter consists of different features:

- Gigabit Ethernet
- Fast Ethernet
- ATM
- Token Ring

All features support the QDIO architecture. Additionally, the Fast Ethernet, ATM, and Token Ring feature can be configured to run either in QDIO or non-QDIO mode. To switch between the two modes, the *OSA/SF for VSE/ESA* program (which is part of VSE/ESA) is required.

The following table summarizes the OSA Express support (QDIO mode) as available with VSE/ESA 2.6. The table also shows the non-QDIO support available. In a non-QDIO environment, either TCP/IP or SNA can be used as access method. As mentioned before, OSA/SF is needed if you plan to switch between the two modes.

Table 1. Overview VSE/ESA 2.6 OSA Express (QDIO) and non-QDIO Support

Network	Mode	TCP/IP	SNA	OSA/SF required
Gigabit Ethernet	QDIO	yes	no	no
Fast Ethernet	QDIO	yes	no	no
Fast Ethernet	non-QDIO	yes	yes	yes
ATM (*)	QDIO	yes	no	no
ATM (*)	non-QDIO	yes	yes	yes
Token Ring	QDIO	yes	no	no
Token Ring	non-QDIO	yes	yes	yes

(*) VSE/ESA supports ATM in LAN Emulation mode only.

Invoking the Support

To use the OSA Express adapter, the following tasks must be performed:

1. Configuring IOCP
2. Defining OSA Express in VSE/ESA (IPL ADD statement)
3. Defining OSA Express in TCP/IP (DEFINE LINK statement).

OSA Express Support

IOCP Configuration

OSA Express is identified in the S/390 I/O configuration by its channel path identifier (CHPID). The channel type for QDIO is OSD.

```
CHPID PATH=FC,TYPE=OSD
CNTLUNIT CUNUMBR=D00,UNIT=OSA,PATH=FC
IODEVICE ADDRESS=(D00,3),CUNUMBR=D00,UNIT=OSA
IODEVICE ADDRESS=(D03,3),CUNUMBR=D00,UNIT=OSA
```

In case of non-QDIO, the TYPE would be OSE instead of OSD.

OSA Express Definition in VSE/ESA

To access the OSA Express adapter in QDIO mode, you need three OSA Express devices (read, write, and datapath). You must specify these devices in the IOCP generation macro with device type OSA.

For VSE/ESA, the corresponding new device type **OSAX** has been introduced. It must be used for all the devices specified in the IOCP generation macro with channel type OSD and can be specified for VSE/ESA with the hardware configuration dialog. Refer also to "Configure Hardware (Fastpath 241)" on page 19. Following are examples of how to specify OSAX devices:

```
ADD D00:D02,OSAX
```

or

```
ADD D00,OSAX
ADD D01,OSAX
ADD D02,OSAX
```

All devices that are to be used later on must be added during IPL. If you want to specify a second DEFINE LINK within the same or a different TCP/IP partition, you have to add three more OSAX devices:

```
ADD D03:D05,OSAX
```

In case of non-QDIO, the device type for VSE/ESA must be OSA (as for the OSA-2 adapter). In non-QDIO mode, the OSA Express adapter behaves like an OSA-2 adapter and you have to specify only two devices of type OSA.

OSA Express Definition in TCP/IP

To use the OSA Express adapter in QDIO mode, specify the TCP/IP DEFINE LINK command as follows:

```
DEFINE LINK, ID=..., TYPE=OSAX,
    DEV=cuu1 (or DEV=(cuu1,cuu2)),
    DATAPATH=cuu3,
    IPADDR=addr,
    MTU=max. 9000, (default: 1492)
    PORTNAME={8byte}name,
    FRAGMENT={NO|YES} (default: NO)
    (YES not supported by OSA Express adapter)
```

Explanations:

1. cuu1,cuu2 must be an even/odd pair. If cuu2 is omitted, cuu1 + 1 is taken as default.
2. An IP address can only be used once per OSA Express adapter, that is, a second DEFINE LINK must contain a different IP address.

- When you specify PORTNAME, you assign a name to the port of the OSA Express adapter. The first user who initializes the adapter determines the name of the port. Subsequent users within the same or different operating systems must use the same name. Starting with a certain microcode level, the OSA Express adapter requires the specification of PORTNAME. It is therefore recommended to always specify PORTNAME. See also "Example 1" and "Example 2" below.

If the DEFINE LINK fails with message 0S39I REASON=0032, the PORTNAME specified does not match the name specified initially.

Example 1:

```
DEFINE LINK, ID=..., TYPE=OSAX,
      DEV=(D00, D01),
      DATAPATH=D02,
      IPADDR=9.164.155.90,
      MTU=9000,
      PORTNAME=OSAXPORT
```

Example 2:

```
DEFINE LINK, ID=..., TYPE=OSAX,
      DEV=D04,
      DATAPATH=D03,
      IPADDR=9.164.155.99,
      MTU=1492,
      PORTNAME=OSAXPORT
```

Further DEFINE LINK information:

- Several LINKs of type OSAX may be defined within one TCP/IP partition.
- The three OSA Express devices used for the DEFINE LINK must be unique within VSE/ESA.
- If running under VM, the three devices describing the OSAX link must be unique within VM.

Additional TCP/IP considerations:

- If you want to change the properties of an OSAX LINK you have to do a DELETE/DEFINE LINK. The MODIFY command is not supported.
- The DEFINE ADAPTER is not needed.

Partition resources required:

For each DEFINE LINK of an OSAX, the TCP/IP partition requires 1050 KB partition GETVIS (ANY) space and 1050 KB for SETPFIX (ANY). It may therefore be necessary to adjust the TCP/IP startup procedure accordingly.

Documentation Available

The following manuals provide additional information:

- For general overview information consult:
 - "Chapter 4: Extended Networking Support" in the *VSE/ESA Planning* manual.
- For general planning information and OSA/SF consult:
 - The manual *Planning for the S/390 Open Systems Adapter Feature*, GC23-3870, and the *VSE/ESA Open Systems Adapter Support Facility User's Guide*, SC28-1946.
- For OSA Express information consult:
 - The manuals *S/390 OSA Express Customer's Guide and Reference*, SA22-7403, and *zSeries 900 OSA Express Customer's Guide and Reference*, SA22-7476.

OSA Express Support

Chapter 7. Virtual Tape Support

This chapter documents the Virtual Tape Support which is new with VSE/ESA 2.6.

Introduction

This section provides introductory and overview information on the Virtual Tape Support. It introduces the topics and the terms which later sections discuss in more detail.

VSE/VSAM or Remote Virtual Tape

In VSE/ESA, a virtual tape is a file or dataset containing a tape image. A virtual tape can be:

- A VSE/VSAM **ESDS** file on the VSE/ESA host side.
- A **remote** file on the server side; for example, a Linux, UNIX, or Windows file. To access such a remote virtual tape, a **TCP/IP** connection is required between VSE/ESA and the remote system.

Defining the Tape Device

A virtual tape must be added to the system like a physical tape (unit). It must have at least one **cuu** address. For example:

```
ADD cuu,3480
```

The Virtual Tape Support is available for tape devices with a device type code of **3480**, **3490**, or **3490E**.

Note: It is recommended to select for virtual tapes unique *cuu* numbers that are not used by physical tape units in order to avoid any tape handling or tape operation problems.

VTAPE Command

You communicate with the Virtual Tape Support via the **VTAPE START** and the **VTAPE STOP** command. Examples are shown in the following sections and a detailed description of the command syntax and the command parameters is provided under “The VTAPE Command/Statement” on page 70.

Before issuing VTAPE START or VTAPE STOP, it is required that the specified *cuu* has been reset with the DVCDN command. DVCDN ensures that any logical units assigned to the *cuu* are unassigned (refer also to Figure 24 on page 68). Before starting any write or read operation the DVCUP command must be issued.

The commands can be issued from both, a static or a dynamic partition, and also from a REXX procedure via the JCL host command environment (ADDRESS JCL).

Functional Components of the Virtual Tape Support

The Virtual Tape Support consists of three functional components:

- **Virtual Tape Simulator**

The Virtual Tape Simulator is part of VSE/ESA 2.6 and ready for use after VSE/ESA installation. It controls virtual tape processing independent of where the virtual tape is located (VSE/VSAM or remote). It receives any incoming

Virtual Tape Support

requests and forwards them to the Virtual Tape Data Handler for processing. It finally provides status information about the function performed.

- **Virtual Tape Data Handler**

The Virtual Tape Data Handler is part of VSE/ESA 2.6 and ready for startup after VSE/ESA installation. It is required for handling the read or write access to any virtual tape: VSE/VSAM virtual tapes or remote virtual tapes via TCP/IP. When the Virtual Tape Support is activated (VTAPE START command or statement), the Virtual Tape Data Handler is loaded into a dynamic partition, which is the default, or into a static partition (refer also to “Startup of the Virtual Tape Data Handler”) . When the Virtual Tape Support is deactivated, the partition is released again.

- **Virtual Tape Server**

The Virtual Tape Server is required for **remote virtual tapes only**. It is the workstation counterpart to the Virtual Tape Data Handler on the VSE/ESA side with which it communicates via TCP/IP. The Virtual Tape Server must be installed on a workstation with a Java platform (refer also to “Installing the Virtual Tape Server” on page 61).

Establishing the Virtual Tape Environment

Startup of the Virtual Tape Data Handler

This section provides some background information on the startup of the Virtual Tape Data Handler. The Virtual Tape Data Handler is started automatically when the first VTAPE START command or statement is submitted. This causes the startup job TAPESRVR, stored in the VSE/POWER reader queue, to be released. By default, the Virtual Tape Data Handler runs in a **dynamic partition** of **class R**.

The Virtual Tape Data Handler requires the C-Runtime Library.

The startup job TAPESRVR is placed in the VSE/POWER reader queue either

- during initial installation of VSE/ESA, or
- during a cold startup of VSE/ESA.

VSE/ESA provides in VSE/ICCF library 59 skeleton SKVTASTJ which includes startup job TAPESRVR (Figure 21 on page 61).


```

* $$ JOB JNM=CATSTVTA,DISP=D,CLASS=0
// JOB CATSTVTA          CATALOG TAPESRVR AND LDVTA, LOAD TAPESRVR
// EXEC LIBR,PARM='MSHP'
ACC S=IJSYSRS.SYSLIB
CATALOG TAPESRVR.Z      REPLACE=YES
$$$$ JOB JNM=TAPESRVR,DISP=L,CLASS=R,LOG=NO
$$$$ LST CLASS=A,DISP=D,PURGE=0004
// JOB TAPESRVR START UP VSE TAPE SERVER
// LIBDEF *,SEARCH=(PRD2.CONFIG,PRD1.BASE,PRD2.SCEEBASE)
// ID USER=VCSR
// EXEC $VTMAIN,SIZE=$VTMAIN
$$/*
$$/&
$$$$ EOJ
/+
CATALOG LDVTA.PROC      REPLACE=YES DATA=YES
// EXEC DTRIINIT
      LOAD TAPESRVR.Z
/*
/+
/*
// EXEC PROC=LDVTA      TO LOAD TAPE SERVER INTO RDR QUEUE
/&
* $$ EOJ

```

Figure 21. Skeleton SKVTASTJ (for Starting the Virtual Tape Data Handler)

The skeleton does the following:

1. Catalogs startup job as TAPESRVR.Z into IJSYSRS.SYSLIB.
2. Catalogs procedure LDVTA which loads TAPESRVR.Z into the reader queue via DTRIINIT.
3. Executes LDVTA.PROC. If you do not want to load the startup job immediately into the active reader queue, delete the line // EXEC PROC=LDVTA.

The job stream loads the Virtual Tape Data Handler into a dynamic partition of class R which occupies 8 MB. 8 MB is the minimum required.

If you create a new TAPESRVR job, delete the old one in the VSE/POWER reader queue to ensure that the new one is released by the VTAPE START command. Note that the job name TAPESRVR must not be changed.

Installing the Virtual Tape Server

Note: The Virtual Tape Server is required for **Remote Virtual Tapes** only.

It must be installed on a workstation with a Java platform. The following steps are required:

- Obtain a copy of the Virtual Tape Server.
- Perform the Virtual Tape Server installation.

In addition, support to uninstall the Virtual Tape Server is available.

The Virtual Tape Server is part of VSE/ESA 2.6 and consists of one file stored in PRD1.BASE: **vtapesrv.w**.

Obtaining a Copy of the Virtual Tape Server

Before you begin, you must already have installed the Java Development Kit (JDK) 1.2.2 or higher on the workstation where you plan to install the Virtual Tape Server. You can download it from the Internet via the following URL:

Virtual Tape Support

<http://www.ibm.com/java/jdk/download/index.html>

To obtain a copy of the Virtual Tape Server, get it either from the Internet or from the VSE/ESA library PRD1.BASE.

- To obtain the Virtual Tape Server from the Internet, enter the following URL and download the file **install.class** to the directory where you want to install the Virtual Tape Server.

<http://www-1.ibm.com/servers/eserver/zseries/os/vse/support/vseconn/vse26/vtape.htm>

- To obtain the Virtual Tape Server from the VSE/ESA library PRD1.BASE, use the FTP (file transfer program) utility of TCP/IP for VSE/ESA to download **vtapesrv.w** to the directory where you want to install the Virtual Tape Server.

Notes:

1. You must download **vtapesrv.w** in *binary*.
2. Make sure that Unix mode is *turned off*. Otherwise **vtapesrv.w** will be downloaded in ASCII mode, even when you specify *binary*. *UNIX mode* is one parameter of your VSE FTP daemon. Some FTP clients might *force* UNIX mode to be turned on. The example below shows how a successful transfer of **vtapesrv.w** was made using a (command line) FTP client. The place where the UNIX mode is set, is shown as bold.

```
c:\temp>ftp 9.164.155.2 (this is the IP address of the VSE/ESA system)
Connected to 9.164.155.2.
220-TCP/IP for VSE -- Version 01.04.00 -- FTP Daemon
    Copyright (c) 1995,2000 Connectivity Systems Incorporated
220 Service ready for new user.
User (9.164.155.2:(none)): sysa
331 User name okay, need password.
Password:
230 User logged in, proceed.
ftp> cd prd1
250 Requested file action okay, completed.
ftp> cd base
250 Requested file action okay, completed.
ftp> binary
200 Command okay.
ftp> get vtapesrv.w
200 Command okay.
150-File: PRD1.BASE.VTAPESRV.W
    Type: Binary Recfm: FB Lrecl: 80 Blksize: 80
    CC=ON UNIX=OFF RECLF=OFF TRCC=OFF CRLF=ON NAT=NO
150 File status okay; about to open data connection
226-Bytes sent: 4,756,400
    Records sent: 59,455
    Transfer Seconds: 16.52 ( 290K/Sec)
    File I/O Seconds: 3.94 ( 1,548K/Sec)
226 Closing data connection.
4756400 bytes received in 17,12 seconds (277,91 Kbytes/sec)
ftp> bye
221 Service closing control connection.
c:\temp>ren vtapesrv.w install.class
```

Performing the Virtual Tape Server Installation

To perform the installation of the Virtual Tape Server, you must:

1. Open a Command Prompt and change to the directory into which you have downloaded the **install.class** file.
2. If you have downloaded the file from the VSE/ESA host, rename **vtapesrv.w** to **install.class**.
3. Type **java install** and press **Enter**. The installation process now begins, and you are guided through various installation menus. If you receive a message such

as "java.lang.NoClassDefFoundError: install", then your local **classpath** environment may not be set correctly. Enter:

```
set classpath=.;%classpath%
```

For further details on how to correct such a problem, refer to "Setting the classpath Environment Variable" in the *VSE/ESA e-business Connectors User's Guide*.

4. The *Select Components to Install* window (Figure 22) provides you with a choice:
 - Select *Virtual Tape Server* to install the Java code of the server.
 - Select *Online Documentation* for online help and support information.

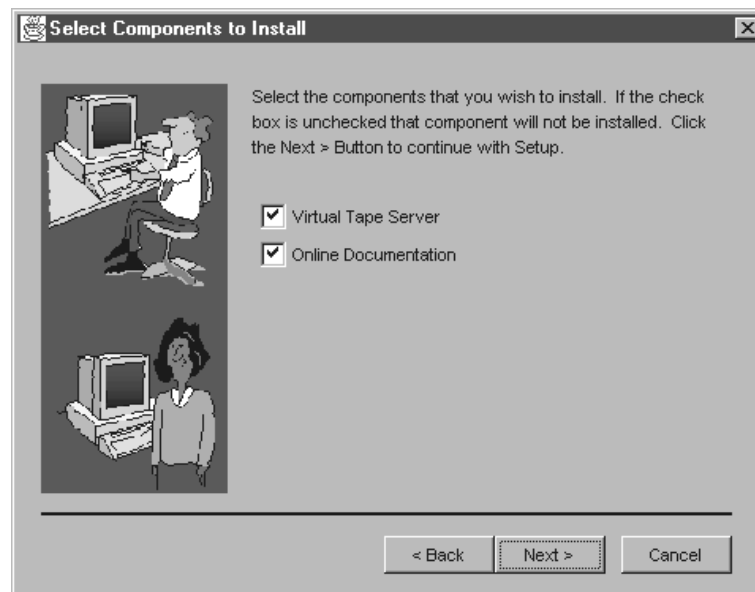


Figure 22. Selecting the Components of the Virtual Tape Server

After making your selection, click **Next**.

5. Select the directory you want to use. The default is **c:\vtape**.
After making your selection, click **Finish** to complete the installation..

Note: Desktop icons are created for Windows NT, Windows 2000, and OS/2.

Uninstalling the Virtual Tape Server: If there is a need to uninstall the Virtual Tape Server from your workstation, three methods are available:

- Using the **Uninstall** option provided by the Virtual Tape Server. From the Windows **Start**, select **Programs — Virtual Tape — Uninstall**, and the *Uninstall* window is displayed. Then select the components you wish to uninstall. If you select **Remove All Components**, after all components have been uninstalled, the icons on your desktop will also be removed.

Note: For Windows, it is recommended to use this method.

- Running the batch uninstall program **juninst** manually. Using this method, you can *only uninstall all components*. Your desktop icons will also be removed. Under Windows NT, this uninstall batch file is contained in the directory **\WINNT\Profiles...**

Virtual Tape Support

- A third method is available under Windows NT only. From the Windows NT **Start**, select **Settings — Control Panel — Add/Remove Programs**. Now you can select **juninst.bat** and click **Install/Uninstall** to remove the Virtual Tape Server.

Starting the Virtual Tape Server

To start the Virtual Tape Server you may either click on the icon **Start Server** in the Programm Group **Virtual Tape** (available on Windows only), or execute one of the script files **run.bat** or **run.cmd** (Windows) or **run.sh** (Linux or UNIX). The run script adds the *VirtualTape.jar* to the classpath and starts the Virtual Tape Server:

```
set classpath=.;VirtualTape.jar;%classpath%
java com.ibm.vse.vtape.VirtualTapeServer
```

Important Considerations When Using Virtual Tapes

In general, the Virtual Tape Support included in VSE/ESA 2.6 is intended to be transparent to applications, and to provide customers with the ability to read from or write to a virtual tape in the same way as if it were a physical tape. For technical and performance reasons, the full range of the capabilities of a physical tape has not been implemented and there are a number of restrictions outlined in this section. This section also provides and points to planning information to be considered before you start using virtual tapes at your installation.

The following **RESTRICTIONS** apply for virtual tapes:

- The SDAID trace program does not support virtual tapes.
- The DITTO/ESA for VSE program does not support the ERASE TAPE function for virtual tapes.
- Multivolume tape files and alternate tapes (ALT option of the ASSGN statement) are not supported for virtual tapes.
- The VSE/ESA dialogs do not support virtual tapes with the exception of the *Installing Optional Programs* dialog. But you can edit job streams created by dialogs which support tape processing and add VTAPE START, VTAPE STOP, DVCDN, and DVCUP statements as required.

As for real tapes, it is recommended **not** to run virtual tape job streams in VSE/ICCF interactive partitions.

When using virtual tapes, you should be aware of the following virtual tape **Requirements** and **Characteristics**:

- The file you need for containing the virtual tape is created automatically in case of a remote virtual tape.
For a VSE/VSAM virtual tape, however, you must create the file yourself. Refer to “VSE/VSAM ESDS File Definition (Skeleton SKVTAPE)” on page 65 for details.
- A remote virtual tape behaves like a physical tape with regard to reading/writing. A VSE/VSAM virtual tape, however, behaves differently in case of writing. Refer to “Writing to VSE/VSAM Virtual Tapes” on page 66 for details.

For the latest information on supported functions and programs, operating characteristics, and possible restrictions refer also to the VSE/ESA home page (Service and Support page) at:

<http://www-1.ibm.com/servers/eserver/zseries/os/vse/support/support.htm>

Working with VSE/VSAM Virtual Tapes

To work with VSE/VSAM virtual tapes, you must first define the VSE/VSAM ESDS file which is to contain the virtual tape. This can be done either via the dialog *Define a New File* (Fastpath 222), or via the VSE/VSAM IDCAMS job stream provided in skeleton SKVTAPE available in VSE/ICCF library 59.

You can then use the new JCL command VTAPE to open the VSE/VSAM file as a virtual tape which can be accessed via the *cuu* specified. For example:

```
VTAPE START,UNIT=cuu,LOC=VSAM,FILE='vsamfilename',SCRATCH
```

In the example, the SCRATCH parameter is optional and causes the virtual tape to be cleared before new data is written to it.

```
VTAPE STOP,UNIT=cuu
```

closes the virtual tape file and drops the association between the tape unit *cuu* and the virtual tape file. If this was the only active VTAPE session, the VSE/ESA partition in which the Virtual Tape Data Handler is running is released after 30 seconds.

VSE/VSAM ESDS File Definition (Skeleton SKVTAPE)

Skeleton SKVTAPE creates a VSE/VSAM ESDS file that is to contain a virtual tape. Figure 23 shows the skeleton.

```
* $$ JOB JNM=SKVTAPE,CLASS=0,DISP=D
// JOB SKVTAPE      CREATE VIRTUAL TAPE FILE
// EXEC IDCAMS,SIZE=AUTO
  DELETE (VSE.VTAPE.FILE) PURGE CL -
    CATALOG(VSESP.USER.CATALOG)
  DEFINE CLUSTER (NAME(VSE.VTAPE.FILE) -
    RECORDS (5000 5000) -
    TO (99366) -
    REUSE -
    NONINDEXED -
    SHAREOPTIONS (1) -
    SPANNED -
    RECORDSIZE (32758 32758) -
    VOLUMES (-V001-) -
    DATA (NAME(VSE.VTAPE.FILE.@D@) -
    CISZ (32768)) -
    CATALOG (VSESP.USER.CATALOG)
/*
// OPTION STDLABEL=DELETE
VTAPE1
/*
// OPTION STDLABEL=ADD
// DLBL VTAPE1,'VSE.VTAPE.FILE',99/366,VSAM,CAT=VSESPUC
/*
// EXEC IESVCLUP,SIZE=AUTO          ADD LABEL TO STDLABUP PROC
D                                  VTAPE1
A VSE.VTAPE.FILE                    VTAPE1 VSESPUC
/*
/&
* $$ EOJ
```

Figure 23. Skeleton SKVTAPE

Virtual Tape Support

Explanations to skeleton SKVTAPE:

-V001- This variable defines the volume on which the VSE/VSAM virtual tape file is located. The VSAM space is part of the VSE/VSAM user catalog VSESPUC (VSESP.USER.CATALOG).

RECORDS The number of RECORDS depends on the amount of data the virtual tape is to contain. The definition provided in SKVTAPE results in a file size of about 160 MB. If this size does not meet your requirements, modify the definitions in SKVTAPE accordingly.

REUSE REUSE allows repeated writing to a virtual tape from the beginning. When specifying the SCRATCH parameter in the VTAPE START command, the tape is cleared before new data is written to it. Without the SCRATCH parameter, existing data is overwritten. Refer also to "Writing to VSE/VSAM Virtual Tapes".
NOREUSE is for creating a new and empty file for writing data to it once; for backup, for example. NOREUSE together with SCRATCH is invalid and causes an error message.

SHAREOPTIONS

SHAREOPTIONS (1) allows multiple READ operations or one WRITE operation to be active. It is recommended not to change the setting of the share option. Refer to "File Sharing" for further details.

RECORDSIZE

The value for the RECORDSIZE parameter is the CISZ value minus 10 bytes.

CISZ

The recommended value for the Control Interval Size is 32 KB; it should not be smaller than 8 KB.

File Name

In the skeleton, VTAPE1 in the DLBL statement is the filename to be used in the VTAPE START command.

File Sharing

Whatever is defined in SHAREOPTIONS, the Virtual Tape Data Handler accepts only single WRITE or multiple READ access to a VSE/VSAM virtual tape from a single VSE/ESA system. This corresponds to SHAREOPTIONS (1). If you want to access a VSE/VSAM virtual tape from more than one VSE/ESA system, use SHAREOPTIONS (1) which allows single WRITE or multiple READ access only. SHAREOPTIONS (1) avoids unpredictable results in case of multiple system access.

Writing to VSE/VSAM Virtual Tapes

WRITE can only start at the beginning of a VSE/VSAM virtual tape. No rewrite or overwrite of existing data is possible except from the beginning a tape. For writing to a VSE/VSAM virtual tape more than once, the file definition (skeleton SKVTAPE) must include the REUSE parameter. Once a VTAPE STOP command has been issued, the tape is closed and an end-of-volume (EOV) indicator is written. This means no further data can be appended (added) to this particular virtual tape.

There are three ways of writing to a VSE/VSAM virtual tape:

1. The VSE/VSAM file is defined with REUSE.
During OPEN processing the tape is positioned to its beginning before a WRITE operation starts. Existing data is overwritten.
2. The VSE/VSAM file is defined with REUSE and VTAPE START includes the SCRATCH parameter.
SCRATCH causes the tape to be cleared before WRITE starts at the beginning of the tape.
3. The VSE/VSAM file is defined with NOREUSE.
You can write to the tape only once (for backup, for example).
NOREUSE with SCRATCH is invalid and causes an error.

Working with Remote Virtual Tapes

To access a remote virtual tape, a TCP/IP connection must be established between VSE/ESA and the remote workstation with the **Virtual Tape Server** installed. You start the VTAPE support for a remote virtual tape with a VTAPE command such as the following:

```
VTAPE START,UNIT=cuu,LOC=ipaddress:portnumber,FILE='filename'
```

The *ipaddress* identifies the Virtual Tape Server workstation on which the remote virtual tape file is located (a Linux, UNIX, or Windows file, for example). *portnumber* is the TCP/IP portnumber to be used for the connection. If the virtual tape file does not exist yet, the command automatically causes the creation of the required file (Linux, UNIX, or Windows) using the *filename* specified. The VTAPE command

```
VTAPE STOP,UNIT=cuu
```

drops the association between the tape unit *cuu* and the remote virtual tape file. If this was the only active VTAPE session, the VSE/ESA partition in which the Virtual Tape Data Handler is running is released after 30 seconds.

File Names and other Considerations

If the required Linux, UNIX, or Windows file for a remote virtual tape does not exist yet, it is automatically created when submitting the corresponding VTAPE START command. When assigning file names you must observe certain rules and characteristics as outlined below.

Linux and UNIX Considerations

Linux and UNIX are case sensitive but job streams created on the VSE/ESA host (dialogs of the Interactive Interface) are in capital letters. It may be therefore necessary to edit such job streams to adapt the *filename* to the Linux or UNIX conventions.

Windows Considerations

Windows file names may contain blanks, therefore the *filename* must be enclosed in quotes. A quote within a *filename* must be coded as two single quotes; for example:

```
FILE='D:\John's\Virtual Tapes\vt001401.001'
```

Windows file names can have more than 100 characters in length. Since the limit for remote files is 100 characters, you may specify *FILE='filename'* twice or even three times. The *filename* is concatenated in storage, thus allowing for a file name

Virtual Tape Support

length of 200 or even 300. The following example is equivalent to the previous example:

```
FILE='D:',FILE='\John'\s\Virtual Tapes\',FILE='vt001401.001'
```

Further Documentation

The workstation with the Virtual Tape Server installed provides the document **vtape.html**. It includes further details about remote virtual tapes and the related environment. You reach the document by selecting from the Start Menu first *Virtual Tape*, and then *Help*.

Examples of Using Virtual Tapes

Backing Up and Restoring Data

Backup functions often produce tape output. Thus you may consider whether virtual tapes are an alternative for such tasks in your data processing environment. For temporary data or short term backups in a VSE/ESA environment, for example, VSE/VSAM virtual tapes avoid the overhead of mounting and handling physical tapes.

Following is a backup example using a remote virtual tape. Data on a remote virtual tape can be saved on CD-ROM for archiving or for distribution. In the example, a VSE library backup and a later restore is assumed.

1. Create a job stream to backup a VSE library on a remote virtual tape as shown in the following sample job stream:

```
// JOB BACKUP (Backup a Library to a PC File)
DVCDN 480
VTAPE START,UNIT=480,LOC=9.164.186.20:2285,          C
          FILE='D:\VSE Backup\prd2.001'
DVCUP 480
MTC REW,480
MTC WTM,480
// EXEC LIBR
BACKUP LIB=PRD2 TAPE=480
/*
DVCDN 480
VTAPE STOP,UNIT=480
DVCUP 480
/&
```

Figure 24. Job Stream Example for Backing Up a VSE/ESA Library

2. Use the programs available on your Linux or Windows system to copy (burn) the VSE library from the remote virtual tape to a CD-ROM for archiving. Depending on the CD-ROM software you have installed, you may create the virtual tape backup of the VSE library directly on the CD-ROM.
3. To restore the VSE library you must create a similar job stream as the one shown for BACKUP, using the Librarian RESTORE command. You can restore the VSE library (stored as virtual tape on CD-ROM) directly from the CD-ROM back to VSE/ESA.

Transferring Virtual Tape Files

It is possible to transfer virtual tape files between a workstation (remote virtual tape) and the VSE/ESA host (VSE/VSAM virtual tape) and vice versa with the TCP/IP File Transfer Program (FTP). For a transfer from workstation to host use

the **put** command, for a host to workstation transfer the **get** command. Make sure you are transferring the files in **binary** mode.

The example below shows the command sequence for a transfer from server to host:

```
C:\>ftp x.x.x.x          <-- enter hostname/IP address of your VSE system
Connected to x.x.x.x.
220-TCP/IP for VSE -- Version 01.04.00 -- FTP Daemon
    Copyright (c) 1995,2001 Connectivity Systems Incorporated
220 Service ready for new user.
User (9.164.155.2:(none)): FRAN  <-- enter your user id here
331 User name okay, need password.
Password:                       <-- enter your password here
230 User logged in, proceed.
ftp> bin                         <-- switch to binary mode
200 Command okay.
ftp> quote site lrecl 16384      <-- enter the record size of your VSAM cluster
200 Command okay.
ftp> quote site recfm v          <-- set record format to variable
200 Command okay.
ftp> put tape.image VSAM.TAPE.IMAGE <-- enter your filenames
```

Installing Optional Programs

The VSE/ESA dialog for installing optional programs has been updated and supports virtual tapes. It is thus ready for use when an optional program is available for electronic delivery. The program can then be downloaded to a virtual tape file from where it can be installed via the dialog as from any other physical tape containing optional programs.

Fastpath 111 gets you to the installation panel for defining the *cuu* and for selecting a virtual tape as input media (Figure 25). If you have selected *Virtual Tape*, the subsequent panel (Figure 26 on page 70) requests you to enter further details about the virtual tape you want to use.

The job stream created by the dialog includes statements such as VTAPE START, VTAPE STOP, DVCDN, and DVCUP.

IN\$PRI2		PREPARE FOR INSTALLATION	
Enter the required data and press ENTER.			
TAPE ADDRESS.....	181	Address of input tape unit (cuu). For valid addresses enter a "?".	
VIRTUAL TAPE.....	1	Is it a virtual tape? Enter 1 if it is a virtual tape, enter 2 if not.	
PF2=REDISPLAY 3=END			

Figure 25. Prepare for Installation Dialog

Virtual Tape Support

If you select Fastpath 112 (instead of 111), you get the *Install Additional Program(s) from Tape* panel. If you enter program installation information in this panel and press PF5 (Process), you get panel INS\$0DI2 which is identical to the panel shown in Figure 25 on page 69 for specifying a virtual tape as input device.

```
UTL$VTAP          VIRTUAL TAPE: SPECIFY THE DATA SET

Enter the required data and press ENTER.

If the file resides on the VSE system specify the following:

VSAM FILE NAME .....          Unique name of the VSAM file
                               containing the tape image.

If the file resides on a remote system specify the following:

IPADDR.....    ___ ___ ___ ___ IP address of the remote system
PORT.....      _____ TCP/IP port number

DATA SET NAME : _____
...            _____
...            _____
...            _____
...            _____
PF1=HELP      2=REDISPLAY 3=END
```

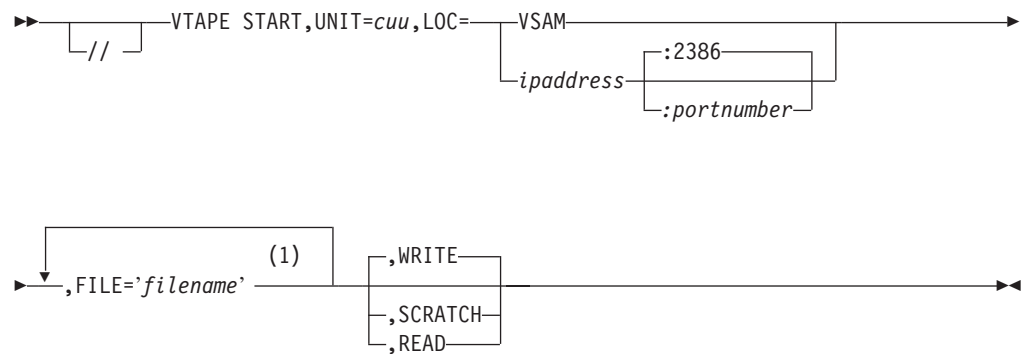
Figure 26. Panel for Defining Virtual Tape Details

If you enter a VSAM FILE NAME, the other fields must remain empty. Use PF1 for further details and help information.

The VTAPE Command/Statement

You communicate with the VSE/ESA Virtual Tape Support through the **VTAPE START** and the **VTAPE STOP** command or statement.

Figure 27 on page 71 shows the syntax of the VTAPE START and VTAPE STOP command/statement.

**Notes:**

- 1 FILE='filename' can be specified up to three times.

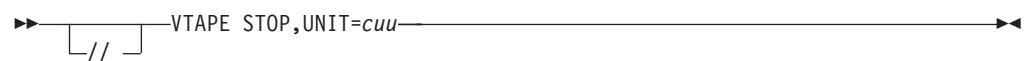


Figure 27. Syntax of VTAPE START and VTAPE STOP Command/Statement

The operands have the following meaning:

START Indicates that a tape unit is to be associated with a virtual tape file. In case of `LOC=ipaddress`, a TCP/IP connection to the Virtual Tape Server workstation is established.

STOP Indicates that an existing association between a tape unit and a virtual tape file is to be dropped. In case `LOC=ipaddress` was specified in the corresponding START command, the TCP/IP connection to the workstation is closed.

UNIT=cuu Specifies the tape unit to be used for the virtual tape. The `cuu` must be added to the system like a physical tape unit with the IPL ADD command. For example:

```
ADD cuu,3480
```

Valid device type codes are 3480, 3490, and 3490E.

LOC=VSAM Indicates that the virtual tape resides in a VSE/VSAM ESDS file on the VSE/ESA system.

LOC=ipaddress:portnumber

Indicates that the remote virtual tape resides on a remote system (Linux, UNIX, or Windows, for example) located on the Virtual Tape Server workstation identified by the `ipaddress`. `portnumber` specifies the TCP/IP port number to be used for the connection. If this operand is omitted, the default port number of 2386 is taken.

FILE='filename'

Identifies the file which contains the virtual tape.

- For a **VSE/VSAM file**, `filename` is the 1 to 7 alphanumeric-characters filename of the DLBL statement.
- For a **remote file**, the `filename` can be up to 100 characters in length, enclosed in quotes. The Linux, UNIX, and Windows conventions for file names apply. Refer to "File Names and other Considerations" on page 67 for further details.

Virtual Tape Support

READ	Specifies that read access to the virtual tape is required.
WRITE	Specifies that write access to the virtual tape is required. This is the default. WRITE includes READ access. When writing to VSE/VSAM virtual tapes , certain rules and restrictions exist. Refer to “Writing to VSE/VSAM Virtual Tapes” on page 66 for details.
SCRATCH	Specifies that write access to the virtual tape is required and that the tape is to be cleared first. It requires REUSE in the VSE/VSAM file definition (skeleton SKVTAPE). SCRATCH includes WRITE and READ access.

Chapter 8. Utility Enhancements

This chapter documents VSE/ESA 2.6 utility enhancements as follows:

- “VSE/Fast Copy Exploitation of FlashCopy and SnapShot”.
- “SDAID Enhancements” on page 74.
- “TERSE Utility” on page 76.

VSE/Fast Copy Exploitation of FlashCopy and SnapShot

The *VSE/Fast Copy* utility (described in the manual *VSE/ESA System Utilities*) exploits the FlashCopy function for IBM Enterprise Storage Server (ESS) devices and the SnapShot function for IBM RAMAC Virtual Array 2 (RVA) devices. It supports **full volume** backup from **disk to disk** but not the copying of files or extents.

The ESS (FlashCopy) support is part of VSE/ESA 2.6, and the RVA (SnapShot) support depends on the availability of the *IXFP/SnapShot for VSE/ESA* program, which is a priced, optional feature of VSE Central Functions.

The following VSE/Fast Copy commands are supported:

- **COPY ALL**
- **COPY VOLUME**

If the FlashCopy and SnapShot support is available, it will be used according to the device type (ESS or RVA) for which a full volume backup request was issued. If the requested support is not available, a normal VSE/Fast Copy backup will be performed.

The following VSE/Fast Copy optional parameters are supported:

IV (input volume)
OV (output volume)
NV (new volume)

The following VSE/Fast Copy optional parameters are tolerated:

NOPROMPT
NOVERIFY
LIST

The following VSE/Fast Copy optional parameters force SnapShot/FlashCopy NOT to be used. These parameters apply to COPY VOLUME only:

EXCLUDE
NOVSAM
NOEXPIRED

Command Examples

1. TRACE GETVIS=SPA
2. TRACE GETVIS=SVA SUBPOOL=MYPOOL
3. TRACE GETVIS=PAR LOC=BEL

Explanation:

1. Traces all requests of Virtual Storage which are within the Dynamic Space Getvis area of a dynamic partition.
2. Traces all requests of Virtual Storage in the System Getvis area belonging to the Subpool MYPOOL.
3. Traces all requests of Virtual Storage which are within a partition below the 16MB line (24 bit).

Initializing the Trace with Procedure SDGETV

The procedure SDGETV initializes traces for all types of Virtual Storage requests. The command syntax is as follows:

```

▶▶ EXEC PROC=SDGETV,GETVIS=[SVA
  PAR] [SUBPool=name] [LOC=ANY
  LOC=BEL]
  
```

The parameters are the same as those described before for the GETVIS/FREEVIS command.

Note that the **AREA**, **OUTPUT**, and **OPTION** definitions can be used as described for other SDAID traces in the *VSE/ESA Diagnosis Tools* manual.

Defaults Set in the Procedure

GETVIS=SVA is active if you omit GETVIS=, and LOC=ANY is active if you omit LOC=.

EXEC Statement Example

```
// EXEC PROC=SDGETV,GETVIS=PAR,AREA=BG,ADDRESS=0:*,TAPE=280
```

The trace invoked has the following characteristics:

- Trace type: GETVIS
- Traced tasks: All tasks
- Target of traced events: Partition Getvis Area
- Area for which events are collected: BG Partition
- Output destination: Tape with device address 280

Trace Output Example

The GETVIS/FREEVIS trace provides information concerning requests to obtain or release Virtual Storage via SVC 3D or SVC 3E, or because of an internal GETVIS call via BRANCH and LINK.

In contrast to a simple trace of the SVC's 3D and 3E which only shows the existence of these SVC's at the point of invocation, this new trace records the result of a particular Virtual Storage request after it has been evaluated by the VSE/ESA GETVIS/FREEVIS routines.

Utility Enhancements

```
GETVIS 0 BG C3 TYPE=PAR RC=00 ST_ADDR=01DEBC80 L=00000320 SUBP=MYPPOOL OPT=2000
          ADDR=006000A4 REQ_PHASE=MYPROGRM PSW=071D0000 006000A6

FREEVIS 0 BG C3 TYPE=PAR RC=00 ST_ADDR=01DEBCA0 L=00000020 SUBP=          OPT=1000
          ADDR=006000F0 REQ_PHASE=MYPROGRM PSW=071D0000 006000F2

FREEVIS 0 BG C3 TYPE=PAR RC=00 -ENTIRE SUBPOOL RELEASED- SUBP=MYPPOOL OPT=1000
          ADDR=006002F0 REQ_PHASE=MYPROGRM PSW=071D0000 006002F2
```

event identifier
space-id
Type of Getvis request
RC of completed function
subpoolname
CPU-number
partition-id of active task
Program which issued the request

Printer Defined as Output Destination

Since SDAID is capable to run in a **multiprocessor** environment, the selected printer is exclusively used by SDAID. An error message will be issued if this printer is already assigned to another partition.

Multiprocessor Capability

All SDAID traces, including the GETVIS/FREEVIS trace, are capable to run in a multiprocessor environment. In the output, this is reflected by the CPU-number (C3 in the example).

TERSE Utility

TERSE is a Cross-Platform Compression Utility (Copyright (C) Advantis, 1994).

TERSE requires LE/VSE or at least the VSE C Language Run-Time Support. You invoke the VSE/ESA implementation of TERSE with:

```
// EXEC TERSE,PARM='...'
```

Parameters are passed by the PARM='...' statement and can be:

```
switches  
sourcefile  
targetfile
```

Parameters are not case sensitive. Invoking TERSE without parameters causes a help message to be printed on SYSLIST.

All TERSE utility messages are printed on SYSLST. The messages do not have a message number.

Some of the more important switches which you may specify are:

```
-b .... binary ..... binary mode (text mode is default)
-h .... help ..... display extended help documentation
-s .... statistics .... display statistical information
-f .... fixed ..... fixed-length records
-e .... ebcdic ..... host ebcdic code page
-a .... ascii ..... pc ascii code page
-l .... language ..... country code for code page pair
```

The target file is assumed to be the same as the source file unless another target file is explicitly specified. The appropriate function (compression or decompression) will be selected automatically. The autoselection logic can also be disabled if necessary. Read the “-h” extended help information to learn how. Extended help also discusses file transfer procedures which you must follow to successfully exchange compressed files with the host.

Invoking TERSE with parameter -h (or -help) prints help information:

```
// EXEC TERSE,PARM='-H'
```

The following switches may be specified to override the autoselection logic which normally determines if a file should be compressed or decompressed by examining the special tersed file header:

```
-c .... compress ..... compress the source file
-d .... decompress .... decompress the source file
```

Under rare circumstances the autoselection logic may assume that an uncompressed file has already been compressed and try to decompress it. In this case it would be necessary to specify the “-c” switch to force compression. In the same fashion, the “-d” switch can force decompression for files which are incorrectly considered by the autoselection logic to be decompressed already.

The following switch is provided to assist in situations when unexpected or inexplicable results occur:

```
-x .... examine ..... display tersed file header data
```

The “-x” switch will cause the autoselection logic to display the contents of the tersed file header without actually doing any data conversion.

To convert a file “in place” (without creating an output file with another file name) just omit the target filename, or specify the same filename for both the source and target files. In either case the new file will replace the original.

When running the TERSE program from a batch file or other environment where extraneous output is undesired, you can specify the “-q” switch:

```
-q .... quiet ..... suppress all boilerplate text
```

The “-q” switch will be ignored if the “-s” switch has also been specified.

File names are specified as follows:

```
DD:PRIMARY.SYSA(MYFILE.TXT)
```

Following is an example of how to invoke the TERSE utility to terse a file (library member):

```
// EXEC TERSE,PARM='DD:PRIMARY.FRAN(INPUT.TXT) DD:PRIMARY.FRAN(OUTPUT.TXT)'
```

Utility Enhancements

This causes the TERSE utility to use INPUT.TXT as input member and terse it to OUTPUT.TXT.

The TERSE utility detects automatically if a given input file is tersed or not. If the input file is not tersed, it will be tersed and stored in the output file. If the input file is tersed it will be untersed and stored in the output file.

The output file can be omitted. In this case the input file is read, tersed/untersed and stored with the same name.

Note: The terse/unterse process uses a temporary file which has the same location as the output file.

Chapter 9. Publication Updates

VSE/ESA System Macros Reference

For the manual *VSE/ESA System Macros Reference*, SC33-6716-00, the following AMODE and RMODE updates apply:

- **GETVCE** macro:
AMODE: 24 or 31
RMODE: 24 or 31
- **LIBRDCB** and all **LIBRM xxx** macros:
AMODE: 24 or 31
RMODE: ANY

VSE/ESA System Utilities

For the manual *VSE/ESA System Utilities*, SC33-6717-00, the following updates apply:

- On page 12 under "Reorganization of Files", the following note needs to be added:

Note: Relocation of files dumped with user-labels will lead to restored files containing the user-labels as normal data extents and further open processing will not call the user-label processing routines.

- On page 15, the following note needs to be added to the description of the OUTFILE parameter:

Note: The EXTENT statements will overrule any user-label extents that were dumped or have to be copied. Therefore, the user labels are handled as data and further open processing on the restored or copied files will not call the user-label processing routines.

VSE/VSAM Commands

In "Chapter 3. Sample IDCAMS Command Job Streams" in the manual *VSE/VSAM Commands*, SC33-6731-00, the **Backup Example 7** (on page 313) shows a job stream with a missing /* statement. The correct job stream is listed below:

```
// JOB BACKUP7
// TLBL TAPE1,'BACKUP.FILE1'
// EXEC IDCAMS,SIZE=AUTO
   BACKUP (*) COMPACT -
       STDLABEL(TAPE1) -
       NOREWIND

/*
// TLBL TAPE2,'BACKUP.FILE2'
// EXEC IDCAMS,SIZE=AUTO
   BACKUP (VSAM.USER.CATALOG.A) COMPACT -
       STDLABEL(TAPE2) -
       NOREWIND

/*
/&
```

VSE/ICCF User's Guide

For the manual *VSE/ICCF User's Guide*, SC33-6739-00, the following updates apply:

1. On page 337, concerning the PARM parameter, the information following the paragraph ending with "The switch is:" must read as follows:

X'80' Parameter has been passed.

The value field starts with a two-byte length field for the parameter value followed by the 1 to 100 byte parameter value. Parameters with zero length have also the X'80' bit on. To identify zero length parameters, test the two-byte length field for the parameter value for all zeros. This is in contrast to the VSE/ESA // EXEC statement where a zero length parameter is flagged with X'00' in the information field. Refer to the *VSE/ESA Guide to System Functions* for details. To test whether a PARM value has been passed, compare registers 1 and 15. If their content is equal, no PARM value was specified.

2. On page 386, the maximum value for &&MAXLOOP has been changed from 4096 to unlimited.

LE/VSE Customization Guide

For the manual *LE/VSE Customization Guide*, SC33-6682-03, the following update applies to page 107, UADUMP parameter of TERMTHDACT:

The use of UADUMP with database managers will bypass any backout processing that may be required after an application failure. Any files still open when an application failure occurs will not be closed.

VSE/ESA Library Control Device Driver for IBM 3494

For the manual *VSE/ESA Library Control Device Driver for IBM 3494*, SC33-6740-00, the following update applies to "Chapter 3. LCDD Customization and Start-Up", section "Defining Customization Options with Control Statements". The following text is to be added as last paragraph of the **Device List** description (on page 27):

For each drive, the rightmost character of the ccuu must correspond with the device number of that drive in the subsystem. Device numbers for any control unit start with 0. For a typically 4-drive subsystem, these devices would be 0, 1, 2, and 3 and could go higher with 3590 adjacent frame support (for example, when 3590 drives in one frame are attached to a control unit located in an adjacent frame that is already fully populated with drives).

Index

Special Characters

- /LISTP command 26
- /SKIP command 27
- \$IJBIXFP, phasename
 - SnapShot/FlashCopy support 43

Numerics

- 3390-9 disk device 29
- 3480 cartridge, distribution tapes 2
- 3590 cartridge, distribution tapes 1
- 4MM-DAT tape 2

A

- access to POWER queue entries 39
- AR commands 45
- ATM 55

B

- BACKUP (IDCAMS) 32
- base program changes 3
- base tapes 2
- buffer hashing, VSE/VSAM 36

C

- CICS ECI over TCP/IP 7
- CICS TS enhancements 10
- CICS Web Support (CWS) 6
- client authentication, SSL 1
- Compile Job Generation dialog 20
- Configure Hardware dialog 19
- connector support 5
- Connectors
 - DB2-based connector 5
 - e-business connectors 5
 - Java-based connector 5
 - VSE/VSAM Redirector Connector 5

D

- Data File Extension During Warm Start 37
- DB2 Server for VSE enhancements 10
- DB2-based connector 5
- Define a Library dialog 18
- Define Transaction Security dialog 19
- Dialog Enhancements 15
- dialogs
 - Compile Job Generation 20
 - Configure Hardware 19
 - Define a Library 18
 - Define Transaction Security 19
 - Display Channel and Device Activity 26
 - Display CICS TS Storage 25

- dialogs (*continued*)
 - FlashCopy VSAM Catalog/Files 15
 - In-Creation Queue 22
 - Maintain Dynamic Partitions 25
 - Manage Batch Queue 21
 - Primary Library 23
 - Storage Dump Management 23
 - Tailor IPL Procedure 25
 - TCP/IP Configuration 17
- Display Channel and Device Activity dialog 26
- Display CICS TS Storage dialog 25
- distribution tapes 2
- documentation updates 10
- DTSECTXN enhancement 6
- dynamic classes 40

E

- e-business connectors 5
- Enterprise Storage Server (ESS)
 - FlashCopy support 43
 - IXFP command 45
- extended base tape 2

F

- Fast Ethernet 55
- FastCopy Exploitation 7
- FICON channel support 7
- FlashCopy support for ESS 43
- FlashCopy VSAM Catalog/Files dialog 15
- FSU 3

G

- G5 processors 55
- G6 processors 55
- GETVIS/FREEVIS trace (SDAID) 74
- GETx procedures, VSE/ICCF 28
- Gigabit Ethernet 55

H

- hardware support 7
- homepage, VSE/ESA ix

I

- IDCAMS BACKUP 32
- IDCAMS IMPORT CONNECT 32
- IDCAMS SNAP 33
- In-Creation Queue dialog 22
- In-Creation Queue entries 40
- initial installation 3
- installation of VSE/ESA 2.6 2
- Interactive Interface enhancements 15
- IPL enhancements 11

- IXFP command 45
- IXFP/SnapShot
 - support for ESS 43
 - support for RVA 43
 - support for VSAM datasets 32
- IXFP/SnapShot support for RAMAC Virtual Array (RVA) 43

J

- Java-based connector 5
- JCL enhancements 13

L

- large DASD (3390-9) 29
- LE/VSE enhancements 9
- Librarian enhancements 14

M

- Maintain Dynamic Partitions dialog 25
- Manage Batch Queue dialog 21
- MSHP enhancements 14

N

- networking capabilities,
 - VSE/POWER 40
- non-QDIO architecture 55
- NOPDS system 11

O

- optional program changes 2, 3
- OSA Express support 7, 55
 - ATM 55
 - Fast Ethernet 55
 - Gigabit Ethernet 55
 - invoking the support 55
 - non-QDIO architecture 55
 - QDIO architecture 55
 - Token Ring 55
- output segmentation, VSE/POWER 40

P

- performance enhancements
 - VSAM buffer hashing 36
- PNET SSL 37
- Primary Library dialog 23
- Publication Updates 79

Q

- QDIO architecture 55

R

RAMAC Virtual Array (RVA)
IXFP command 45
 SnapShot support 43
Remote Virtual Tape 67
REXX/VSE enhancements 8

S

SDAID enhancements 74
Secure Sockets Layer (SSL) support 5
 security
 DTSECTXN enhancement 6
 Secure Sockets Layer (SSL) support 5
shipment of VSE/ESA 2.6 2
SNAP (IDCAMS) 33
SnapShot (IXFP/SnapShot)
 support for VSAM datasets 32
SnapShots, of entire disk volumes 33
SSL client authentication 1
SSL support 5
Storage Dump Management dialog 23
synonym list 33
system layout changes 3

T

Tailor IPL Procedure dialog 25
TAPESRVR job 60
TCP/IP Configuration dialog 17
TCP/IP enhancements 10
TCP/IP interface 37
TERSE utility 76
Token Ring 55

U

utilities 73
 GETVIS/FREEVIS trace (SDAID) 74
 TERSE utility 76
 VSE/Fast Copy utility (exploiting
 SnapShot/FlashCopy) 73
Utilities 7

V

Virtual Tape Data Handler 60
Virtual Tape Server 60
Virtual Tape Simulator 59
Virtual Tape support 7, 59
 Backing Up and Restoring Data 68
 Examples of Using Virtual Tapes 68
 Implementation 59
 installing Virtual Tape Server 61
 installing VSE/ESA optional
 programs 69
 Overview 59
 remote virtual tape 67
 startup of Virtual Tape Data
 Handler 60
 Transferring Virtual Tape Files 68
 Virtual Tape support 59
 VSE/VSAM virtual tape 65
 VTAPE command/statement 70

VSE/ESA 2.5 support
 DB2-based connector 5
 Display Channel and Device
 dialog 26
 Display CICS TS Storage dialog 25
 e-business connectors 5
 FSU 3
 In-Creation Queue dialog 22
 initial installation 3
 Java-based connector 5
 JCL enhancements 13
 Librarian enhancements 14
 Maintain Dynamic Partitions
 dialog 25
 Manage Batch Queue dialog 21
 MSHP enhancements 14
 Primary Library dialog 23
 Storage Dump Management
 dialog 23
 Tailor IPL Procedure dialog 25
 VSE/ICCF enhancements 26
VSE/ESA 2.6 support
 base program changes 3
 CICS ECI over TCP/IP 7
 CICS TS functions 10
 DB2 Server for VSE 10
 dialog enhancements 15
 enhancements Java/DB2
 connectors 5
 hardware support 7
 installation 2
 Interactive Interface enhancements 4,
 15
 IPL enhancements 4, 11
 JCL enhancements 4
 LE/VSE enhancements 9
 Librarian enhancements 4
 optional program changes 3
 OSA Express support 7, 55
 overview VSE/ESA 2.6 1
 REXX/VSE enhancements 8
 SDAID enhancements 74
 Secure Sockets Layer (SSL) support 5
 shipment 2
 support of 3390-9 disk device 29
 system layout changes 3
 TCP/IP enhancements 10
 TERSE utility 76
 Utilities support 7
 Virtual Tape support 7, 59
 VSE/POWER enhancements 8, 37
 VSE/VSAM enhancements 8, 29
 VSE/VSAM Redirector Connector 5
 VSE/VSAM support of large
 DASD 29
 VTAPE command/statement 70
 zSeries 900 processors 7
VSE/ESA e-business connectors 5
VSE/ESA homepage ix
VSE/Fast Copy utility (exploiting
 SnapShot/FlashCopy) 73
VSE/ICCF
 /LISTP command 26
 /SKIP command 27
 GETx procedures 28
VSE/ICCF enhancements 26

VSE/POWER

 access to queue entries 39
 Data File Extension During Warm
 Start 37
 In-Creation Queue entries 40
 increase in dynamic classes 40
 networking capabilities 40
 output segmentation 40
 PNET SSL 37
VSE/POWER enhancements 8, 37
VSE/VSAM
 buffer hashing 36
 enhancements 8
 IXFP/SnapShot support for 32
 performance enhancements 36
 Redirector Connector 5
 support of large DASD (3390-9) 29
 support of large DASD (3390-9) 29
VSE/VSAM enhancements 8, 29
VSE/VSAM Redirector Connector 5
VSE/VSAM support of large DASD
(3390-9) 29
VSE/VSAM Virtual Tape 65
VTAPE command/statement 70

Z

z/VM 7
zSeries 800 processors 1
zSeries 900 processors 7, 55

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