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# Introduction and Release Guide

Version 1 Release 5

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Version 1 Release 5

#### Note

Before using this information and the product it supports, be sure to read the general information under "Notices" on page 223.

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This edition applies to Version 1 Release 5 of z/OS (5694-A01) and to all subsequent releases and modifications until otherwise indicated in new editions.

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# Contents

I Т T Т I T I I I L 1 L Т I Т I L L I L 1 Т L L I Т I T 1 I I L I Т L I L I Ι

Summary of changes	
Chapter 1. What's new i	n z/OS (z/OS V1R2 through z/OS V1R5) .
BCP new functions to cor	nsider
64-bit virtual storage e	nhancements
Service Aids enhancen	nents in z/OS V1R5
System logger enhance	ements in z/OS V1R4 and z/OS V1R5
RRS enhancements	
Open data set relief	
System-managed duple	exing rebuild
System logger automa	tic restart
System logger enhance	ements in z/OS V1R2 and z/OS V1R3
Service aids enhancen	nents in z/OS V1R2
Service aids enhancen	nents in z/OS V1R4
New example for deter	mining your CPC type, model, and serial number .
Distributed byte range	lock manager (BRLM) support
Support for additional i	nstallation-defined static system symbols
Resource recovery ser	vices subordinate failure notification
Batching cache structu	re operations
New set of callable cel	I pool services for AMODE 64
SMF support for sub-c	apacity pricing
Intelligent Resource Di	rector and workload manager self management.
VVLIVI enclave service o	
Sustem lagger laggtree	ements
System logger logstrea	$E = \frac{1}{2} \left( \sum_{i=1}^{n} \frac{1}{2} \sum_{i=1}^{$
Coupling facility synch	ropous and asynchropous commands onbancomont
WI M-managed batch i	nitiator enhancement
Paging availability enb	
Page data set protection	
Command flooding	
Unconditional log close	j 
C/C++ new functions to c	onsider
Communications Server r	new functions to consider.
IP Services: Application	n interfaces for network monitoring
IP Services: Full Virtua	ILAN support for OSA-Express
IP Services: Enterprise	Extender enhancements
Sysplex Distributor rou	nd-robin distribution.
Workload distribution (	Application Server Affinity) enhancements
VIPABACKUP enhance	ement
Dynamically assign Sy	splex Distributor ports
DVIPA limit increase .	
Sysplexports performation	nce enhancement
IP Services: Integrated	WLM/QoS Performance Monitor
IP Services: Increase r	maximum number of allowed sockets
IP Services: MVS syste	em symbol resolution enhancements in TCPIP.DATA
IP Services: Netstat en	hancements
IP Services: Intrusion [	Detection Services enhancements

IP Services: TCP/IP asynchronous I/O support enhancements		. 18
IP Services: Policy code restructure		. 19
IP Services: Managed System Infrastructure (msys) for Setup FTP		
customization support		. 19
IP Services: MVS Remote Execution Server support for multilevel security		19
IP Services: OSA performance enhancements		. 19
IP Services: Improve diagnostics for DLC dumps		. 20
IP Services: DHCP daemon enhancement.		. 20
IP Services: CTRACE formatting filter enhancements		. 20
IP Services: SMTP support for IP Mailer Name		. 20
IP Services: HiperSockets broadcast support		. 21
IP Services: Exploitation of IBM CP assist for cryptographic functions	·	21
IP Services: IBM @server, zSeries 990 HinerSockets enhancements	•	
IPv6 support — Full Virtual LAN (VLAN) support for OSA-Express	•	. 21
IPv6 support for Enterprise Extender	•	. 22
IPVO Support and ungrade for Condmail	•	. 20
	·	. 20
IPv6 support for CICS sockets API	·	. 24
	·	. 24
IPv6 support for the SYSLOG daemon and the DCAS, IFIP, and SNIP		~-
servers	·	. 25
IPv6 support for TSO rexec and rsh and associated MVS daemons	·	. 25
IPv6 support for SMF recording.	•	. 25
IPv6 support for XCF, SameHost, and ESCON		. 26
IPv6 support enhancement for IPAQENET6 Interface type		. 26
IPv6 support for dynamic XCF		. 27
IPv6 support enhancements for Netstat		. 27
IPv6 support enhancements for OMPROUTE.		. 27
IPv6 support for network access control.		. 28
IP Services: Autoconfigure target library for FTP load module transfer.		. 28
IP Services: Define FTP ephemeral port range for firewall compatibility		. 29
IP Services: FTP TLS support enhancements		. 29
IP Services: Improve FTP serviceability		. 29
IP Services: Enforce nonzero error return code in FTP		30
IP Services: Allow the FTP server load module to run above the 16M line	•	. 30
IP Services: Display status of ETPKEEPALIVE timer		30
IP Services: ETP SERVALITH Port of Entry support	•	. 00
IP Services: The SErvice transport of Entry Support	•	21
IP Services: TN2270 Telesever enhancement	•	. 01
IP Services. TN3270 Takeover emilancement.	·	. 31
IP Services. TN3270 Reyboard control enhancements	·	. 32
	·	. 32
IP Services: IN3270 Network management	·	. 33
IP Services: Improve performance for TN32/0 definite response sessions		33
IP Services: Network Access Control for TN3270	·	. 33
IP Services: Multilevel security LU Name Assignment support for TN3270		34
IP Services: IPv6 support for SNMP applications		. 34
IP Services: TCP/IP subagent		. 34
IP Services: Network SLAPM2 subagent		. 35
IP Services: SNMP TN3270 Telnet subagent		. 36
IP Services: osnmp command		. 36
IP Services: MIB modules		. 36
IP Services: Sysplex-wide dynamic source VIPAs for TCP connections .		. 37
IP Services: Sysplexports		. 37
IP Services: Sysplex Wide Security Association (SWSA)		. 37
IP Services: Network access control		. 38
IP Services: Fast Response Cache Accelerator (FRCA) access control		. 38
IP Services: Resolver enhancements.		. 38
		2.2

1

IP Services: Managed System Infrastructure (msys) for Setup enhancement	40
IP Services: OSA SNMP subagent support	. 40
IP Services: Event trace enhancements.	. 40
IP Services: Netstat enhancements	. 41
IP Services: TCP/IP support for Simple Network Time Protocol (SNTP)	. 41
IP Services: IPv6 support	. 42
IP Services: Intrusion Detection Services	. 42
IP Services: Sysplex Distributor policy enhancements	. 43
IP Services: Policy Agent enhancements	. 43
IP Services: OROUTED to OMPROUTE migration	. 44
IP Services: OMPROUTE to allow RIP1 and RIP2 packets over the same	
	. 44
IP Services: Replaceable static routes	44
IP Services: OMPROUTE wildcard IP addressing enhancement	45
IP Services: Additional BIP filter for OMPBOUTE	45
IP Services: OSPE MD5 authentication	. 40
IP Services: Native socket API TCP NODELAY support	. 45
IP Services: Native socket ATTTOT_NODELAT support	. 45
IP Services: Netstat Intel enhancements	. 40
IP Services: Netsial performance counters	. 40
IP Services. Restrict access to Netsial commanus.	. 47
IP Services. 2/05 UNIX RSHD Kelberos support	. 47
IP Services: Application-onven policy classification.	. 47
IP Services: Virtual LAN priority tagging.	. 47
IP Services: Packet trace ennancements	. 48
IP Services: Fast connection reset for Sysplex Distributor	. 48
IP Services: HiperSockets	. 48
IP Services: Efficient routing using HiperSockets Accelerator	. 49
IP Services: Connection load balancing using Sysplex Distributor in a networ	k
	. 49
IP Services: CICS sockets listener enhancements	. 49
IP Services: SMF recording enhancements	. 49
IP Services: SMTP exit to filter unwanted mail	. 50
IP Services: Improve TCP/IP storage utilization management	. 50
IP Services: Enterprise Extender performance enhancements	. 50
IP Services: Enhanced CLAW packing	. 51
IP Services: OSA-Express token ring support	. 51
IP Services: Changes to EZAZSSI	. 51
IP Services: IPSec enhancements	. 52
IP Services: TCP configuration options	. 52
IP Services: Network Print Facility move	. 52
IP Services: GUIs to configure policies	. 52
IP Services: FTP server and client enhancements	. 53
IP Services: Telnet server and client enhancements	. 53
IP Services: SNMP server and client enhancements	. 54
IP Services: BIND-based DNS name server enhancements	. 54
SNA Services: APPN trace enhancement	. 54
SNA Services: CSDUMP command enhancements	. 55
SNA Services: DLUR message enhancements	. 55
SNA Services: Enterprise Extender enhancements.	. 55
SNA Services: BTP display enhancement	. 57
SNA Services: Session setup and problem determination enhancements	57
SNA Services: Sift-down support for model major nodes	. 58
SNA Services: Storage management enhancements	58
SNA Services: Support for concurrent APING commands	. 50
SNA Services: SWNORDER enhancements	. 50
SNA Services: Trace performance enhancements	. 55
	. 00

I I I I I L I I I Ι L L I I I T I I I T I I I I I I I I I I Ι L I L L L I T I L L I I I T T I I I Ι I

SNA Services: Transmission subsystem enhancements	. 60
SNA Services: IPv6 support for SNA display of IP addresses	. 61
SNA Services: CSM buffer tracking	. 61
SNA Services: Improve diagnostics for DLC dumps	. 62
SNA Services: OSA performance enhancements	. 62
SNA Services: VTAM INOPDUMP enhancement	. 62
SNA Services: IBM @server zSeries 990 HiperSockets enhancements	. 63
SNA Services: Enterprise Extender dial processing enhancements	. 63
SNA Services: Enterprise Extender addressing enhancement for logical lines	
and PUs	. 64
SNA Services: Enable HPR-only VRNs for interchange sessions	. 64
SNA Services: DISPLAY ID= <i>rtpname</i> diagnostic enhancement	64
SNA Services: SBB mode dump enhancement	64
SNA Services: Increase maximum value for AUTOGEN on XCA major nodes	65
SNA Services: VIT data timestamp enhancement	65
SNA Services: VARY ACTUPDATE command for CDBSC major nodes	00
enhancement	65
SNA Services: OPEN application control block (ACB) limit increase	66
SNA Services: NONMODE support for Directory Services (DS) database	00
ontrios	66
	66
SNA Services. AFFN lopology liddes enhancements.	. 00
SNA Services: VIAW INOPDUWP enhancement	. 67
SNA Services: CNN routing failure message	. 68
SNA Services: Display topology database update (IDU) statistics	. 68
SNA Services: Display APPN Class of Service	. 68
SNA Services: Enterprise Extender global connection network enhancements	69
SNA Services: Generic resource affinity management enhancements	69
SNA Services: Model application trace enhancements	69
SNA Services: DLC work unit tracking	69
SNA Services: Support for coupling facility duplexing	. 70
SNA Services: HPR route test support	. 70
SNA Services: CP-CP diagnostic enhancements	. 70
Cryptographic Services new functions to consider	. 70
ICSF: PCI X Cryptographic Coprocessor (PCIXCC) support	. 70
ICSF: Pass phrase initialization	. 71
ICSF: CKTAUTH parameter	. 71
ICSF: CP Assist for Cryptographic Functions (CPACF) support	. 71
ICSF: User Defined Extension (UDX) support	. 71
ICSF: PCI Cryptographic Accelerator (PCICA) support	. 72
ICSF: Pass phrase initialization	. 72
ICSF: Reencipher and activate a PKDS	. 72
ICSF: Setup and customization enhancements	. 72
ICSF: RMF performance measurements added to selected ICSF services	73
ICSF: Usability enhancements to ICSF TSO/E panels	. 73
ICSF: PKDSCACHE parameter	. 73
ICSF: DOMAIN parameter.	. 74
ICSF: MAXLEN parameter	. 74
PKI Services: Support for mandatory extension for the generation of	
certificates.	. 74
PKI Services: Certificate revocation list (CRL) distribution points.	. 75
PKI Services: Multiple application domains.	. 75
PKI Services: Parallel Sysplex support	. 75
PKI Services: e-mail notification for completed certificate requests and	-
expiration warnings	. 76
PKI Services: Support for MAIL, STREET, and POSTALCODE qualifiers for	2
distinguished names	76

1

PKI Services: Using encrypted passwords for your LDAP servers	. 76
PKI Services: Storing serial number and event files in the VSAM object store	77
System SSL: New Secure Socket Layer APIs	. 77
System SSL: Transport Layer Security (TLS) Version 1.0 (RFC 2246)	. 77
System SSL: certificate management APIs	. 77
System SSL: IPv6 support for System SSL	. 78
System SSL: Sysplex session ID caching	. 78
System SSL: Serviceability enhancements.	. 78
System SSL: User ID support of RACF key rings	. 78
System SSL: RSA private keys stored in ICSF	. 79
System SSL: Support a list of LDAP servers	. 79
System SSL: gskkyman certificate creation	. 79
System SSL: Digital Signature Standard (DSS) certificates	. 79
System SSL: Enhanced PKCS#12 support	. 80
System SSL: Enhanced environment close	. 80
System SSL: Toleration for recycled LDAP Server	. 80
System SSL: C++ SSL samples	. 80
System SSL: Java SSL samples	. 80
System SSL: CRL caching performance enhancement	. 81
System SSL: Certificate revocation list support added	. 81
System SSL: AES Symmetric Cipher for SSL V3 and TLS connections	. 81
DFSMS new functions to consider.	. 81
Basic partitioned access method enhancements for UNIX files	. 81
Catalog enhancements	. 82
CVAF re-indexing of online volumes	. 83
DFSMS fast replication enhancement	. 83
DFSMSdss physical data set DUMP and RESTORE enhancements	. 84
DFSMSdss use of 64-bit real storage	. 84
DFSMSdss REPLACEUnconditional Keyword	. 85
DFSMShsm CDS/EA using CDSQ or CDSR serialization	. 85
DFSMShsm migration installation exits	. 85
DFSMShsm RACF FACILITY class enhancement	. 86
DFSMSrmm managing data sets and volumes in a set	. 86
Enhanced data integrity for sequential data sets.	. 86
File sequence number greater than 9999	. 87
Media types and recording technologies expanded to 255	. 88
Name-hiding function	. 88
OAM object enhancements	. 89
SMS availability and usability enhancements	. 90
Striping enhancements to extended-format sequential data sets	. 90
VSAM enhancements	. 91
DFSMStvs	. 92
Catalog customer satisfaction	. 93
Catalog usage threshold	. 93
OAM multiple object backup	. 93
VSAM index control interval size calculation	. 94
VSAM kev-range specifications is obsoleted	. 95
DFSMSrmm backup at anvtime.	. 95
DFSMSrmm duplicate volume support	. 95
DFSMSrmm command authorization using data set names	. 96
DFSMSrmm default media name	. 96
DFSMSrmm TSO/E help packaging enhancement	. 96
DFSMSrmm ACS pooling control enhancements	. 97
DFSMSrmm reporting enhancements	. 97
DFSMSrmm recording the data set expiration date	. 97
DFSMSrmm report generator enhancements	. 98
	. 55

I I I T T L L L L I I T T I I

I I I I I I L L I I I I T L I I I L I I L I I T I I I I I

IBM TotalStorage Enterprise Tape System 3592.	. 98
Fibre Channel Protocol	. 99
Large volume support	. 99
RLS coupling facility caching enhancements	. 100
RLS lock table CF duplexing	. 100
SMS miscellaneous enhancements	. 100
DFSMSdss FCNOCOPY/FCWITHDRAW enhancement	. 101
DFSMSdss HFS logical copy	. 101
DFSMSdss enhanced dump conditioning	. 102
DFSMShsm common recall queue	. 102
DFSMSrmm bin management enhancements	. 102
DFSMSrmm support for using storage locations as home locations	. 103
Coupled extended remote copy	. 103
CONFIGHFS enhancements	. 103
Dynamic volume count	. 104
VSAM striped data set enhancements	. 104
DFSMSrmm special character support	. 105
DFSMSrmm report generator	. 105
VSAM large real storage	. 105
IBM 3590 capacity utilization and performance enhancements	. 105
Peer-to-Peer Remote Copy extended distance feature	. 106
XRC parameters in parmlib.	. 106
Programs using DCOLLECT	. 107
DFSORT new functions to consider	. 107
Improvements in Performance	. 107
New and Changed Installation and Run-Time Options	. 107
Distributed File Service new functions to consider	. 109
zFS multilevel security support	. 109
Enhanced ASCII	. 109
Carriage return/line feed in SMB server configuration files	. 109
Export of non-owned shared HFS file systems	. 109
	. 109
Mapping all users in a domain.	. 110
Dynamic zFS configuration changes.	. 110
zFS aggregate can be dynamically extended	. 110
Duplicate file system name for zFS	. 110
System symbols for data sets can be used in IOEFSPRM for zFS.	. 111
Several new pfsctl APIs for zFS	. 111
Several zfsadm commands and pfsctl APIs now accept the mount file	
system name	. 111
zFS file systems support z/OS UNIX ACLs	. 111
MOUNT commands for zFS file systems in BPXPRMxx	. 112
-size and -grow on the ioeagfmt utility for zFS	. 112
SUPERUSER.FILESYS.PESCTL support for zES commands	. 112
zES messages can be sent to a message data set	113
zES can be run outside of JES control	113
Several zES caches are in data snaces	113
HCD and HCM new functions to consider	113
Multiple logical channel subsystems (LCSS) support	113
Support of physical channel identifiers	114
Enhanced IODE prompt	. 114
HCD profile changes	. 114
Redesigned Switch Configuration Detail Report	. 115
Limitation of Channel Subsystem Report	115
Default SIZE parameter of INITIODE utility	115
Enhanced checking	115
	. 115

1

Hardware support	116
Infoprint Server new functions to consider	116
Common message log	116
IP PrintWay e-mail support in z/OS V1R5.	117
IP PrintWay extended mode.	117
Java 1.4 support.	120
NetSpool enhancements	120
Security enhancements	120
SMF type 6 record restructure	121
Infoprint Central	122
Support for IBM Infoprint XT Extender for z/OS	123
IP PrintWay copy support for LAN printers	123
IP PrintWay e-mail support in z/OS V1R2.	123
IP PrintWay enhancements for printing to VTAM printers	124
IP PrintWay query printer status	125
IP PrintWay resubmit for filtering enhancements	125
IP PrintWay TCP/IP connection timeout enhancement	125
NetSpool exit enhancements	126
NetSpool PCL conversion	126
Print Interface support for more than 255 conjes	120
Print Interface remote transform support for IBM Informati Color 130 Plus	120
Printer Internace remote transform support for 150 milliophilit Color 150 mills	107
Print Interface subsystem for batch applications	107
	100
	120
	129
AFP Printer Driver and AFP viewer now on Internet only	129
	129
Integrated Security Services new functions to consider	130
	130
Firewall Technologies: ISAKMP server enhancements for dynamic VIPA	130
Firewall Technologies: Changed ISAKMP server	131
Firewall Technologies: Enhanced configuration client GUI.	131
Firewall Technologies: Changed configuration server	131
LDAP Server: Modify DN enhancements	132
LDAP Server: CRAM-MD5 and DIGEST-MD5 authentication.	132
LDAP Server: Transport Layer Security (TLS) support	132
LDAP Server: ACL enhancements	132
LDAP Server: SDBM enhancements	133
LDAP Server: ibm-entryuuid support	134
LDAP Server: Activity logging	134
LDAP Server: Monitor support	134
LDAP Server: TDBM schema	134
LDAP Server: Kerberos authentication	134
LDAP Server: Native authentication	135
LDAP Server: Extended operations for accessing Policy Director data	135
LDAP Server: Abandon support	135
Network Authentication Service: Support for IPv6	135
Network Authentication Service: MIT Kerberos's New Database Manager (NDBM)	
Network Authentication Service: Command enhancements	135
Network Authentication Service: Support for message logging using system	135 136
	135 136
daemon	135 136
daemon	135 136 136
daemon	135 136 136 136 137
daemon	135 136 136 136 137 137
daemon	135 136 136 136 137 137

I I I T T L L L L I I T T I I L L I I I I I L I I I I T L I L I L I I L L I T Ι I I I I I

New built-in functions for panel processing	137
Member list enhancements	137
Data set list enhancements	. 138
PDS member delete by pattern	. 138
ISPF Edit	. 138
Exit 11 (Logical Screen End)	. 138
Configuration utility enhancements	. 139
Configurable minimum and maximum scroll amounts	139
Multiple User and Site command tables	139
Terminal types and translation tables	139
Enhancements to SCLM utilities	140
New SCLM services and variables	. 140
ISPF product and library changes	. 140
ISPF DM component changes	141
ISPF PDF component changes	. 142
ISPF SCLM component changes.	. 142
SCLM Package Backout and Version Viewer	143
JES2 new functions to consider	143
Examine checkpoint scheduling settings to accommodate JES2 ENF58	
record generation.	143
Update JES2 Exit 14, 36, and 37 processing to support multilevel security	144
Update JES2 Exit 34 to support PSO unallocation flagging	144
Examine/update JES2 exits to recognize null service class for WLM	
processing	145
Dynamic proclibs and INCLUDE initialization statement	145
Spinning JESLOG data sets for long running jobs	146
INCLUDE initialization statement enhancements	146
\$QLOCNXT macro	147
Checkpoint improvements	147
PARTNUM=0 on INITDEF initialization statement supported	147
SAPI JMR	148
SPOOL read SSI.	148
PARM operand on JES2 START command	148
Warm start redesign	148
New monitor address space	. 148
Support for spool extents that end past the 64 KB track boundary on a	
volume	149
999 999 JES2 job numbers	149
JES3 new functions to consider	149
Advancing from the DAT prefix to data in spooled records	. 150
Updating the BFSIZ parameter on an NJERMT statement	. 150
Updating operator procedures to account for "health" checker messages	
and commands	. 150
Using the optional NOREQ parameter	. 150
DUPJOBNM parameter on the OPTIONS initialization statement	. 151
ALTJCL parameter on the STANDARDS initialization statement	151
Improved JESLOG data set processing	. 151
Spinning JESLOG data sets for long running jobs	. 151
JESMSG macro enhancement.	. 152
Specifying the spool partition for NJE nodes	. 152
Improved WANTDUMP handling	. 153
999 999 JES3 job numbers	. 153
Language Environment new functions to consider	. 153
putenv() changes for the X/Open CAE Specification	153
Additional Enhanced ASCII support	. 154
Multilevel security support	. 154

Additional IEEE math functions							154
utoa() family of functions							154
C Transactional VSAM							155
Status stop support							155
Support of Java stack overflow error							155
Heap pools serviceability.							155
Heap pools cell size maximum increase							155
XPLINK high-performance Language Environment functions.							156
Support for debugger application programming interface (API)							156
Support for code pages IBM-4933 and IBM-13124							156
Additional G11N White Paper Currency support							156
Support of Debug Tool for DB2 Stored Procedures							156
CICS trace of an application domain							157
Enhanced pthread_quiesce_and_get_np()							157
IPv6 support							157
Transport Layer Security (TLS) Certificate Support							157
iconv() support for code page IBM-5488							157
G11N White Paper Currency support							157
z/OS.e support							158
z/OS Managed System Infrastructure for Setup support							158
OMVS outage avoidance.							159
Language Environment preinitialization services							159
Vendor heap manager.							159
Thread-specific data performance enhancements	•			•		•	159
Euro code page support	•		•	•		•	159
BiDi layout transformation function and utility	•	•	•	•	•	•	159
Access Control List (ACL) support	•	•	•	•	•	•	160
CICS dynamic storage tuning	•	•	•	•	•	•	160
Hean storage diagnostics support	•	•	•	•	•	•	160
Documentation improvements for traces	•	•	•	•	•	•	160
	•	•	•	•	•	•	160
	•	·	•	•	•	•	160
	•	•	•	•	•	•	161
Demoval of SOM Support from Language Environment	•	•	•	•	•	•	101
Enhanced ASCII Europtionality	•	•	•	•	•	•	101
	•	•	•	•	•	•	101
ISO/IEC 14882:1998 Programming Language - C++	·	·	•	•	•	•	101
	•	·	•	•	•	•	161
Internet Protocol (IP) address conversion.	·	·	•	•	•	·	162
	·	·	•	•	•	·	162
	•	·	•	•	•	·	162
Goal mode support	·	·	•	•	•	·	162
Enhancement to the uname utility	·	·	•	•	•	·	162
Chinese code conversion standard	•	·	•	•	•	·	162
Upgrade of IBM Open Class Library	•	•		•	•	·	163
Server thread task management	•	•		•	•	·	163
TCP/IP resolver enhancement	•	•		•		•	163
pread() and pwrite()						•	163
Reusable enclaves for CICS scalable Java Virtual Machine (J)	/M	)					163
msys for Operations new functions to consider							163
msys for Operations							164
msys for Setup new functions to consider							164
msys for Setup							164
RMF new functions to consider							164
RMF monitoring support for Performance Blocks (PB) State Sa	am	plin	ıg				164
RMF monitoring support for Enqueue Contention Management	ι.						165
Multilevel security support							165
-							

I I I T T L I L L I I T I I I L L I I I I L L I I I I T L I I I L I I I L I T I I I I I

Shared Memory Support	. 165
64-bit API Support	. 165
IBM RMF Spreadsheet Reporter Java (TM) Technology Edition	. 165
Support of HiperSockets	. 166
Monitor III data gatherer	. 166
Support of WLM.	. 166
Reporting of report class periods	. 167
Enhanced reporting for coupling facilities	. 167
Support of FICON switch cascading.	. 167
State samples breakdown in the WLMGL report	. 167
Support of Intelligent Resource Director (IRD)	. 167
Support of WI M goal mode	168
Support of the cryptographic hardware	169
I DAP integration	169
Enhanced reporting of IOP utilization	169
Online reporting of values related to zSeries software pricing	160
Support of EICON Director	170
Support of FICON Director	. 170
Support for multiloval security	. 170
Control of agging guetom commande	. 170
Control of saving system continands	. 170
	. 1/1
	. 1/1
	. 1/1
SELECT with DSID on JDS	. 1/1
Controlling the format of CPU information	. 172
Column and action character enhancements	. 172
Spool Volumes panel	. 172
Process panel	. 173
Enclaves panel	. 173
Server enhancements	. 173
User-defined symbols in the WHEN statement	. 173
New action characters and columns.	. 173
Additional sysplex-wide panels	. 174
Operlog performance improvement	. 174
Enhancements to the System Command Extension function	. 174
Enhancements to the Reply Command Extension pop-up	. 174
Filter enhancements	. 175
Long forms of display and list action characters	. 175
JES2 elimination of APPLCOPY support	. 175
Security Server new functions to consider	. 175
RACF: Multilevel security support	. 176
RACF: Dynamic Template enhancements.	. 177
RACF: DB2 Version 8 support.	. 177
RACF: z/OS V1R5 FMID update	. 178
BACF: DB2 Version 7 support	. 178
BACF: Mixed-case profile names	179
BACE: Support of Network Authentication Service	179
BACE: SAE trace	179
BACE: Universal groups	180
BACE: Support of PKI Services	180
BACE: Support of Policy Director Authorization Services	181
BACE: Support of enterprise identity manning (FIM)	1. 1.01
BACE: Z/OS LINIX security usability enhancements	1. 1.01
BACE: PADS enhancemente	192
RACE: Enhancements	192
	102
	. 104

1 T 1 Т Т 1 Т T Т T T 1 

	. 186
SMP/E new functions to consider.	. 186
LINK LMODS Command	. 186
REPORT CALLLIBS Command Removal.	. 186
UPGRADE Command	. 186
GIMXSID Service Routine	. 187
GIMZIP: Archive Segmentation	. 187
GIMZIP: User Defined Subdirectories	. 187
Java Archive Files	. 188
Smaller SMPLTS data set	. 188
DUMMY data set for SYSDEFSD	189
SMP/E Dialog Customization	190
GIMUTTBL Removal	. 190
SMPPTS spill data sets	190
SMP/F BECEIVE from network	191
Conditional JCI IN processing	191
AMODE-64 and COMPAT-PM4 link-edit parameters	192
Selected SMP/E data sets may now reside in the HES	102
HOI DDATA summary reports	192
HES data sat identification	102
7/OS LINIX now functions to consider	102
	102
	100
	. 193
	. 193
	. 193
Creating directories during Z/OS UNIX Initialization	. 194
Debugging programs that use 64-bit addressing	. 194
	10/
	. 194
Starting the login shell as a child shell	. 194
Mounting file systems using symbolic links	. 194 . 194 . 194
Mounting file systems using symbolic links	. 194 . 194 . 194 . 194
Mounting file systems using symbolic links	. 194 . 194 . 194 . 194 . 195
Mounting file systems using symbolic links         Starting the login shell as a child shell         Multilevel security         Temporary file system (TFS) enhancements         Support of multipath links and SuperNet routes for IPV4 addresses         Updating security procedures	. 194 . 194 . 194 . 194 . 195 . 195
Mounting file systems using symbolic links         Starting the login shell as a child shell         Multilevel security         Temporary file system (TFS) enhancements.         Support of multipath links and SuperNet routes for IPV4 addresses         Updating security procedures         Access control lists (ACLs)	. 194 . 194 . 194 . 194 . 195 . 195 . 195
Mounting file systems using symbolic links         Starting the login shell as a child shell         Multilevel security         Temporary file system (TFS) enhancements.         Support of multipath links and SuperNet routes for IPV4 addresses         Updating security procedures         Access control lists (ACLs)         Shutting down z/OS UNIX without re-IPLing.	. 194 . 194 . 194 . 194 . 195 . 195 . 195 . 195
Mounting file systems using symbolic links	. 194 . 194 . 194 . 195 . 195 . 195 . 195 . 195 . 196
Mounting file systems using symbolic links	. 194 . 194 . 194 . 195 . 195 . 195 . 195 . 195 . 196 . 196
Mounting file systems using symbolic links	. 194 . 194 . 194 . 195 . 195 . 195 . 195 . 195 . 196 . 196
Mounting file systems using symbolic links	. 194 . 194 . 194 . 195 . 195 . 195 . 195 . 196 . 196 . 199
Mounting file systems using symbolic links	. 194 . 194 . 194 . 195 . 195 . 195 . 195 . 196 . 196 . 199 . 199
Mounting file systems using symbolic links	<ul> <li>. 194</li> <li>. 194</li> <li>. 194</li> <li>. 195</li> <li>. 195</li> <li>. 195</li> <li>. 195</li> <li>. 196</li> <li>. 196</li> <li>. 196</li> <li>. 199</li> <li>. 199</li> <li>. 200</li> </ul>
Mounting file systems using symbolic links	<ul> <li>194</li> <li>194</li> <li>194</li> <li>195</li> <li>195</li> <li>195</li> <li>195</li> <li>196</li> <li>196</li> <li>199</li> <li>199</li> <li>200</li> </ul>
Mounting file systems using symbolic links	<ul> <li>194</li> <li>194</li> <li>194</li> <li>195</li> <li>195</li> <li>195</li> <li>195</li> <li>196</li> <li>196</li> <li>199</li> <li>199</li> <li>200</li> <li>201</li> </ul>
Mounting file systems using symbolic links	<ul> <li>. 194</li> <li>. 194</li> <li>. 194</li> <li>. 195</li> <li>. 195</li> <li>. 195</li> <li>. 195</li> <li>. 196</li> <li>. 196</li> <li>. 199</li> <li>. 199</li> <li>. 200</li> <li>. 201</li> <li>. 201</li> </ul>
Mounting file systems using symbolic links	<ul> <li>. 194</li> <li>. 194</li> <li>. 194</li> <li>. 195</li> <li>. 195</li> <li>. 195</li> <li>. 195</li> <li>. 196</li> <li>. 196</li> <li>. 199</li> <li>. 199</li> <li>. 200</li> <li>. 201</li> <li>. 201</li> <li>. 201</li> </ul>
Mounting file systems using symbolic links	<ul> <li>. 194</li> <li>. 194</li> <li>. 194</li> <li>. 195</li> <li>. 195</li> <li>. 195</li> <li>. 195</li> <li>. 196</li> <li>. 196</li> <li>. 199</li> <li>. 200</li> <li>. 201</li> </ul>
Mounting file systems using symbolic links	<ul> <li>. 194</li> <li>. 194</li> <li>. 194</li> <li>. 195</li> <li>. 195</li> <li>. 195</li> <li>. 195</li> <li>. 195</li> <li>. 196</li> <li>. 196</li> <li>. 196</li> <li>. 199</li> <li>. 200</li> <li>. 201</li> </ul>
Mounting file systems using symbolic links	<ul> <li>194</li> <li>194</li> <li>194</li> <li>195</li> <li>195</li> <li>195</li> <li>195</li> <li>195</li> <li>195</li> <li>196</li> <li>196</li> <li>196</li> <li>199</li> <li>200</li> <li>201</li> </ul>
Mounting file systems using symbolic links	<ul> <li>194</li> <li>194</li> <li>194</li> <li>195</li> <li>195</li> <li>195</li> <li>195</li> <li>195</li> <li>195</li> <li>196</li> <li>196</li> <li>196</li> <li>196</li> <li>199</li> <li>200</li> <li>201</li> <li>202</li> <li>202</li> <li>203</li> </ul>
Mounting file systems using symbolic links         Starting the login shell as a child shell         Multilevel security         Temporary file system (TFS) enhancements.         Support of multipath links and SuperNet routes for IPV4 addresses         Updating security procedures         Access control lists (ACLs)         Shutting down z/OS UNIX without re-IPLing.         ISHELL enhancements         Additional z/OS UNIX enhancements         Z/OS base elements and features.         z/OS optional features.         Z/OS optional features.         Z/OS base elements descriptions         BCP (Base Control Program)         BookManager READ         BDT (Bulk Data Transfer)         Communications Server         Cryptographic Services         DCE (Distributed Computing Environment)         DCE application support	<ul> <li>194</li> <li>194</li> <li>194</li> <li>195</li> <li>195</li> <li>195</li> <li>195</li> <li>195</li> <li>195</li> <li>196</li> <li>196</li> <li>196</li> <li>199</li> <li>200</li> <li>201</li> <li>202</li> <li>203</li> <li>203</li> </ul>
Mounting file systems using symbolic links	<ul> <li>194</li> <li>194</li> <li>194</li> <li>195</li> <li>195</li> <li>195</li> <li>195</li> <li>195</li> <li>195</li> <li>196</li> <li>196</li> <li>196</li> <li>199</li> <li>200</li> <li>201</li> <li>201</li> <li>201</li> <li>201</li> <li>201</li> <li>201</li> <li>201</li> <li>201</li> <li>201</li> <li>202</li> <li>203</li> <li>204</li> </ul>
Mounting file systems using symbolic links	<ul> <li>194</li> <li>194</li> <li>194</li> <li>195</li> <li>195</li> <li>195</li> <li>195</li> <li>195</li> <li>196</li> <li>196</li> <li>196</li> <li>199</li> <li>200</li> <li>201</li> <li>201</li></ul>
Mounting file systems using symbolic links	<ul> <li>194</li> <li>194</li> <li>194</li> <li>194</li> <li>195</li> <li>195</li> <li>195</li> <li>195</li> <li>195</li> <li>196</li> <li>196</li> <li>196</li> <li>199</li> <li>200</li> <li>201</li> <li>203</li> <li>203</li> <li>204</li> <li>205</li> </ul>
Mounting file systems using symbolic links	<ul> <li>194</li> <li>194</li> <li>194</li> <li>194</li> <li>195</li> <li>195</li> <li>195</li> <li>195</li> <li>195</li> <li>196</li> <li>196</li> <li>196</li> <li>196</li> <li>199</li> <li>200</li> <li>201</li> <li>203</li> <li>204</li> <li>205</li> <li>206</li> </ul>
Mounting file systems using symbolic links	<ul> <li>194</li> <li>194</li> <li>194</li> <li>194</li> <li>195</li> <li>195</li> <li>195</li> <li>195</li> <li>195</li> <li>196</li> <li>196</li> <li>196</li> <li>199</li> <li>200</li> <li>201</li> <li>203</li> <li>204</li> <li>205</li> <li>206</li> <li>206</li> </ul>

I I L T Ι L I I L L I I I 1 L I I I L Т I I I I T T I I I I T I I I

HCD (Hardware Configuratio		• •		•		• •	•					•	•	. 20
	n Definition)													. 20
HLASM (High Level Assembl	er)													. 20
IBM LibraryServer	· · · ·													. 20
IBM HTTP Server														. 20
CKDSF (Device Support Fac	cility)													. 20
ntegrated Security Services														. 20
SPF														. 20
JES2														20
anguage Environment		• •	•	•		•••	•	·	•	•	·	•	·	20
		• •	•	• •		•••	·	•	•	•	•	•	•	21
mere for Operations		• •	•	• •		•••	•	·	•	•	·	•	·	21
neve for Setup		• •	•	• •		•••	•	•	•	•	·	•	·	. 21
Notwork File System (NES)		• •	•	• •	•	• •	•	•	•	•	·	•	·	. 21
Deen Systema Adapter Supp		 	/오드	•••	•	• •	•	•	•	•	·	·	·	. 21
Dpen Systems Adapter Supp	on Facility (	05A	/3г	)	•	• •	•	·	•	•	•	·	·	. 21
Run-Time Library Extensions		• •	·	•		• •	·	·	·	·	·	·	·	. 21
SMP/E	· · · ·	• •	·	• •	•	•	·	·	·	·	·	·	·	. 212
Time Sharing Option/Extension	ons (ISO/E)	• •	·	• •	•	•	•	·	•	•	·	·	·	. 21
Ierminal Input Output Contro	ller (TIOC)	· ·	·	• •	•	•	·	·	·	·	÷	·	·	. 212
Text Search		• •	÷	• . •	•	• •	·	•	•	•	·	•	·	. 21
JNIX System Services (X/Op	en UNIX 95	fund	ctior	ıs) .		•	•	•				•		. 21
3270 PC File Transfer Progra	am		•			• •		•						. 21
Buik Data Transfer (BDT) SN	IANJE													. 21
зик Data Transfer (BDT) SN C/C++ without Debug Tool .	IA NJE	· ·	:	• •			:	:	:	•	:	•	•	. 21 . 21
C/C++ without Debug Tool . C/C++ without Debug Tool . Communications Server Sect	urity Level 3	· · · ·		• •			•	•	•	•		•	•	. 21 . 21 . 21
C/C++ without Debug Tool . C/C++ without Debug Tool . Communications Server Sector DFSMS Features (DFSMSds	urity Level 3	   sm, [	DFS	MS	rm	im)								. 21 . 21 . 21 . 21
C/C++ without Debug Tool C/C++ without Debug Tool Communications Server Sect DFSMS Features (DFSMSds DFSORT.	urity Level 3 s, DFSMShs	· · · · · · sm, [	DFS	MS	rm	im)	· · ·							. 21 . 21 . 21 . 21 . 21
C/C++ without Debug Tool C/C++ without Debug Tool Communications Server Sect DFSMS Features (DFSMSds DFSORT.	urity Level 3 s, DFSMShs	· · · · · · sm, [ · ·	DFS	MS	rm	im)	· · ·		· · ·					. 21 . 21 . 21 . 21 . 21 . 21 . 21 . 21
Buik Data Transfer (BDT) SN C/C++ without Debug Tool Communications Server Sect DFSMS Features (DFSMSds DFSORT. GDDM-PGF	urity Level 3 s, DFSMShs	  sm, [ 	DFS	MS	rm	im)	· · ·	· · · ·	· · ·	· · · ·	· · ·	· · · ·	· · · ·	. 21 . 21 . 21 . 21 . 21 . 21 . 21 . 21
Buik Data Transfer (BDT) SN C/C++ without Debug Tool Communications Server Sect DFSMS Features (DFSMSds DFSORT. GDDM-PGF GDDM-REXX. HCM (Hardware Configuratio	urity Level 3 s, DFSMShs	· · · · · · sm, [ · · ·	DFS	MS	rm	im)	· · · · · · · ·	· · · ·	· · · · · · · ·	• • • • • •	• • • • • •	· · · ·	· · · ·	. 21 . 21 . 21 . 21 . 21 . 21 . 21 . 21
Buik Data Transfer (BDT) SN C/C++ without Debug Tool Communications Server Sect DFSMS Features (DFSMSds DFSORT. GDDM-PGF GDDM-REXX HCM (Hardware Configuratio High Level Assembler Toolkit	urity Level 3 s, DFSMShs	· · · · · · sm, [ · · · · ·	DFS	MS	irm	im)	· · · ·	· · · ·	• • • • • • •	· · · · · · · · ·		· · · ·		. 21 . 21 . 21 . 21 . 21 . 21 . 21 . 21
Buik Data Transfer (BDT) SN C/C++ without Debug Tool Communications Server Sect DFSMS Features (DFSMSds DFSORT. GDDM-PGF GDDM-REXX HCM (Hardware Configuratio High Level Assembler Toolkit IBM HTTP Server NA Secure	urity Level 3 s, DFSMShs   n Manager)	· · · · · · sm, [ · · · · · ·	DFS	MS	irm	im)	· · · · · · · · · · · · · · · · · · ·	• • • • • • • •						. 21 . 21 . 21 . 21 . 21 . 21 . 21 . 21
Buik Data Transfer (BDT) SN C/C++ without Debug Tool Communications Server Sect DFSMS Features (DFSMSds DFSORT. GDDM-PGF GDDM-REXX HCM (Hardware Configuratio High Level Assembler Toolkit IBM HTTP Server NA Secure Infoprint Server	urity Level 3 s, DFSMShs   n Manager) 	· · · · · · sm, [ · · · · · ·	DFS	MS	irm	im)	· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · ·						. 21 . 21 . 21 . 21 . 21 . 21 . 21 . 21
Buik Data Transfer (BDT) SN C/C++ without Debug Tool Communications Server Sect DFSMS Features (DFSMSds DFSORT. GDDM-PGF GDDM-REXX HCM (Hardware Configuratio High Level Assembler Toolkit IBM HTTP Server NA Secure Infoprint Server	urity Level 3 s, DFSMShs  n Manager)	 sm, [    	DFS		irm	im)	· · · · · · · · · · · · · · · · · · ·	• • • • • • • • •						. 21: . 21:
C/C++ without Debug Tool . Communications Server Sector DFSMS Features (DFSMSds DFSORT	urity Level 3 s, DFSMShs  n Manager)  	· · · sm, [ · · · · · · · · ·	DFS	 MS 	irm	im)	· · · · ·							. 21; . 21;
C/C++ without Debug Tool . C/C++ without Debug Tool . Communications Server Sector DFSMS Features (DFSMSds DFSORT	urity Level 3 s, DFSMShs  n Manager)    	 sm, [      	DFS		irm	im)	· · · · · ·	· · · · · · · · · · · · · · · · · · ·						. 21: . 21:
Buik Data Transfer (BDT) SN C/C++ without Debug Tool Communications Server Sect DFSMS Features (DFSMSds DFSORT GDDM-PGF GDDM-REXX HCM (Hardware Configuratio High Level Assembler Toolkit IBM HTTP Server NA Secure Infoprint Server JES3	urity Level 3 s, DFSMShs  n Manager)    	· · · · · · · · · · · · · · · · · · ·	DFS		irm	im)	· · · · · · · ·	• • • • • • • • • • •						. 21: . 21:
C/C++ without Debug Tool . C/C++ without Debug Tool . Communications Server Sector DFSMS Features (DFSMSds DFSORT	urity Level 3 s, DFSMShs  n Manager)    		DFS		irm		· · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·					· · · · · · · · · · · · · · · · · · ·	. 21 . 21 . 21 . 21 . 21 . 21 . 21 . 21
Buik Data Transfer (BDT) SN C/C++ without Debug Tool Communications Server Sector DFSMS Features (DFSMSds DFSORT	urity Level 3 s, DFSMShs  n Manager)    	· · · · · · · · · · · · · · · · · · ·	DFS				· · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·						<ul> <li>21;</li> <li>21;</li></ul>
Buik Data Transfer (BDT) SN C/C++ without Debug Tool Communications Server Sector DFSMS Features (DFSMSds DFSORT	urity Level 3 s, DFSMShs    m Manager)    		DFS	 MS  	irm	im) im) i i i i i i i i i i i i i i i i i i i	· · · · · ·							. 21 . 21
Bulk Data Transfer (BDT) SN C/C++ without Debug Tool Communications Server Sect DFSMS Features (DFSMSds DFSORT. GDDM-PGF GDDM-REXX HCM (Hardware Configuratio High Level Assembler Toolkit IBM HTTP Server NA Secure Infoprint Server JES3 RMF (Resource Measuremen SDSF (System Display and S Security Server z/OS Security Level 3.	urity Level 3 s, DFSMShs  n Manager)    		DFS		irm	im) 	· · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·						. 21 . 21
Bulk Data Transfer (BDT) SN C/C++ without Debug Tool . Communications Server Sector DFSMS Features (DFSMSds DFSORT GDDM-PGF GDDM-REXX HCM (Hardware Configuratio High Level Assembler Toolkit IBM HTTP Server NA Secure Infoprint Server JES3 RMF (Resource Measuremen SDSF (System Display and S Security Server z/OS Security Level 3	urity Level 3 s, DFSMShs  n Manager)    		DFS				· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·						. 21: . 22: . 22:
Bulk Data Transfer (BDT) SN C/C++ without Debug Tool . Communications Server Sector DFSMS Features (DFSMSds DFSORT GDDM-PGF GDDM-REXX HCM (Hardware Configuratio High Level Assembler Toolkit IBM HTTP Server NA Secure Infoprint Server JES3 SDSF (System Display and S Security Server z/OS Security Level 3 Appendix. Accessibility. Using assistive technologies Keyboard navigation of the u	urity Level 3 s, DFSMShs  n Manager)  t Facility) Search Facili  ser interface		DFS			· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·							<ul> <li>21:</li> <li>21:</li></ul>
Bulk Data Transfer (BDT) SN C/C++ without Debug Tool . Communications Server Sect DFSMS Features (DFSMSds DFSORT GDDM-PGF GDDM-REXX HCM (Hardware Configuratio High Level Assembler Toolkit IBM HTTP Server NA Secure Infoprint Server JES3 RMF (Resource Measuremer SDSF (System Display and S Security Server z/OS Security Level 3 Using assistive technologies Keyboard navigation of the u	urity Level 3 s, DFSMShs  n Manager)  nt Facility) Search Facili  ser interface		DFS	 MS     			· · · · · · · · ·							<ul> <li>21:</li> <li>21:</li></ul>
Buik Data Transfer (BDT) SN C/C++ without Debug Tool . Communications Server Sector DFSMS Features (DFSMSds DFSORT	urity Level 3 s, DFSMShs    m Manager)    		DFS			· · · · · · · · · · · · · · · · · · ·								<ul> <li>21:</li> <li>21:</li></ul>

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# About this book

This book is an introduction to  $z/OS^{TM}$ , the next generation of the OS/390<sup>®</sup> operating system. It explains the enhancements that make z/OS the premier operating system, unmatched in the industry today. It also lists and describes the functional elements and features that together make up z/OS.

This book is also a release guide. That is, it will explain the new functional content of the release of z/OS.

# Who should read this book

This book is for people who are interested in using an advanced-technology, enterprise-wide server operating system environment that is completely dedicated to supporting business goals. It helps anyone who needs a quick overview of the advances that z/OS offers.

# Summary of changes

Summary of changes for GA22-7502-07 z/OS Version 1 Release 5

This book contains information previously presented in *z/OS Introduction and Release Guide*, GA22-7502-06, which supports z/OS Version 1 Release 5.

#### **New Information**

This book contains minor revisions and retains the revision bars marking updated descriptions of new enhancements to the elements and features of z/OS for Version 1 Release 5 in Chapter 1 present in the previous edition.

Summary of changes for GA22-7502-06 z/OS Version 1 Release 5

This book contains information previously presented in *z/OS Introduction and Release Guide*, GA22-7502-05, which supports z/OS Version 1 Release 4.

#### **New Information**

This book contains updated descriptions of new enhancements to the elements and features of z/OS for Version 1 Release 5 in Chapter 1.

#### Summary of changes for GA22-7502-05 z/OS Version 1 Release 4

This book contains information previously presented in *z/OS Introduction and Release Guide*, GA22-7502-04, which supports z/OS Version 1 Release 4.

#### **New Information**

This book contains updated descriptions of new enhancements to the elements and features of z/OS for Version 1 Release 4 in Chapter 1.

#### Summary of changes for GA22-7502-04 z/OS Version 1 Release 4

This book contains information previously presented in *z/OS Introduction and Release Guide*, GA22-7502-03, which supports z/OS Version 1 Release 4.

#### **New Information**

This book contains updated descriptions of new enhancements to the elements and features of z/OS for Version 1 Release 4 in Chapter 1.

#### **Changed Information**

The descriptions of the base elements and optional features is now listed alphabetically.

#### Summary of changes for GA22-7502-03 z/OS Version 1 Release 4

This book contains information previously presented in *z/OS Introduction and Release Guide*, GA22-7502-02, which supports z/OS Version 1 Release 3.

#### **New Information**

This book contains descriptions of new enhancements to the elements and features of z/OS for Version 1 Release 4 in Chapter 1.

#### Summary of changes for GA22-7502-02 z/OS Version 1 Release 3

This book contains information previously presented in *z/OS Introduction and Release Guide*, GA22-7502-01, which supports z/OS Version 1 Release 2.

#### **New Information**

This book contains descriptions of new enhancements to the elements and features of z/OS for Version 1 Release 3 in Chapter 1.

# Chapter 1. What's new in z/OS (z/OS V1R2 through z/OS V1R5)

 	This chapter lists the major new enhancements in z/OS that have been introduced in z/OS V1R2 through z/OS V1R5. These enhancements require customization
 	actions before you can use them. This chapter refers you to the documents that describe the customization actions.
	With z/OS V1R5, the z/OS elements and features have been re-structured as follows:
	New elements and features
1	<ul> <li>Integrated Security Services element (contains DCE Security Server, OCEP.</li> </ul>
 	Firewall Technologies, LDAP server, Network Authentication Services, and EIM)
1	<ul> <li>Run-Time Library Extensions element</li> </ul>
1	<ul> <li>z/OS Security Level 3, new unpriced feature (contains OCSF Security Level 3, System SSL Security Level 3, Network Authentication Service Level 3)</li> </ul>
1	Removed elements and features
	<ul> <li>C/C++ IBM Open Class Library element</li> </ul>
	<ul> <li>C/C++ with Debug Tool priced feature</li> </ul>
	Modified elements and features
	<ul> <li>BookManager BookServer has been renamed to IBM LibraryServer</li> </ul>
1	<ul> <li>Security Server now contains only BACE (other components have been</li> </ul>
	moved to the new Integrated Security Services element)
	<ul> <li>Cryptographic Services now contains PKI Services (moved from Security Server)</li> </ul>
	The following z/OS V1R5 elements and features do not have exploitation
	information in this chapter:
I	• BDT
	BDT File-to-File
	BDT SNA NJE
	BookManager BUILD     BookManager BEAD
	C/C++ without Debug Tool
	Communications Server Security Level 3
	DCE Application Support
	DCE Base Services
	Encina Toolkit Executive
	• EREP
	ESCON Director Support
	• FFSI
	• GDDM • GDDM-PGF
•	• GDDM-REXX
	GDDM-REXX     HLASM
	<ul> <li>GDDM-REXX</li> <li>HLASM</li> <li>HLASM Toolkit</li> </ul>
   	<ul> <li>GDDM-REXX</li> <li>HLASM</li> <li>HLASM Toolkit</li> <li>IBM HTTP Server</li> </ul>
     	<ul> <li>GDDM-REXX</li> <li>HLASM</li> <li>HLASM Toolkit</li> <li>IBM HTTP Server</li> <li>IBM HTTP Server NA Secure</li> </ul>
       	<ul> <li>GDDM-REXX</li> <li>HLASM</li> <li>HLASM Toolkit</li> <li>IBM HTTP Server</li> <li>IBM HTTP Server NA Secure</li> <li>IBM LibraryServer</li> </ul>
       	<ul> <li>GDDM-REXX</li> <li>HLASM</li> <li>HLASM Toolkit</li> <li>IBM HTTP Server</li> <li>IBM HTTP Server NA Secure</li> <li>IBM LibraryServer</li> <li>ICKDSF</li> </ul>

	<ul> <li>Network File System</li> <li>OCSF Security Level 3</li> <li>OSA/SF</li> <li>Security Server Network Authentication Service Level 3</li> <li>System SSL Security level 3</li> <li>Text Search</li> <li>TIOC</li> <li>TSO/E</li> <li>3270 PC File Transfer Program</li> </ul>
I	BCP new functions to consider
I	This section describes new BCP functions in z/OS.
I	64-bit virtual storage enhancements
	<b>Description:</b> Enhancements to 64-bit virtual storage support in z/OS V1R5 include 64-bit shared memory support and multiple guard area support for private high virtual storage. Shared memory objects can be shared across address spaces. The default shared memory addressing area is between 2TB and 512 TB. Multiple guard areas allow a program to increase or decrease the amount of usable space in a memory object by adjusting the size of the guard area.
Ι	When change was introduced: z/OS V1R5.
Ι	Reference information: z/OS MVS Programming: Extended Addressability Guide.
Ι	Service Aids enhancements in z/OS V1R5
	<ul> <li>Description: For z/OS V1R5 the following enhancements are made to the MVS Service Aids. These enhancements are intended to offset the increasing complexity of installing and maintaining a z/OS system.</li> <li>IPCS has new performance-related code that keeps multiple data sets (DCBs) open when reporting multi-volume dump data.</li> <li>The SLIP command contains improved problem determination capabilities.</li> <li>New CTRACE options for tracing shared memory objects in high virtual storage provide debugging aids for 64-bit virtual problems.</li> </ul>
I	When change was introduced: z/OS V1B5
' 1	Reference information: z/QS MVS System Commands
	System larger enhancements in -/OC VID4 and -/OC VID5
	<b>System logger ennancements in Z/OS V1H4 and Z/OS V1H5</b> <b>Description:</b> With APAR OW51854, System Logger provided support for monitoring log stream offload activity. The monitoring function issues messages IXG3111 and IXG312E, among others, to notify the installation when offloads are taking too long. The installation can determine the cause of the delay, attempt to remedy any problems, and then reply to message IXG312E specifying the action the system is to take. In z/OS V1R5, System Logger provides a new message (IXG3141) to indicate when the system has terminated offload monitoring due to a reply of "EXIT" to message IXG312E. Existing message IXG066I now only indicates that there is no logger event monitoring in effect on a system; the system no longer issues that message following the EXIT response to IXG312E. Also in z/OS V1R5, System Logger extends the monitoring function to include the monitoring of Allocation and HSM Recall service tasks for delays. If Logger detects that a delay of a service request is inhibiting other log stream resource requests, the monitoring function

issues messages IXG271I and IXG272E. The installation can then reply to message IXG272E to indicate the action that System Logger is to take.

#### When change was introduced:

- APAR OW51854 z/OS V1R4 with rollback to OS/390 V2R10.
- Service task monitoring z/OS V1R5.

#### Reference information: z/OS MVS Setting Up a Sysplex.

### **RRS** enhancements

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**Description:** Starting with z/OS V1R2, resource recovery services (RRS) supports multisystem cascaded transactions. This support enhances the scope of cascaded transactions to span multiple systems in a sysplex as long as the systems all use the same logging group. With multisystem cascaded transaction support, RRS can also allow resource managers to restart on any system in the same RRS logging group.

- When change was introduced: z/OS V1R2.
- Reference information: z/OS MVS Programming: Resource Recovery.

# Open data set relief

**Description:** Certain control blocks used by allocation can now be moved above the 16 MB line. You control this by specifying LOC=ANY on the GETDSAB macro. This allows you to increase the number of dynamically allocated data sets.

When change was introduced: z/OS V1R2.

**Reference information:** For information about using the LOC parameter of the GETDSAB macro, see *z/OS MVS Programming: Authorized Assembler Services Guide* and *z/OS MVS Programming: Authorized Assembler Services Reference ENF-IXG.* 

# System-managed duplexing rebuild

**Description:** System-managed duplexing rebuild is a process by which a duplexed copy of a coupling facility structure is created and maintained, so that in the event of a failure, a viable structure remains available to the application. While the structure is duplexed, operations to the structure are maintained in a synchronized manner through protocols established by z/OS. As opposed to user-managed duplexing rebuild, which applies only to cache structures, system-managed duplexing rebuild applies to all structure types.

**When change was introduced:** The function is enabled by APAR OW41617 on z/OS V1R2, R3, and R4.

Reference information: z/OS MVS Setting Up a Sysplex.

## System logger automatic restart

**Description:** System logger is changed to automatically restart if it was not terminated by the FORCE IXGLOGR,ARM command.

When change was introduced: APAR OW53349 on OS/390 V2R10 and z/OS V1R1 – V1R4.

Ι	<b>Reference information:</b> <i>z/OS MVS Setting Up a Sysplex</i> .
∣ <b>Sys</b> ∣	<b>EXAMPLE 2 Constant of the set </b>
     	<ul> <li>when the primary LOGR couple data set is at least at the z/OS V1R2 format level:</li> <li>Coupling facility system-managed duplexing facility. As of z/OS V1R2, the system-managed duplexing rebuild enhancement allows the system logger to provide more recovery opportunities for log stream data written to coupling facility structures.</li> </ul>
     	<ul> <li>As of z/OS V1R3, you can dynamically change policy attributes for log streams and structures without having to disconnect all the applications and subsystems connected to the log stream. This includes changing structure definitions in the LOGR couple data set without having to delete and redefine associated resources (staging data sets, for example).</li> </ul>
   	<ul> <li>As of z/OS V1R3, system logger now allows more flexible high-level qualifiers for log stream data sets. The new EHLQ (extended high-level qualifier) parameter for log stream definitions in the LOGR couple data set allows you to use more than one qualifier for log stream high-level qualifiers.</li> </ul>
     	<b>Note:</b> Because connections to log streams with the EHLQ parameter are not supported on pre-z/OS V1R3 systems, you should consider not using the EHLQ parameter until all the systems in your sysplex are running at the z/OS V1R3 level (or later) and you are sure that you will not need to fall back to a pre-z/OS V1R3 level.
I	When change was introduced: z/OS V1R2 and z/OS V1R3 (as noted above).
 	<b>Reference information:</b> For more information about system logger couple data set requirements, see Appendix B of <i>z/OS MVS System Messages, Vol 10 (IXC-IZP)</i> .
Ser	ce aids enhancements in z/OS V1R2
   	<b>Description:</b> In z/OS V1R2, the following enhancements were made to the z/OS service aids. These enhancements are intended to offset the increasing complexity of installing and maintaining z/OS systems:
I	IPCS enhancements:
   	<ul> <li>When IPCS is invoked it indicates which level of the operating system it is intended to support. This helps when debugging dumps or traces in a multisystem, multilevel environment.</li> </ul>
I	<ul> <li>IPCS allows users to access HFS paths.</li> </ul>
 	<ul> <li>IPCS uses data spaces to make more private area storage available for analysis and to accommodate larger reports.</li> </ul>
	<ul> <li>The IPCS dialog provides a SORT primary command, which helps users manage multiple IPCS reports.</li> </ul>
	<ul> <li>IPCS enhances the WHERE command to associate private area addresses with storage subpools.</li> </ul>
1	<ul> <li>IPCS eases problems when multiple dumps are required to adequately analyze a problem</li> </ul>
-     	<ul> <li>IBM now supplies a large set of sample DUMP command parmlib members in SYS1.SAMPLIB. Each of the parmlib members can be used as supplied or can be used as a base for further modification depending on installation-specific requirements, such as system names, address space names, and so on. To use</li> </ul>

   	these parmlib members, you should copy them to a data set in your parmlib concatenation. Care has been taken to ensure that system symbols are used where names can vary by installation.
I	The SLIP command has two new parameters, ACTION=STOPGTF and MSGID.
I	When change was introduced: z/OS V1R2.
I	Reference information:
 	<ul> <li>To set up the IBM-supplied DUMP command parmlib members, see z/OS MVS Diagnosis: Tools and Service Aids.</li> </ul>
 	<ul> <li>To use the PARMLIB parameter of the DUMP command, or to use the SLIP command, see z/OS MVS System Commands.</li> </ul>
	<ul> <li>For more information about IPCS enhancements, see z/OS MVS IPCS User's Guide, z/OS MVS IPCS Commands, and z/OS MVS IPCS Customization.</li> </ul>
Service aids	enhancements in z/OS V1R4
 	<b>Description:</b> In z/OS V1R4, the following enhancements were made to the z/OS service aids:
     	<ul> <li>IPCS split-opcode support upgrades the OPCODE subcommand and dialog primary command to display the mnemonics for multibyte split operation codes introduced as part of z/Architecture (such as E3, EB, or ED) when only the first byte or two is entered.</li> </ul>
       	• The new IPCS COPYCAPD subcommand extracts a selected dump to a separate dump data set where it can be the focus of analysis. In addition, the COPYCAPD and COPYDUMP subcommands both support dynamic allocation of BLKSIZE in logical record length, using the dynamic allocation equivalents of the AVGREC JCL keyword.
 	<ul> <li>The new IPCS LISTTOD subcommand converts TOD clock values to legible time stamps.</li> </ul>
	<ul> <li>Support is added for writing of a CTRACE data set from unauthorized code, such as ported C/C++ products.</li> </ul>
I	When change was introduced: z/OS V1R4.
I	Reference information:
 	<ul> <li>For information about the COPYCAPD, LISTTOD, and OPCODE subcommands, seez/OS MVS IPCS Commands.</li> </ul>
 	<ul> <li>For information about external CTRACE writer support, see z/OS MVS IPCS Customization.</li> </ul>
New example number	for determining your CPC type, model, and serial
   	<b>Description:</b> A new example shows how to determine your system's central processor complex (CPC) type, model, and serial number. The example should be used on the SYSPLEX control statement in the IFAURP usage report program for usage based pricing.
I.	When change was introduced: z/OS V1R4.
I	Reference information: z/OS MVS Product Management.

Ι	Distributed byte range lock manager (BRLM) support
   	<b>Description:</b> z/OS UNIX System Services now supports the distributed byte range lock manager (BRLM), allowing you to set up BRLM so that every system in the sysplex is started with BRLM. By default, the lock manager is initialized on only one system in the sysplex.
 	When change was introduced: z/OS V1R4 but rolled back to OS/390 V2R10 by PTF UW85155.
   	<ul> <li>Reference information:</li> <li>z/OS MVS Setting Up a Sysplex</li> <li>z/OS UNIX System Services Planning</li> </ul>
Ι	Support for additional installation-defined static system symbols
	<b>Description:</b> You can now define as many as 800 static system symbols for each system in a multisystem environment. (This is in addition to the system symbols that z/OS provides.) The previous limit was 99. Apart from the increase in the size of the symbol table, the table functions as it did previously. In addition, if you use automatic restart manager (ARM), note that the automatic restart manager couple data set expands in size to accommodate the larger symbol table associated with the increased number of static system symbols supported.
Ι	When change was introduced: z/OS V1R4.
   	<ul> <li>Reference information:</li> <li>z/OS MVS Setting Up a Sysplex</li> <li>z/OS MVS Initialization and Tuning Reference</li> </ul>
Ι	Resource recovery services subordinate failure notification
   	<b>Description:</b> Resource recovery services (RRS) supports a new optional exit routine, SUBORDINATE_FAILED, designed to notify resource managers interested in the coordinator unit of recovery (UR) on a coordinator system about the following kinds of failure:
 	<ul> <li>RRS or a resource manager (such as IMS<sup>™</sup>) failing on its subordinate system while the sysplex cascaded transaction is in flight.</li> </ul>
 	<ul> <li>The subordinate system itself failing while the sysplex cascaded transaction is in flight.</li> </ul>
I	<ul> <li>A subordinate syncpoint ending abnormally (task termination)</li> </ul>
     	The exit routine receives control for the coordinator UR, notifying resource managers interested in the coordinator UR that have the exit defined about the failure. This gives the interested resource managers a chance to take appropriate action for the sysplex cascaded transaction, such as triggering a backout for the transaction or sending the outcome to its external coordinator.
Ι	When change was introduced: z/OS V1R4.
   	<b>Reference information:</b> For information about implementing the new SUBORDINATE_FAILED exit routine, see <i>z/OS MVS Programming: Resource Recovery</i> .

Batching cac	he structure operations
   	<b>Description:</b> Enhancements to the IXLCACHE service allow you to batch cache structure operations, reducing the number of commands sent to the coupling facility. There are three new request types:
 	<ul> <li>IXLCACHE REQUEST=WRITE_DATALIST lets you write a batch of data with one request, which can reduce the number of writes issued in a high-update environment, such as a query workload.</li> </ul>
   	<ul> <li>IXLCACHE REQUEST=CASTOUT_DATALIST lets you cast out a batch of data with one request, which can improve castout processing for programs using a staging buffer that resides outside of the local cache.</li> </ul>
   	<ul> <li>IXLCACHE REQUEST=CROSS_INVALLIST lets you cross invalidate a batch of data with one request, which can improve the performance of local cache buffer invalidation when the list of entry names cannot be mapped to a single name mask.</li> </ul>
   	Note that you <i>cannot</i> use the new request types on a pre-z/OS V1R4 system or on a system connected to a coupling facility with a CFCC level lower than CFLEVEL=12.
I	When change was introduced: z/OS V1R4.
I	<b>Reference information:</b> z/OS MVS Programming: Sysplex Services Reference.
New set of ca	allable cell pool services for AMODE 64
     	<ul> <li>Description: A new set of callable cell pool services is provided for use when running AMODE 64 programs to exploit 64-bit addressing. Your system's addressing mode will determine which set of services to use, as follows:</li> <li>When running in AMODE 24 or AMODE 31, use the CSRP<i>xxx</i> services.</li> <li>When running in AMODE 64, use the CSRC4<i>xxx</i> services.</li> </ul>
I	When change was introduced: z/OS V1R4.
   	<ul> <li>Reference information:</li> <li>z/OS MVS Programming: Assembler Services Reference ABE-HSP</li> <li>z/OS MVS Programming: Assembler Services Guide</li> </ul>
SMF support	for sub-capacity pricing
         	<b>Description:</b> A new SMFPRM <i>xx</i> parameter, MULCFUNC or NOMULCFUNC, allows you to specify whether users of the IFAUSAGE service must specify the REQUEST=FUNCTION <i>xxx</i> parameter. MULCFUNC, which is the default, means that users of IFAUSAGE (who register and deregister) must specify REQUEST=FUNCTION <i>xxx</i> requests. NOMULCFUNC means that users of IFAUSAGE do not need to use the FUNCTION <i>xxx</i> requests. Specifying NOMULCFUNC can help users of the Sub-Capacity Reporting Tool to limit the volume of the SMF records.
I	When change was introduced: z/OS V1R3.
 	<b>Reference information:</b> See the Sub-Capacity Reporting Tool Web site at http://www.ibm.com/servers/eserver/zseries/wlc_lm/scrt.html.
Intelligent Re	source Director and workload manager self management
	<b>Description:</b> The Intelligent Resource Director (IRD) is a new BCP component that extends the concept of goal-oriented resource management by allowing you to

	group system images that are resident on the same physical server running in LPAR mode, and in the same sysplex, into an "LPAR cluster". This gives the workload manager (WLM) the ability to manage resources, both processor and DASD I/O, not just in one single image but across the entire cluster of system images.
	WLM is also enhanced to allow workload balancing of non-z/OS partitions, in particular, Linux images. WLM then manages the CPU resources given to these partitions based on their relative importance compared to the other workloads running in the same LPAR cluster.
I	When change was introduced: z/OS V1R1 and z/OS V1R2.
I	Reference information: z/OS MVS Planning: Workload Management.
WLM enclave	service class reset
	<b>Description:</b> Workload manager (WLM) now allows operators and system administrators to reset the service characteristics of independent enclaves. Through the z/OS SDSF optional feature, individual enclaves can be reset to another service class, quiesced, or resumed.
I	When change was introduced: z/OS V1R3.
I	Reference information: z/OS MVS Planning: Workload Management.
WLM reporting	g enhancements
	<b>Description:</b> Workload manager (WLM) reporting is enhanced to allow users to more effectively and efficiently manage applications and tools running on their systems. For report classes, the same reporting capabilities now exist as for service classes. This is accomplished by aggregating data within report class periods that are derived from the service class period where transactions are running. To provide more transparency on cryptographic hardware usage, WLM also collects and reports using and delay samples for CMOS Cryptographic Coprocessors and PCI Cryptographic Coprocessors by service class or report class period.
I	When change was introduced: z/OS V1R2.
I	Reference information: z/OS MVS Planning: Workload Management.
System logger	r logstream offload monitor
	<b>Description:</b> System logger offload monitor function is delivered with APAR OW51854. It provides a monitoring function for certain key parts of logger offload processing. One IXGLOGR address space offloads a logstream to DASD for a given offload. If this offload is delayed for any reason, such as SYSIEFSD Q4 resource contention, volume offline, or DFSMShsm recalls, then the offload process for the logstream under discussion is delayed sysplex-wide. This can lead to other system logger allocation delays as well, on any system in the sysplex.
	With APAR OW51854, system logger provides ways of identifying offload inhibitors by way of monitoring and messages. System logger monitors offload allocation progress and notifies the installation when offloads are taking too long, allowing it to take action by replying to WTOR IXG312E. (Some system logger periods of inactivity could be caused by offload data set allocation, or DFSMShsm recalls, and may be normal). Logger may now be able to move offload work from a system

   	where it is not progressing to another system connected to the logstream, to attempt to complete the offload. If there is no other system to move the work to, the offload may be attempted again on the same system, possibly allowing other work to proceed.
 	When change was introduced: z/OS V1R4 but rolled back to OS/390 V2R10 by PTFs UW87629, UW87630, and UW87631.
I	Reference information: z/OS MVS Setting Up a Sysplex.
	Support for the LICENSE=z/OSe parameter in IEASYSxx for z/OS.e Description: The new LICENSE parameter in parmlib member IEASYSxx lets you specify which operating system is running, z/OS or z/OS.e. The default is LICENSE=z/OS, but you can specify LICENSE=z/OSe for the z/OS.e operating system once you have licensed it to your z800 and have agreed to the z/OS.e terms and conditions.
I	When change was introduced: z/OS V1R3.
   	<ul> <li>Reference information:</li> <li>For information about the differences between z/OS and z/OS.e, see z/OS and z/OS.e Planning for Installation.</li> </ul>
	• For more information about the LICENSE parameter in parmlib member IEASYSxx, see z/OS MVS Initialization and Tuning Reference.
	Coupling facility synchronous and asynchronous commands enhancement
	<b>Description:</b> z/OS V1R2 introduced a new algorithm for determining whether it is more efficient to issue a command to the coupling facility synchronously or asynchronously. Based on the configuration and workload, some Parallel Sysplex configurations might experience a significant change in the reporting of activity to some structures in the coupling facility RMF report.
I	When change was introduced: z/OS V1R2.
	<b>Reference information:</b> See Washington Systems Center Flash 10159 at http://www.ibm.com/support/techdocs. (Search for "flash10159".)
	WLM-managed batch initiator enhancement Description: Workload manager (WLM) is enhanced to improve the balancing of WLM-managed batch initiators between systems of a sysplex. On systems with high utilization, the number of initiators is reduced. On systems with low utilization, more initiators are started.
	This enhancement can improve sysplex performance by making better use of the processing capability of each system. WLM attempts to distribute the initiators across all members in the sysplex to balance the utilization of the systems while taking care that jobs with affinities to specific systems are not hurt by WLM decisions. Initiators are stopped on systems that are utilized over 95 percent when another system in the sysplex offers the required capacity for such an initiator. WLN also increases the number of initiators more aggressively when a system has low utilization and jobs are waiting for execution.
I	When change was introduced: z/OS V1R4.

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I	<b>Reference information:</b> z/OS MVS Planning: Workload Management.
	Paging availability enhancement Description: The availability of the paging subsystem is enhanced by exploiting parallel access volumes (PAVs) on the IBM Enterprise Storage Server. PAV devices lead to higher page I/O throughput, reduced contention, and shorter lockout times. This enhancement is helpful, for example, when a dump is written.
I	When change was introduced: z/OS V1R3.
 	<b>Reference information:</b> None. (No customer action is necessary to exploit this enhancement.)
I	Page data set protection
     	<b>Description:</b> The page data set protection enhancement was introduced in z/OS V1R3 to help guard you from unintentionally IPLing with a page data set that is already in use. It does this by formatting and maintaining a status information record at the beginning of each page data set and by using an ENQ to serialize usage of the data sets.
   	The page data set protection enhancement prevents two systems from accidentally using the same physical data set. However, it is not possible to prevent the same data sets from being used when either:
	<ul> <li>The request to use the data set comes from a system outside of the GRS Ring/Star configuration.</li> </ul>
I	The installation has excluded the data sets from multisystem serialization.
   	<ul><li>Page data sets are protected by a two-tier mechanism using:</li><li>SYSTEMS level ENQ</li><li>Status Information Record</li></ul>
I	When change was introduced: z/OS V1R3.
 	<b>Reference information:</b> None. (No customer action is necessary to exploit this enhancement.)
	<b>Command flooding</b> Description: Most z/OS commands are executed by attaching a task in either the *MASTER* or CONSOLE address space. If too many of these tasks are attached at one time (usually because a program has issued too many MGCRE macros), the system could run short of space in LSQA and eventually enter wait state 07E, which

Starting with APAR OW45398, which is incorporated into z/OS V1R2 and later, attached commands that run in the \*MASTER\* or CONSOLE address space are divided into four "command classes". (APAR OW52913, which is incorporated into z/OS V1R4 and later, adds two more command classes.) In each class, only 50 commands can execute at one time. Any additional commands in that class must wait for execution. This prevents the out-of-space condition and the resulting wait state 07E from occurring.

To manage the number of commands that are awaiting execution, the system operator can issue the CMDS command to display the status of commands, remove

would require a re-IPL.

   	selected commands that are awaiting execution, or cancel commands that are executing. When a command is removed before execution, the command issuer receives message IEE065I COMMAND NOT EXECUTED, CMD=command instead of the usual command response message.
I	The IEECMDS macro provides similar function for use in programs.
   	When change was introduced: Introduced in z/OS V1R2, and rolled back to OS/390 V2R10 by PTFs UW77694, UW78695, UW79319, UW81203, UW81328, UW84102, and UW85060.
Ι	Reference information:
 	<ul> <li>For information about the authorization needed to issue the CMDS command, see z/OS MVS Planning: Operations.</li> </ul>
Ι	<ul> <li>For information about the CMDS command, see z/OS MVS System Commands.</li> </ul>
 	<ul> <li>For information about the IEECMDS macro, see z/OS MVS Programming: Authorized Assembler Services Reference ENF-IXG.</li> </ul>
I	Unconditional log close
   	<b>Description:</b> UNCOND is a new parameter on the command VARY <i>nnnnn</i> ,HARDCPY,OFF. It can be used to turn off hardcopy even if no other hardcopy medium is active. When SYSLOG has been turned off in this way, the log buffers are kept until they reach LOGLIM in number, and then discarded.
I	When change was introduced: z/OS V1R2.
I	Reference information: z/OS MVS System Commands.
	C/C++ new functions to consider
I	This section describes new C/C++ functions in z/OS.
 	See "Language Environment new functions to consider" on page 153 for C/C++ new functions to consider.
I I	Communications Server new functions to consider
I	This section describes new Communications Server functions in z/OS.
I	IP Services: Application interfaces for network monitoring
· T	<b>Description:</b> Communications Server now provides several interfaces that allow
   	network operations, for both TCP/IP and VTAM.
Ι	These new interfaces for TCP/IP provide the following:
	<ul> <li>The capability to programmatically obtain copies of TCP/IP packet and data trace buffers in real-time as the traces are collected.</li> </ul>
	<ul> <li>The capability to format the TCP/IP packet trace records collected.</li> </ul>
I	The capability to obtain:
	<ul> <li>Activation and deactivation events for TCP connections in SMF format and buffered</li> </ul>

   	<ul> <li>The capability to monitor:</li> <li>TCP connection and UDP endpoint activity using a callable API</li> <li>TCP/IP storage usage using a callable API</li> </ul>		
   	<ul> <li>The new interfaces for VTAM provide the following:</li> <li>The ability to collect Enterprise Extender (EE) summary and connection data</li> <li>The ability to collect HPR endpoint data</li> <li>Communication Storage Manager (CSM) storage statistics</li> </ul>		
 	When change was introduced: z/OS V1R5. Also in z/OS V1R4 via APAR PQ78753.		
I	Reference information: z/OS MVS System Commands.		
	IP Services: Full Virtual LAN support for OSA-Express Description: z/OS Communications Server extends Virtual LAN (VLAN) support by allowing you to assign a Virtual LAN identifier (VLAN ID) to an OSA-Express link or interface. This allows all packets using an OSA-Express to carry a VLAN ID, and thus segregate traffic into different VLANs without needing multiple real LANs or creating new subnetworks.		
I	When change was introduced: z/OS V1R5.		
   	<ul> <li>Reference information:</li> <li>z/OS Communications Server: IP Configuration Reference</li> <li>z/OS Communications Server: IP Migration and Exploitation</li> </ul>		
IP Services: Enterprise Extender enhancements			
 	<b>Description:</b> z/OS Communications Server enhances the support for Enterprise Extender in two areas:		
	<ul> <li>Enterprise Extender, IBM's strategic mechanism for integrating SNA and IP networks, is IPv6-enabled.</li> </ul>		
	<ul> <li>You can specify a hostname, instead of an IP address, for use by remote Enterprise Extender endpoints wishing to connect to an Enterprise Extender node. The remote endpoint will perform name-to-address resolution on the hostname to obtain the correct IP address for Enterprise Extender connection establishment, reducing some of the costs previously associated with Enterprise Extender in a multiple enterprise environment. The ability to exchange hostnames, instead of explicit IP addresses, allows Enterprise Extender nodes to exploit the use of network address translation (NAT) between Enterprise Extender connection endpoints much more easily than in previous releases.</li> </ul>		
Ι	When change was introduced: z/OS V1R5.		
 	<b>Reference information:</b> <ul> <li>z/OS Communications Server: SNA Migration and Exploitation.</li> </ul>		
	Sysplex Distributor round-robin distribution		
1	Description: Opplex Distributor uses workload manager (welivi) information to		

**Description:** Sysplex Distributor uses Workload Manager (WLM) information to distribute incoming work according to varying LPAR capacities, sending more work where there is more capacity. For some applications though, distributing according

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- to WLM capacity and policy recommendations is not appropriate, such as when connections are to be spread evenly among server instances.
  - z/OS Communications Server introduces a new DISTMethod ROUNDROBIN parameter on the VIPADISTRIBUTE statement that may be used to assign incoming connections for the Distributed DVIPA among available server instances in a round-robin method.

#### When change was introduced: z/OS V1R5.

#### **Reference information:**

- z/OS Communications Server: IP Configuration Guide
- z/OS Communications Server: IP Configuration Reference
- z/OS Communications Server: IP System Administrator's Commands
- z/OS Communications Server: IP Migration and Exploitation

# Workload distribution (Application Server Affinity) enhancements

- Description: The Timed Affinity feature of Sysplex Distributor allows affinities to be established between a specific client (identified by its IP address) and a particular instance of a server application for which work is being balanced with Sysplex Distributor, using a Distributed Dynamic VIPA. This feature ensures that a client that establishes a relationship with a server will be directed to that particular server for subsequent connections.
   When change was introduced: z/OS V1R5.
   Reference information:
  - z/OS Communications Server: IP Configuration Guide
  - z/OS Communications Server: IP Configuration Reference
  - z/OS Communications Server: IP System Administrator's Commands
  - z/OS Communications Server: IP Migration and Exploitation

## VIPABACKUP enhancement

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**Description:** VIPABACKUP is a statement in the VIPADYNAMIC block to designate Dynamic VIPAs (DVIPAs) to provide automatic backup when the owning stack fails. It was introduced in Communications Server for OS/390 V2R8 for cases of outages of the routing TCP/IP so that existing connections to other TCP/IPs in the sysplex are not disrupted.

In z/OS Communications Server, VIPABACKUP is enhanced so that a DVIPA may be activated on a backup TCP/IP before it is activated elsewhere in the Sysplex with the VIPADEFINE statement. The VIPABACKUP statement has new statements that allow this to occur. A new MOVEABLE parameter, subnet mask definition, and an optional SERVICEMGR parameter can be coded on TCP/IP initialization or during VARY OBEY processing. The IPCS command to display the configuration is enhanced for VIPABACKUP to show the new parameters, if specified.

When change was introduced: z/OS V1R5.

#### Reference information:

- z/OS Communications Server: IP Configuration Reference
- z/OS Communications Server: IP System Administrator's Commands

I	• z/OS Communications Server: IP Migration and Exploitation			
Dynamically a	<b>Assign Sysplex Distributor ports</b> <b>Description:</b> With APAR PQ65205, the maximum number of ports you could specify for a distributed dynamic VIPA was raised from 4 to 64. This APAR is applicable to z/OS V1R2 and z/OS V1R4. With z/OS V1R5 Communications Server, applications that are candidates for workload distribution with Sysplex Distributor, and that listen on more than 64 ports, are able to use a single distributed Dynamic VIPA by exploiting the ability to dynamically assign Sysplex Distributor ports. Previously existing applications and configurations continue to work the way they did before z/OS V1R5 Communications Server. New distributed DVIPAs configured without a PORT parameter on the VIPADISTRIBUTE statement will determine where to distribute work based on where there are applications with listening sockets bound to the distributed DVIPA, regardless of how many different ports are involved.			
I	When change was introduced: z/OS V1R5.			
   	<ul> <li>Reference information:</li> <li>z/OS Communications Server: IP Configuration Reference</li> <li>z/OS Communications Server: IP System Administrator's Commands</li> <li>z/OS Communications Server: IP Migration and Exploitation</li> </ul>			
DVIPA limit increase				
   	<b>Description:</b> The limit for Dynamic Virtual IP Addresses (DVIPAs) is increased from 256 to 1024. As part of this change, some TCP/IP control blocks associated with DVIPAs were moved from common storage to TCP/IP private storage.			
I	When change was introduced: z/OS V1R5.			
   	<ul> <li>Reference information:</li> <li>z/OS Communications Server: IP Configuration Reference</li> <li>z/OS Communications Server: IP Configuration Guide</li> </ul>			
Sysplexports performance enhancement				
       	<b>Description:</b> The use of the SYSPLEXPORTS function introduced in z/OS V1R4 Communications Server caused performance degradation for short-lived connections. z/OS V1R5 Communications ServerS provides significant performance improvement for short-lived connections by having the stack obtain a group of ephemeral ports from the Coupling Facility (CF) and managing port allocation instead of calling the CF for each bind().			
I	When change was introduced: z/OS V1R5.			
1	<b>Reference information:</b> This improvement is automatically implemented and you do not need to reference another document.			
IP Services: Integrated WLM/QoS Performance Monitor				
   	<b>Description:</b> The Policy Agent is changed to include a new performance collection function. <i>Performance collection</i> allows policy performance data to be collected and maintained for retrieval by external performance monitor applications, and also			

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   	provides optional logging of the performance data to a performance log file. A Policy API (PAPI) interface is added to allow external user applications to access policy data.				
   	The Integrated WLM/QoS Performance Monitor API is also being used by the new Network SLAPM2 Subagent (nslapm2). This subagent provides policy performance monitoring using the NETWORK-SLAPM2-MIB. This new subagent is the replacement for the SNMP SLA subagent.				
I	When change was introduced: z/OS V1R5.				
I	Reference information:				
I	• z/OS Communications Server: IP Configuration Reference				
I	• z/OS Communications Server: IP Configuration Guide				
I	• z/OS Communications Server: IP System Administrator's Commands				
I	• z/OS Communications Server: IP Programmer's Reference				
IP Services: In	IP Services: Increase maximum number of allowed sockets				
 	<b>Description:</b> The maximum number of sockets allowed has been increased to 65535 for the following Sockets APIs:				
	Macro (EZASMI)				
	Sockets Extended (EZASOKET)				
	<ul> <li>CICS<sup>®</sup> Sockets (not including C Sockets under CICS)</li> </ul>				
	IMS Sockets				
	REXX Sockets				
   	Prior to z/OS V1R5 Communications Server, the highest MAXSOC value that a Sockets application could issue on an INITAPI command (or the MAXDESC value on a REXX Sockets 'Initialize' call) was 2000. The limit increase allows for a TCP socket descriptor set ranging from socket number 0 to socket number 65534.				
I	When change was introduced: z/OS V1R5.				
I	Reference information:				
I	• z/OS UNIX System Services Planning				
IP Services: MVS system symbol resolution enhancements in					
     	<b>Description:</b> Automatic resolution of MVS <sup>™</sup> system symbols is supported for the Resolver setup file and for the TCPIP.DATA file. In previous releases, automatic resolution of MVS system symbols was not supported for the Resolver setup file or for the TCPIP.DATA file; it was necessary to use the EZACFSM1 utility program to resolve MVS system symbols for those files.				
I	When change was introduced: z/OS V1R5.				
I	Reference information:				
	• z/OS Communications Server: IP Configuration Reference				
	z/OS Communications Server: IP Configuration Guide				
I	• z/OS Communications Server: IP Migration and Exploitation				

IP Services: Ne	etstat enhancements			
Description: Netstat is changed in the following ways:				
   	<ul> <li>The D TCPIP,,NETSTAT,ACCESS,NETWORK, Netstat CACHINFO/-C, IDS/-k, VCRT/-V, VDPT/-O, VIPADCFG/-F, VIPADYN/-v reports are enhanced to support LONG report format in preparation for future IPv6 support where applicable.</li> </ul>			
     	<ul> <li>The LONG format is further enhanced to support all of Netstat reports. The existing stack-wide output format option (FORMAT LONG/SHORT) configured on the IPCONFIG profile statement, or Netstat FORMAT/-M option, can be used to instruct all Netstat reports to produce output according to either the old or new format.</li> </ul>			
   	<ul> <li>For all of TSO NETSTAT reports, the report data do not have message identifiers displayed when the LONG format report is required. Error messages will continue to have message identifiers.</li> </ul>			
 	<ul> <li>For TSO NETSTAT HELP report, the report data do not have message identifiers displayed for both LONG and SHORT format reports.</li> </ul>			
   	<ul> <li>The new host name filter (HOSTName/-H) is added to ALL/-a, ALLCONN/-a, BYTEINFO/-b, CONN/-c, SOCKETS/-s, TELNET/-t, and VCRT/-V reports for TSO and UNIX<sup>®</sup> shell Netstat.</li> </ul>			
I	• The existing interface filter (INTFName/-K) support is added to HOME/-h report.			
l I	<ul> <li>The existing IP address filter (IPAddr/-I) filter support is added to BYTEINFO/-b report.</li> </ul>			
   	<ul> <li>For all interfaces or links except VIPAs, the additional interface statistic information is added to Netstat DEVLINKS/-d report and the existing BytesIn and BytesOut are moved in the new statistics section.</li> </ul>			
l I	<ul> <li>A new error message, EZZ2391I, will be issued when Netstat cannot obtain storage to retrieve requested information from the TCP/IP stack.</li> </ul>			
 	<ul> <li>The configured DELAYACKS information is added to the Configured TCP Information sections of the Netstat CONFIG/-f report.</li> </ul>			
	<ul> <li>The LogProtoErr field is removed from the Configured TCP Information and Configured UDP Information sections of Netstat CONFIG/-f report.</li> </ul>			
I	When change was introduced: z/OS V1R5.			
I	Reference information:			
I	• z/OS Communications Server: IP System Administrator's Commands			
IP Services: In	trusion Detection Services enhancements			
     	<b>Description:</b> The Intrusion Detection Services (IDS) support is enhanced to include interface flood detection as part of its ATTACK FLOOD support. This support identifies a potential interface flood condition so that an installation can take action in a timely manner. If you already have IDS policy defined for FLOODs, you will automatically receive this enhanced support.			
   	New IDS actions, ibm-idslfcFloodMinDiscard and ibm-idslfcFloodPercentage, can be defined in the LDAP policy to allow you to modify the minimum number of discards and the percentage of discards that identify an interface flood.			
 	New syslogd messages related to interface flood are added as a result of these enhancements			
The trmdstat flood summary and detail reports are updated to include the interface flood information. A new flood statistics report has been created to display the flood statistics data collected.

The Netstat IDS/-k report has been updated to include the interface flood information.

When change was introduced: z/OS V1R5.

## **Reference information:**

- z/OS Communications Server: IP System Administrator's Commands
- z/OS Communications Server: IP Configuration Reference
- z/OS Communications Server: IP Configuration Guide
- z/OS Communications Server: IP Migration and Exploitation
- z/OS Communications Server: IP Messages Volume 4 (EZZ-SNM)

## IP Services: Multilevel security

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**Description:** TCP/IP provides support for the z/OS multilevel security environment. This environment is intended for government and commercial customers who require advanced Mandatory Access Control (MAC) security features based on security labels.

Specifically, some government and commercial installations require the advanced Mandatory Access Control (MAC) security features provided by a z/OS multilevel security environment to be extended to their TCP/IP networking environment. z/OS Communications Server TCP/IP participates in an activated z/OS multilevel security environment in several ways:

- MAC processing in stack access control and network access control is enhanced.
- Proprietary packet tagging is provided when needed between stacks on the same system or within a sysplex.
- Security labels are considered when sysplex distributor selects a target application.

When change was introduced: z/OS V1R5.

## **Reference information:**

- z/OS Security Server RACF Security Administrator's Guide
- z/OS Communications Server: IP Configuration Reference
- z/OS Communications Server: IP Configuration Guide
- z/OS Planning for Multilevel Security
- z/OS Communications Server: IP Migration and Exploitation

## IP Services: OMPROUTE enhancements

**Description:** OMPROUTE is enhanced in the following areas:

• The OMPROUTE detailed trace can be diverted to the CTRACE facility rather than to a file.

This enhances the performance of OMPROUTE due to synchronous file I/O during heavy OMPROUTE loads by changing these operations to memory I/O or asychronous file I/O.

• The OMPROUTE limit of 255 total interfaces is relaxed. Previously OMPROUTE could only handle 255 total interfaces on a system, including VIPA. For IPv4,

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OMPROUTE can now handle an unlimited number of VIPA interfaces in addition to 255 real interfaces. For IPv6, there is no absolute limit to how many interfaces OMPROUTE can handle, although performance and network design will naturally impose practical limits. OMPROUTE can be configured to ignore local interfaces that are not configured to it. The IGNORE\_UNDEFINED\_INTERFACES option eliminates the need to define every local interface to OMPROUTE. Without this solution, it was necessary to define every local interface to OMPROUTE whether it was being used for dynamic routing or not. If a local interface was undefined to OMPROUTE, OMPROUTE would configure it using default values, and then override stack definitions with those default values, which may be undesirable. For example, the default value for the subnet mask is the class mask and the default MTU value is 576. OMPROUTE would also possibly advertise the interface and its default values to other routers. For example, undefined interface 9.67.101.10 would be given a subnet mask of 255.0.0.0 (the class mask for a class A address) and OMPROUTE could advertise that the host could reach the entire 9.0.0.0 network via that interface. With this new function, OMPROUTE can be told to ignore interfaces not defined to it, and it will not configure or advertise those interfaces. The limit on multipath dynamic routes increased from 4 to 16. Previously OMPROUTE could only compute and store up to four equal cost routes to the same destination. By increasing this limit to 16, OMPROUTE's ability to implement network redundancy is greatly enhanced. OMPROUTE allows display of generic interfaces (which are interfaces that are not running any routing protocol), and allows OSPF MD5 authentication keys to be specified in a matter compatible with many vendor routers. Support for IPv6 dynamic routing is added. This includes support for IPv6 static routes, defined and learned IPv6 prefixes, and RIPng (RIP for IPv6). See "IPv6 support enhancements for OMPROUTE" on page 27 for more information. When change was introduced: z/OS V1R5. **Reference information:** • z/OS Communications Server: IP Diagnosis Guide • z/OS Communications Server: IP Configuration Reference z/OS Communications Server: IP Configuration Guide z/OS Communications Server: IP System Administrator's Commands • z/OS Communications Server: IP Migration and Exploitation IP Services: TCP/IP asynchronous I/O support enhancements Т **Description:** The performance of asynchronous stream socket receive operations is improved when applications are changed to use common storage buffers. Т Prior to this enhancement, asynchronous socket receive operations consumed more system resources than the corresponding synchronous receive operations. This enhancement reduces that disparity. When change was introduced: z/OS V1R5. **Reference information:** z/OS UNIX System Services Programming: Assembler Callable Services Reference

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 	<ul> <li>z/OS C/C++ Run-Time Library Reference</li> <li>z/OS Communications Server: IP Migration and Exploitation</li> </ul>
IP Services: P	olicy code restructure
   	<b>Description:</b> The default value for the LDAP_SchemaVersion parameter on the Policy Agent ReadFromDirectory configuration statement is changed from 2 to 3.
I	When change was introduced: z/OS V1R5.
I	Reference information:
	z/OS Communications Server: IP Configuration Reference
<ul> <li>IP Services: N</li> <li>customization</li> </ul>	lanaged System Infrastructure (msys) for Setup FTP support
     	<b>Description:</b> Managed System Infrastructure (msys) for Setup was introduced in z/OS V1R2 Communications Server and enhanced in z/OS V1R4 Communications Server. In z/OS V1R5 Communications Server, complete configuration of FTP servers and FTP clients is available using msys for Setup. This allows for a GUI configuration as an alternative to creating your own configuration file.
Ι	When change was introduced: z/OS V1R5.
   	<ul> <li>Reference information:</li> <li>z/OS Managed System Infrastructure for Setup User's Guide</li> <li>z/OS Communications Server: IP Migration and Exploitation</li> </ul>
IP Services: N security	IVS Remote Execution Server support for multilevel
IP Services: N	IVS Remote Execution Server support for multilevel Description: The Remote Execution Server can be started with the option to add the security label to the job card.
IP Services: N security	IVS Remote Execution Server support for multilevel Description: The Remote Execution Server can be started with the option to add the security label to the job card. When change was introduced: z/OS V1R5.
IP Services: N security	IVS Remote Execution Server support for multilevel Description: The Remote Execution Server can be started with the option to add the security label to the job card. When change was introduced: z/OS V1R5. Reference information:
IP Services: N security	IVS Remote Execution Server support for multilevel Description: The Remote Execution Server can be started with the option to add the security label to the job card. When change was introduced: z/OS V1R5. Reference information: • z/OS Communications Server: IP Configuration Reference
IP Services: N security	<ul> <li>IVS Remote Execution Server support for multilevel</li> <li>Description: The Remote Execution Server can be started with the option to add the security label to the job card.</li> <li>When change was introduced: z/OS V1R5.</li> <li>Reference information: <ul> <li>z/OS Communications Server: IP Configuration Reference</li> <li>z/OS Communications Server: IP Migration and Exploitation</li> </ul> </li> </ul>
IP Services: N security	<ul> <li>IVS Remote Execution Server support for multilevel</li> <li>Description: The Remote Execution Server can be started with the option to add the security label to the job card.</li> <li>When change was introduced: z/OS V1R5.</li> <li>Reference information: <ul> <li>z/OS Communications Server: IP Configuration Reference</li> <li>z/OS Communications Server: IP Migration and Exploitation</li> </ul> </li> <li>Description: The Remote Execution Server can be started with the option to add the security label to the job card.</li> </ul>
IP Services: N security	<ul> <li>IVS Remote Execution Server support for multilevel</li> <li>Description: The Remote Execution Server can be started with the option to add the security label to the job card.</li> <li>When change was introduced: z/OS V1R5.</li> <li>Reference information: <ul> <li>z/OS Communications Server: IP Configuration Reference</li> <li>z/OS Communications Server: IP Migration and Exploitation</li> </ul> </li> <li>Description: z/OS Communications Server provides improved performance for IPv4 by offloading checksum processing to an OSA-Express in QDIO mode that supports the checksum offload function. z/OS Communications Server also introduces new configuration parameters to provide more granular control over fixed storage usage for OSA-Express QDIO and HiperSockets interfaces, as well as some control over the inbound performance of OSA-Express QDIO interfaces.</li> </ul>
IP Services: N security	<ul> <li>IVS Remote Execution Server support for multilevel</li> <li>Description: The Remote Execution Server can be started with the option to add the security label to the job card.</li> <li>When change was introduced: z/OS V1R5.</li> <li>Reference information: <ul> <li>z/OS Communications Server: IP Configuration Reference</li> <li>z/OS Communications Server: IP Migration and Exploitation</li> </ul> </li> <li>Description: z/OS Communications Server provides improved performance for IPv4 by offloading checksum processing to an OSA-Express in QDIO mode that supports the checksum offload function. z/OS Communications Server also introduces new configuration parameters to provide more granular control over fixed storage usage for OSA-Express QDIO and HiperSockets interfaces, as well as some control over the inbound performance of OSA-Express QDIO interfaces.</li> <li>When change was introduced: z/OS V1R5.</li> </ul>
IP Services: N security	<ul> <li><b>IVS Remote Execution Server support for multilevel</b></li> <li>Description: The Remote Execution Server can be started with the option to add the security label to the job card.</li> <li>When change was introduced: z/OS V1R5.</li> <li><b>Reference information:</b> <ul> <li>z/OS Communications Server: IP Configuration Reference</li> <li>z/OS Communications Server: IP Migration and Exploitation</li> </ul> </li> <li><b>Observiption:</b> z/OS Communications Server provides improved performance for IPv4 by offloading checksum processing to an OSA-Express in QDIO mode that supports the checksum offload function. z/OS Communications Server site fraces, as well as some control over the inbound performance of OSA-Express QDIO interfaces.</li> <li>When change was introduced: z/OS V1R5.</li> </ul> <li><b>Reference information:</b> <ul> <li>When change was introduced: z/OS V1R5.</li> </ul> </li>
IP Services: N security	<ul> <li><b>IVS Remote Execution Server support for multilevel</b></li> <li>Description: The Remote Execution Server can be started with the option to add the security label to the job card.</li> <li>When change was introduced: z/OS V1R5.</li> <li><b>Reference information</b></li> <li>z/OS Communications Server: IP Configuration Reference</li> <li>z/OS Communications Server: IP Migration and Exploitation</li> <li><b>OSA performance enhancements</b></li> <li>Description: z/OS Communications Server provides improved performance for IPv4 by offloading checksum processing to an OSA-Express in QDIO mode that supports the checksum offload function. z/OS Communications Server also introduces new configuration parameters to provide more granular control over fixed storage usage for OSA-Express QDIO and HiperSockets interfaces, as well as some control over the inbound performance of OSA-Express QDIO interfaces.</li> <li>When change was introduced: z/OS V1R5.</li> <li><b>Reference information</b></li> <li>z/OS Communications Server: IP Configuration Reference</li> <li>z/OS Communications Server: IP Configuration Reference</li> </ul>

I	• z/OS Communications Server: IP Migration and Exploitation
IP Services: In	<b>Description:</b> During recovery from a failure, the dump process may dump additional information for VTAM <sup>®</sup> DLC dumps, thus requiring fewer re-creates by the user. In some cases, both VTAM and TCP/IP address spaces will be dumped. The VIT dataspace and TCP/IP CTRACE dataspace may also be included in the dump. This will provide a more useful dump.
	<b>Note:</b> Because more information is dumped, you may need to examine the current size of your dump datasets and increase them if necessary.
I	When change was introduced: z/OS V1R5.
	<b>Reference information:</b> This improvement is automatically implemented and you do not need to reference another document.
IP Services: D	HCP daemon enhancement
   	<b>Description:</b> The DHCP daemon will create a process ID file that can then be used in automated operations (such as a BPXBATCH job) to issue kill commands to stop the DHCP daemon.
I	When change was introduced: z/OS V1R5.
I	Reference information:
	z/OS Communications Server: IP Configuration Guide
I	• z/OS Communications Server: IP Migration and Exploitation
IP Services: C	TRACE formatting filter enhancements
   	<b>Description:</b> Two new filters are provided when formatting SYSTCPIP CTRACE records. New selection keywords, ADDR and RECORD, can be specified on the CTRACE command OPTIONS parameter.
   	When ADDR is specified, only trace records containing the specified address will be formatted. When RECORD is specified, only those trace records that match the specified record number or range of numbers will be formatted.
I	When change was introduced: z/OS V1R5.
   	<ul> <li>Reference information:</li> <li>z/OS Communications Server: IP Diagnosis Guide</li> <li>z/OS Communications Server: IP Migration and Exploitation</li> </ul>
IP Services: S	MTP support for IP Mailer Name
   	<b>Description:</b> An optional statement called IPMAILERNAME is added to the SMTPPROC configuration data set. This statement enables Simple Mail Transfer Protocol (SMTP) to forward non-local mail to the specified IP mailer name.
I	When change was introduced: z/OS V1R5.
	Reference information: <ul> <li>z/OS Communications Server: IP Configuration Reference</li> </ul>

• z/OS Communications Server: IP Migration and Exploitation

## IP Services: HiperSockets broadcast support

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**Description:** HiperSockets broadcast support (which is very similar to OSA-Express QDIO broadcast support) will be provided for user configured HiperSockets (iQDIO) MPCIPA devices.

When change was introduced: z/OS V1R5.

#### **Reference information:**

- z/OS Communications Server: IP Configuration Reference
- z/OS Communications Server: IP Migration and Exploitation

## IP Services: Exploitation of IBM CP assist for cryptographic functions

**Description:** z/OS Communications Server supports new IBM<sup>®</sup> CP assist cryptographic instructions for IPSec. The IBM @server zSeries<sup>™</sup> 990 provides IBM CP assist that improves symmetric encryption/decryption performance, as well as SHA1 performance. These instructions are synchronous clearkey.

Some zSeries 990s support a new cryptographic coprocessor, called the PCIX Cryptographic Coprocessor (PCIXCC). However, IPSec will attempt encryption/decryption first by using the new ICSF crypto assist instructions; and if crypto assist is not present, IPSec will attempt encryption/decryption using PCIXCC. If PCIXCC is not available or fails, IPSec will perform encryption/decryption by using software.

Encryption/decryption method	zSeries 990 without PCIXCC feature	zSeries 990 with PCIXCC feature
Crypto assist	IPSec invokes crypto assist if present.	IPSec invokes crypto assist if present.
PCIXCC	Not available.	If crypto assist is not present, IPSec invokes PCIXCC.
Software	If crypto assist is not present or if it fails, IPSec invokes software.	If PCIXCC is not present or if it fails, IPSec invokes software.

Table 1. Encryption/decryption methods and the zSeries 990

When change was introduced: z/OS V1R5.

**Reference information:** This improvement is automatically implemented and you do not need to reference another document.

## IP Services: IBM @server zSeries 990 HiperSockets enhancements

The following HiperSockets enhancements are available with and exclusive to the IBM @server zSeries 990:

Spanned channels

With the introduction of a new channel subSystem, transparent sharing of Internal Coupling Channels (ICs) and HiperSockets is possible.

The multiple image facility allows sharing of channel resources across logical partitions (LPs). ICs and HiperSockets can be configured as multiple image

I I I I I I I I I I I I	<ul> <li>facility-spanning channels. <i>Spanning channels</i> is the ability for Internal Coupling Channels and HiperSockets channels to be configured to multiple channel subsystems, and be transparently shared by any or all of the configured LPs without regard to the logical channel subsystem (LCSS) to which the LP is configured. This support is applicable to Internal Coupling Channels (ICP CHPID type) for Parallel Sysplex<sup>®</sup> and to HiperSockets (IQD CHPID type).</li> <li>Increased number of HiperSockets CHPIDs (iQDIO Internal LANs) The number of Internal LANs that can be configured is increased from 4 to 16. When HiperSockets was introduced, up to 4 internal Local Area Networks (LANs) could be configured. An IQD CHPID represents one Internal LAN. That number is now increased to up to 16 internal LANs (IQD CHPIDs).</li> <li>Increased number of supported TCP/IP stacks</li> <li>The number of supported TCP/IP stacks is increased from 1024 to 4096. Because each TCP/IP stack requires one communication queue, this means 4096 TCP/IP stacks are now supported (instead of 1024 TCP/IP stacks).</li> </ul>
1	A HiperSockets channel must be spanned in order to communicate between LPARs in different LCSSs.
     	The HiperSockets enhancements are fundamentally transparent to Communications Server. There are no Communications Server configuration actions required (there are no changes in VTAM or TCP/IP definitions). If you want to take advantage of the enhancements, however, you must consider which LPs will be required to connect (span) across LCSSs. Next, you must decide how to deploy the IQD CHPID spanning.
   	The TCP/IP Dynamic XCF support will dynamically attempt to use HiperSockets connectivity and can dynamically detect if the sysplex IQD CHPID was configured to span across LCSSs. IQD CHPIDs and the CHPID's spanning attributes are configured using HCD.
I	When change was introduced: z/OS V1R5.
1	Reference information:• z/OS HCD User's Guide
IPv6 support –	- Full Virtual LAN (VLAN) support for OSA-Express Description: Communications Server extends Virtual LAN support by allowing you to assign a Virtual LAN identifier (VLAN ID) to an OSA-Express link or interface. This allows all packets using an OSA-Express to carry a VLAN ID, and thus segregate traffic into different Virtual LANs without needing multiple real LANs or creating new subnetworks.
   	See "IP Services: Full Virtual LAN support for OSA-Express" on page 12 for the restrictions, dependencies, and incompatibilities that you must consider when using the VLAN ID support for either IPv4 or IPv6 traffic.
I	When change was introduced: z/OS V1R5.
   	<ul> <li>Reference information:</li> <li>z/OS Communications Server: IPv6 Network and Application Design Guide</li> <li>z/OS Communications Server: IP Configuration Reference</li> <li>z/OS Communications Server: IP Migration and Exploitation</li> </ul>

## IPv6 support for Enterprise Extender

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## Description:

Support for Enterprise Extender (EE) is enhanced to be IPv6 enabled. It is also enhanced to allow you to specify a hostname when using either IPv4 or IPv6 addressing; see "IP Services: Enterprise Extender enhancements" on page 12 for more information.

#### When change was introduced: z/OS V1R5.

## **Reference information:**

- z/OS Communications Server: IPv6 Network and Application Design Guide
- z/OS Communications Server: SNA Migration and Exploitation

## IPv6 support and upgrade for Sendmail

**Description:** z/OS UNIX Sendmail is a mail program running in an UNIX System Services shell. It has function similar to SMTPROC known in previous MVS TCP/IP versions but allows HFS access, mail filters, TLS connections, and IPv6 socket support. However, if you intend to use the mail server also as a gateway to an NJE/RSCS network, the SMTPROC server has to be used instead of the Sendmail daemon because of rewriting the mail header for NJE/RSCS networks or vice versa. The Sendmail program Version 8.12.1 is based on the Berkeley UNIX 4.1c BSD code.

Communications Server is enhanced in the following areas:

IPv6 support

IP version 6 (IPv6) is a new version of the Internet Protocol, designed as the successor to IP version 4 (IPv4). The most significant change from IPv4 to IPv6 is the "Expanded Addressing Capabilities." Thus, it affects the IP resolving.

TLS support

This is an extension to the SMTP service that allows an SMTP server and client to use transport-layer security to provide private, authenticated communication over the Internet. This gives SMTP agents the ability to protect some or all of their communications from eavesdroppers and attackers.

· Mail filter support

The Sendmail Mail Filter API (Milter) is designed to allow third-party programs access to mail messages as they are being processed in order to filter meta-information and content.

· Configuration and file location

Sendmail configuration changed due to many new features. Those changes include configuration file's version number and header format, for example. You can modify old sendmail.cf (8.8.7) to let it be parsed by Sendmail (8.12.1) correctly.

Sendmail 8.9 has introduced a new configuration directory for Sendmail related files, /etc/mail.Beginning with 8.10, all files will use this directory by default (some options may be set by OSTYPE() files). This new directory should help to restore uniformity to Sendmail's file locations.

#### When change was introduced: z/OS V1R5.

## **Reference information:**

• z/OS Communications Server: IPv6 Network and Application Design Guide

I	<ul> <li>z/OS Communications Server: IP Configuration Guide</li> </ul>
l	<ul> <li>z/OS Communications Server: IP Configuration Reference</li> </ul>
I	<ul> <li>z/OS Communications Server: IP Programmer's Reference</li> </ul>
I	<ul> <li>z/OS System Secure Sockets Layer Programming</li> </ul>
l	<ul> <li>z/OS Summary of Message and Interface Changes</li> </ul>
	<ul> <li>z/OS Communications Server: IP Migration and Exploitation</li> </ul>
IPv6 support	for CICS sockets API
 	<b>Description:</b> Communications Server enables IP CICS sockets to support IPv6. This includes the following changes:
 	<ul> <li>The Task Related User Interface is enabled to define standard and enhanced IPv6 Listeners/subtasks.</li> </ul>
I	• The IBM distributed Listener is enabled to support IPv6 enabled child subtasks.
I	<ul> <li>The IP CICS Advanced Sockets API is affected as follows:</li> </ul>
I	<ul> <li>It is enabled to support IPv6 functions.</li> </ul>
I	<ul> <li>It has new socket options.</li> </ul>
I	<ul> <li>It has new ioctl commands.</li> </ul>
I	<ul> <li>It has new resolver functions.</li> </ul>
I	<ul> <li>It has new utility functions.</li> </ul>
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I	<ul> <li>It has new ioctl commands.</li> </ul>
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I	<ul> <li>It has new utility functions.</li> </ul>
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	<ul> <li>z/OS Communications Server: IP Configuration Reference</li> </ul>
1	• z/OS Communications Server: IP System Administrator's Commands
	<ul> <li>z/OS Communications Server: IP Messages Volume 4 (EZZ-SNM)</li> </ul>
I	• z/OS Communications Server: IP Migration and Exploitation
<ul><li>IPv6 support 1</li><li>servers</li></ul>	for the SYSLOG daemon and the DCAS, TFTP, and SNTP
1	<b>Description:</b> Communications Server enhances the SYSLOG daemon and DCAS, TFTP, and SNTP servers so that they can operate with IPv6 networks.
     	In addition, once you have permitted RACF <sup>®</sup> to allow the SYSLOG daemon to run in a non-swappable state, it becomes the default for the SYSLOG daemon. Previously, if the system became busy, it was possible that the SYSLOG daemon's address space was swapped out. This could have prevented messages from being logged or could have delayed the logging of messages.
   	Furthermore, the new stratum level used by the SNTP daemon can be specified with a start option. The stratum level is an indication of the accuracy of the z/OS clock. This may vary from site to site. The default stratum level is 1.
I	When change was introduced: z/OS V1R5.
I	Reference information:
1	• z/OS Communications Server: IPv6 Network and Application Design Guide
1	z/OS Communications Server: IP Configuration Guide
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1	z/OS Communications Server: IP Configuration Reference
1	<ul> <li>z/OS Communications Server: IP Configuration Reference</li> <li>z/OS Communications Server: IP Migration and Exploitation</li> </ul>
I IPv6 support 1	<ul> <li>z/OS Communications Server: IP Configuration Reference</li> <li>z/OS Communications Server: IP Migration and Exploitation</li> <li>for TSO rexec and rsh and associated MVS daemons</li> </ul>
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IPv6 support f	<ul> <li>z/OS Communications Server: IP Configuration Reference</li> <li>z/OS Communications Server: IP Migration and Exploitation</li> </ul> <b>for TSO rexec and rsh and associated MVS daemons Description:</b> Communications Server enhances the TSO rexec and rsh commands and RXSERVE so that they can operate over IPv6 networks. Support has been added for the rsh command in the UNIX environment. <b>When change was introduced:</b> z/OS V1R5. <b>Reference information:</b> <ul> <li>z/OS Communications Server: IPv6 Network and Application Design Guide</li> <li>z/OS Communications Server: IP Configuration Guide</li> <li>z/OS Communications Server: IP Configuration Reference</li> <li>z/OS Communications Server: IP Migration and Exploitation</li> </ul> <b>for SMF recording Description:</b> Communications Server enhances the existing use of System Management Facilities (SMF) to provide additional information for system management and accounting. Specifically, the SMF recording enhancements include the following: <ul> <li>IPv6 enablement of SMF records is complete.</li> </ul>

	<ul> <li>A stack's IPv6 enablement status is reflected in the Stack Initialization and Termination records.</li> </ul>
I	<ul> <li>Statistics for IPv6 interfaces are reported in the Interface Statistics record.</li> </ul>
I	<ul> <li>IPv6 TN3270 connections are reflected in the TN3270 Server Session</li> </ul>
İ	Initialization and Termination records.
I	<ul> <li>Security information is added to the various FTP server and client SMF records,</li> </ul>
L	for the purpose of identifying the security mechanism and levels for FTP
Ι	transfers.
Ι	<ul> <li>The TCP Connection Termination record is modified to report Telnet-specific</li> </ul>
	information, such as LU name, application name, and protocol, for those
I	connections that are TN3270 connections.
	<ul> <li>The formats for several of the type 119 SMF records are changed to add additional subsections reflecting new information.</li> </ul>
I	When change was introduced: z/OS V1R5.
I	Reference information:
I	• z/OS Communications Server: IPv6 Network and Application Design Guide
I	z/OS Communications Server: IP Configuration Reference
I	<ul> <li>z/OS Communications Server: IP Migration and Exploitation</li> </ul>
	<b>3 1 1 1</b>
I	IPv6 support for XCF, SameHost, and ESCON
L	Description: The multipath channel point-to-point (MPCPTP) Data Link Control
1	(DLC) is updated to support IPv6 traffic. With the new support, a new interface type
	(MPCPTP6) may be used to carry IPv6 traffic over ESCON <sup>®</sup> channels, over XCF
I	(CTC) simulated by the IUTSAMEH function in VTAM.
 	The MPCPTP6 interface may point to the same TRLE as an MPCPTP DEVICE, thus allowing IPv4 and IPv6 traffic to share the same physical resources.
 	Prior to this enhancement, the only network attachment supported for IPv6 traffic was the OSA-Express.
 	The Netstat DEVLINKS/-d displays are changed to describe the MPCPTP6-type interface.
I	When change was introduced: z/OS V1R5.
Ι	Reference information:
Ι	• z/OS Communications Server: IPv6 Network and Application Design Guide
L	<ul> <li>z/OS Communications Server: IP Configuration Reference</li> </ul>
I	<ul> <li>z/OS Communications Server: IP System Administrator's Commands</li> </ul>
I	• z/OS Communications Server: IP Migration and Exploitation
	IPV6 support enhancement for IPAQENE16 Interface type
	<b>Description:</b> The IPAQENET6 Interface type, which handles IPv6 over Ethernet/QDIO, is enhanced to allow for manual configuration of the Interface ID
Ι	portion of local IPv6 addresses.
 	In z/OS V1R4 Communications Server, network administrators had no control over the Interface ID portion (bits 64 through 128) of Link-Local or Autoconfigured IPv6

1	addresses on their IPAQENET6 interfaces. Without control over the Interface ID value, the possibility exists that multiple IPv6 hosts in a customer network will have
	the same IPv6 address. With this new support, customers who wish to have unique
1	IPv6 addresses in the Link, Site, and Global scopes can manually configure unique
	Interface IDs onto their IPAQENET6 interfaces. This will then result in formation of
1	unique Link-Local, Site-Local, and Global IPv6 addresses.
I	When change was introduced: z/OS V1R5.
I	Reference information:
I	<ul> <li>z/OS Communications Server: IPv6 Network and Application Design Guide</li> </ul>
I	<ul> <li>z/OS Communications Server: IP Configuration Reference</li> </ul>
I	• z/OS Communications Server: IP Migration and Exploitation
IPv6 support	for dynamic XCF
I	Description: z/OS V1R4 Communications Server introduced the basic support of
	IPv6 addresses on the TCPIP stack, but that support did not include static or
	dynamic XCF. Communications Server now provides IPv6 support for static and
	dynamic XCF. This section describes the IPV6 support for dynamic XCF. See "IPV6
	support for ACF, Samenosi, and ESCON on page 26 for a description of the IPV6
1	
I	When change was introduced: z/OS V1R5.
I.	Reference information:
	• z/OS Communications Server: IPv6 Network and Application Design Guide
	<ul> <li>z/OS Communications Server: IP Configuration Guide</li> </ul>
	<ul> <li>z/OS Communications Server: IP Configuration Reference</li> </ul>
I	• z/OS Communications Server: IP Migration and Exploitation
IPv6 support	enhancements for Netstat
1	Description: Netstat is changed in the following way for IPv6 support:
         	<ul> <li>The D TCPIP,,NETSTAT,ACCESS,NETWORK, Netstat CACHINFO/-C, IDS/-k, VCRT/-V, VDPT/-O, VIPADCFG/-F, VIPADYN/-v reports are enhanced to support LONG report format in preparation for future IPv6 support where applicable. The existing stack-wide output-format option (FORMAT SHORT/LONG) configured on the IPCONFIG profile statement, or Netstat FORMAT/-M option, can be used to instruct these Netstat reports to produce output according to either the old or new format.</li> </ul>
I	When change was introduced: z/OS V1R5.
I	Reference information:
1	• z/OS Communications Server: IPv6 Network and Application Design Guide
1	<ul> <li>z/OS Communications Server: IP System Administrator's Commands</li> </ul>
1	<ul> <li>z/OS Communications Server: IP Migration and Evaluation</li> </ul>
IPv6 support	ennancements for OMPROUTE
   	<b>Description:</b> Support for IPv6 dynamic routing is added to OMPROUTE. This includes support for IPv6 static routes, defined and learned IPv6 prefixes, and RIPng (RIP for IPv6).

I	When change was introduced: z/OS V1R5.
I	Reference information:
I	• z/OS Communications Server: IPv6 Network and Application Design Guide
I	• z/OS Communications Server: IP Configuration Guide
I	• z/OS Communications Server: IP Configuration Reference
I	• z/OS Communications Server: IP System Administrator's Commands
I	• z/OS Communications Server: IP Migration and Exploitation
IPv6 support f	or network access control
I	Description: Network access control is extended to IPv6 network addresses.
I	When change was introduced: z/OS V1R5.
I	Reference information:
I	• z/OS Communications Server: IPv6 Network and Application Design Guide
	<ul> <li>z/OS Communications Server: IP Configuration Guide</li> </ul>
I	<ul> <li>z/OS Communications Server: IP Configuration Reference</li> </ul>
I	<ul> <li>z/OS Security Server RACF Security Administrator's Guide</li> </ul>
I	• z/OS Communications Server: IP Migration and Exploitation
IP Services: A	utoconfigure target library for FTP load module transfer
   	<b>Description:</b> You can now specify to FTP whether to create MVS directories as partitioned data sets (PDSs) or as partitioned data sets extended (PDSEs). Prior to this release, you could create an MVS PDS with FTP, but not a PDSE.
           	When transferring load modules, you must allocate an MVS directory on the target host before the transfer. The target MVS directory characteristics must be compatible with the source MVS directory for the transfer to succeed. Before this release, you had to determine the characteristics of the source directory and configure FTP with FTP.DATA statements, locsite subcommands, or SITE commands specifying the same characteristics before creating the directory. Now the mkdir and Imkdir subcommands do the configuration for you as they create the new directory. Specifically, in z/OS V1R5 CS:
   	• The FTP client mkdir subcommand has a new <i>(like</i> parameter that allows you to create an MVS directory on the FTP server host with characteristics compatible with an MVS directory on the FTP client host.
   	• The FTP client Imkdir subcommand has a new <i>(like</i> parameter that allows you to create a local MVS directory with characteristics compatible with an MVS directory on the FTP server host.
 	<b>Note:</b> The FTP subcommands lmkdir and mkdir will change the local and remote site variables, respectively, if the new parameters are used.
I	When change was introduced: z/OS V1R5.
I	Reference information:
I	• z/OS Communications Server: IP User's Guide and Commands
I	z/OS Communications Server: IP Configuration Reference
	<ul> <li>z/OS DFSMS: Using Data Sets</li> </ul>
	<ul> <li>z/OS Communications Server: IP Migration and Exploitation</li> </ul>

IP Services: E	Define FTP ephemeral port range for firewall compatibility
I	Description: FTP sessions through firewalls are enhanced in two ways:
	• You can configure the FTP server to select ephemeral ports from a specific range of values compatible with your firewall configuration.
1	<ul> <li>IPv4 security-protected and encrypted sessions through Network Address Translation (NAT) firewalls are enabled.</li> </ul>
I	When change was introduced: z/OS V1R5.
I	Reference information:
	<ul> <li>z/OS Communications Server: IP User's Guide and Commands</li> </ul>
	<ul> <li>z/OS Communications Server: IP Configuration Reference</li> </ul>
	<ul> <li>z/OS Communications Server: IP Configuration Guide</li> </ul>
I	• z/OS Communications Server: IP Migration and Exploitation
IP Services: F	TP TLS support enhancements
     	<b>Description:</b> The FTP server can now be configured to allow a user to log in without specifying a password. The server will use the TLS authenticated X.590 certificate provided by the FTP client to perform this login. This support allows you to take advantage of using a certificate instead of a password to complete the login procedure.
I	When change was introduced: z/OS V1R5.
I	Reference information:
I	<ul> <li>z/OS Communications Server: IP Configuration Reference</li> </ul>
I	• z/OS Communications Server: IP Migration and Exploitation
IP Services: I	mprove FTP serviceability
 	<b>Description:</b> Communications Server enhances diagnosis of failures in the FTP server and client. The enhancements include the following areas:
 	<ul> <li>Client error logging to the system log is provided (see "IP Services: Enforce nonzero error return code in FTP" on page 30).</li> </ul>
 	<ul> <li>Client error codes are extended to further describe failures in the client (see "IP Services: Enforce nonzero error return code in FTP" on page 30).</li> </ul>
 	<ul> <li>Dynamic allocation failure reporting is enhanced to ensure all failures record needed information. This includes S99ERROR, S99INFO, and S99ERSN.</li> </ul>
1	<ul> <li>All Language Environment (LE) and UNIX System Services (USS) failure reporting, including errnojr (referred to as errno2), is provided.</li> </ul>
I	<ul> <li>Message EZA2589E text is changed to include the failing operation.</li> </ul>
I	When change was introduced: z/OS V1R5.
I	Reference information:
I	<ul> <li>z/OS Communications Server: IP User's Guide and Commands</li> </ul>
I	<ul> <li>z/OS Communications Server: IP Messages Volume 1 (EZA)</li> </ul>
I	<ul> <li>z/OS Communications Server: IP Messages Volume 3 (EZY)</li> </ul>
I	<ul> <li>z/OS Language Environment Run-Time Messages</li> </ul>
I	<ul> <li>z/OS UNIX System Services Messages and Codes</li> </ul>
I	• z/OS Communications Server: IP Diagnosis Guide

	• z/OS Communications Server: IP Migration and Exploitation
IP Serv	vices: Enforce nonzero error return code in FTP
   	<b>Description:</b> The new LOGCLIENTERR and updated CLIENTERRCODES statements direct the FTP client to provide enhanced diagnostic information when the client detects a failure. Specifically:
     	<ul> <li>LOGCLIENTERR will generate a message on the system log and the batch job log (or return it to the user in an interactive environment) with complete information about the command code, reply code, and computed return code related to the failure.</li> </ul>
   	<ul> <li>CLIENTERRCODES has a new option, EXTENDED, to append the code of the failing subcommand to the client error code for the batch or interactive return code. Several client error codes are new in z/OS V1R5 CS and all the possible client error codes are set more consistently and reliably.</li> </ul>
I	In addition, the text for message EZA1735I has changed from:
I	EZA1735I FTP Return Code = rc, Error Code = ec
	to
1	EZAI/351 Sta Return tode = rc, Error tode = ec
 	This change more accurately reflects the contents of the message since the actual return code in the FTP client may not be a standard return code.
I	When change was introduced: z/OS V1R5.
	Reference information:
1	<ul> <li>z/OS Communications Server: IP User's Guide and Commands</li> <li>z/OS Communications Server: IP Messages Volume 4 (EZZ-SNM)</li> </ul>
1	<ul> <li>z/OS Communications Server: IP Migration and Exploitation</li> </ul>
IP Serv	vices: Allow the FTP server load module to run above the 16M
	<b>Description:</b> The FTP server load module EZAFTPLS (alias ftpdns) is now linkedited with RMODE=ANY so that it can be loaded above the 16M line. This is an enhancement, because below the line space is a limited resource.
   	This enhancement will not require any action to implement; in z/OS V1R5 CS when FTP is installed, the linkedit occurs with RMODE=ANY. However, if you have previously coded your security exits to have the dependency of working below the line, you should examine the exits and modify them appropriately.
I	When change was introduced: z/OS V1R5.
1	<b>Reference information:</b> This improvement is automatically implemented and you do not need to reference another document.
IP Serv	vices: Display status of FTPKEEPALIVE timer
   	<b>Description:</b> Previously, the FTP client LOCSTAT subcommand displayed all client timers except the FTPKEEPALIVE timer. The following enhancements are now available:

 	<ul> <li>The FTP STAT subcommand displays the value of the server's FTPKEEPALIVE timer.</li> </ul>
     	<ul> <li>FTP issues message EZYFT47I for every statement coded in FTP.DATA that it ignores. A new configuration statement, SUPPRESSIGNOREWARNINGS, can be coded in either the FTP client's or FTP server's FTP.DATA to suppress message EZYFT47I.</li> </ul>
I	When change was introduced: z/OS V1R5.
I	Reference information:
1	• z/OS Communications Server: IP User's Guide and Commands
I	• z/OS Communications Server: IP Configuration Reference
I	• z/OS Communications Server: IP Migration and Exploitation
IP Services: F	TP SERVAUTH Port of Entry support
   	<b>Description:</b> The FTP Daemon uses NETACCESS profiles in the SERVAUTH class for Port of Entry authorization for IPv6 clients. The FTP Daemon may optionally be migrated to use NETACCESS profiles instead of profiles in the TERMINAL class for Port of Entry authorization for IPv4 clients.
   	<b>Note:</b> Programs invoked by the z/OS INET daemon that perform login or change identity will also use NETACCESS profiles in the SERVAUTH class for Port of Entry authorization when the client's IP address is mapped in a NETACCESS zone.
I	When change was introduced: z/OS V1R5.
     	<ul> <li>Reference information:</li> <li>z/OS Communications Server: IP Configuration Guide</li> <li>z/OS Communications Server: IP Configuration Reference</li> <li>z/OS Security Server RACF Security Administrator's Guide</li> <li>z/OS Communications Server: IP Migration and Exploitation</li> </ul>
IP Services: T	N3270 IP address range configuration
   	<b>Description:</b> IP ranges can now be specified in IPGROUP or DESTIPGROUP statements in addition to exact IP addresses and IP subnets.
I	When change was introduced: z/OS V1R5.
I	Reference information:
I	• z/OS Communications Server: IP Configuration Reference
I	• z/OS Communications Server: IP Migration and Exploitation
IP Services: T	N3270 Takeover enhancement
	<b>Description:</b> Telnet now supports takeover of connections without the end user having to specify an LU name.
     	When a connection is lost but still considered active by Telnet, the LU cannot be reused and the application session remains. The end user cannot reconnect to that session until an inactivity timer causes the session to drop. TKOSPECLU solves this problem for end users who specify an LU name at connection request time. Most end users do not specify an LU name and are not able to take advantage of

	the takeover function. With TKOGENLU and TKOGENLURECON, a single connection can be taken over by an end user from the same client.
I	When change was introduced: z/OS V1R5.
I	Reference information:
I	• z/OS Communications Server: IP Configuration Guide
I	• z/OS Communications Server: IP Configuration Reference
I	• z/OS Communications Server: IP Migration and Exploitation
IP Services: TI	N3270 Keyboard control enhancements
       	<b>Description:</b> The Telnet Server now allows customized control of the keyboard unlock function in conjunction with SNA read commands received from the host application. This control is implemented by a new TCP/IP profile parameter called UNLOCKKEYBOARD. Use of this parameter enables the system programmer to dictate whether a 3270 unlock keyboard datastream sequence is sent to a TN3270 client before or after a read command is forwarded from the host application.
   	UNLOCKKEYBOARD also provides control over whether or not a clear screen and unlock keyboard sequence are sent to TN3270 clients when Telnet receives the application BIND.
   	In addition, the Telnet Server will more fully implement the TN3270E functional extensions to RFC 2355 by employing use of the Keyboard Restore Indicator (KRI) in the TN3270E header. There are no external changes associated with this functional extension to RFC 2355.
I	When change was introduced: z/OS V1R5.
I I	When change was introduced: z/OS V1R5. Reference information:
I I I	<ul> <li>When change was introduced: z/OS V1R5.</li> <li>Reference information:</li> <li>z/OS Communications Server: IP Configuration Guide</li> </ul>
I I I	<ul> <li>When change was introduced: z/OS V1R5.</li> <li>Reference information:</li> <li>z/OS Communications Server: IP Configuration Guide</li> <li>z/OS Communications Server: IP Configuration Reference</li> </ul>
I I I I	<ul> <li>When change was introduced: z/OS V1R5.</li> <li>Reference information: <ul> <li>z/OS Communications Server: IP Configuration Guide</li> <li>z/OS Communications Server: IP Configuration Reference</li> <li>z/OS Communications Server: IP Migration and Exploitation</li> </ul> </li> </ul>
I IP Services: IP	<ul> <li>When change was introduced: z/OS V1R5.</li> <li>Reference information: <ul> <li>z/OS Communications Server: IP Configuration Guide</li> <li>z/OS Communications Server: IP Configuration Reference</li> <li>z/OS Communications Server: IP Migration and Exploitation</li> </ul> </li> <li>Pv6 support for TN3270</li> </ul>
I IP Services: IP	<ul> <li>When change was introduced: z/OS V1R5.</li> <li>Reference information: <ul> <li>z/OS Communications Server: IP Configuration Guide</li> <li>z/OS Communications Server: IP Configuration Reference</li> <li>z/OS Communications Server: IP Migration and Exploitation</li> </ul> </li> <li>V6 support for TN3270</li> <li>Description: The Telnet Server now supports IPv6 format IP addresses, depending on the support level of the TCP/IP stack. If the stack is running IPv6, Telnet completely supports IPv6. If the stack is running IPv4, Telnet is IPv4 capable. There is no external parameter needed in Telnet to turn on IPv6 support. Telnet is always IPv6 capable if the stack supports IPv6. If the TCP/IP stack is running in IPv4 mode, no IPv6 function is available in Telnet.</li> </ul>
I <b>IP Services: IP</b>	<ul> <li>When change was introduced: z/OS V1R5.</li> <li>Reference information: <ul> <li>z/OS Communications Server: IP Configuration Guide</li> <li>z/OS Communications Server: IP Configuration Reference</li> <li>z/OS Communications Server: IP Migration and Exploitation</li> </ul> </li> <li>V6 support for TN3270 Description: The Telnet Server now supports IPv6 format IP addresses, depending on the support level of the TCP/IP stack. If the stack is running IPv6, Telnet completely supports IPv6. If the stack is running IPv4, Telnet is IPv4 capable. There is no external parameter needed in Telnet to turn on IPv6 support. Telnet is always IPv6 capable if the stack supports IPv6. If the TCP/IP stack is running in IPv4 mode, no IPv6 function is available in Telnet. Displays that are tabular in style will use a two-line format to display the data when a client identifier appears on the line if either of the following IPv6 switch conditions are met: <ul> <li>The stack is running IPv6 mode.</li> <li>The configuration statement FORMAT LONG is specified.</li> </ul></li></ul>
IP Services: IP	<ul> <li>When change was introduced: z/OS V1R5.</li> <li>Reference information: <ul> <li>z/OS Communications Server: IP Configuration Guide</li> <li>z/OS Communications Server: IP Configuration Reference</li> <li>z/OS Communications Server: IP Migration and Exploitation</li> </ul> </li> <li>PVG support for TN3270</li> <li>Description: The Telnet Server now supports IPv6 format IP addresses, depending on the support level of the TCP/IP stack. If the stack is running IPv6, Telnet completely supports IPv6. If the stack is running IPv4, Telnet is IPv4 capable. There is no external parameter needed in Telnet to turn on IPv6 support. Telnet is always IPv6 capable if the stack supports IPv6. If the TCP/IP stack is running in IPv4 mode, no IPv6 function is available in Telnet.</li> <li>Displays that are tabular in style will use a two-line format to display the data when a client identifier appears on the line if either of the following IPv6 switch conditions are met: <ul> <li>The stack is running IPv6 mode.</li> <li>The configuration statement FORMAT LONG is specified.</li> </ul> </li> <li>If the new two-line format is used, it is always used even when the data would fit on a single line. This will ensure uniformity of output for displays.</li> </ul>

I	Reference information:	
I	• z/OS Communications Server: IPv6 Network and Application Design Guide	
L	<ul> <li>z/OS Communications Server: IP Configuration Reference</li> </ul>	
L	• z/OS Communications Server: IP Migration and Exploitation	
IP Services:	IN3270 Network management	
               	<b>Description:</b> Monitoring of the total Telnet transaction can now be done within the Telnet Server. Monitoring is requested by using the new TN3270 Server Profile statements, MONITORGROUP and MONITORMAP. The transaction data can then be retrieved by using either the D TCPIP,,TELNET,CONN,CONN=connid detail command or by using SNMP. The SNMP support is provided by a new SNMP TN3270 Telnet subagent. The SNMP transaction data is defined in a new Enterprise-specific TN3270 MIB. A sample of this MIB is installed in the HFS as file /usr/lpp/tcpip/samples/mvstn3270.mi2. Activation of the SNMP TN3270 Telnet subagent is controlled by the new TNSACONFIG Profile statement. Refer to <i>z/OS Communications Server: IP Configuration Reference</i> for more detailed information on all the new TN3270 Telnet Server Profile statements.	
1	<b>Note:</b> Requests from the management application may cause a reduction in performance.	
I	When change was introduced: z/OS V1R5.	
I	Reference information:	
I	<ul> <li>z/OS Communications Server: IP Configuration Reference</li> </ul>	
I	<ul> <li>z/OS Communications Server: IP Configuration Guide</li> </ul>	
I	<ul> <li>z/OS Communications Server: IP System Administrator's Commands</li> </ul>	
I	<ul> <li>z/OS Communications Server: IP Messages Volume 4 (EZZ-SNM)</li> </ul>	
I	• z/OS Communications Server: IP Migration and Exploitation	
<ul><li>IP Services:</li><li>sessions</li></ul>	Improve performance for TN3270 definite response	
 	<b>Description:</b> The TN3270E server can now turn off DELAYACKS for TN3270E clients that have negotiated a definite response.	
I	When change was introduced: z/OS V1R5.	
1	<b>Reference information:</b> This improvement is automatically implemented and you do not need to reference another document.	
IP Services: Network Access Control for TN3270		
   	<b>Description:</b> Administrators can now restrict the access of TN3270 ports using security zones. With this support, the TN3270 server can now participate in Network Access Control and the granularity of security access that it provides.	
I	When change was introduced: z/OS V1R5.	
I	Reference information:	
L	<ul> <li>z/OS Communications Server: IP Configuration Reference</li> </ul>	
I	• z/OS Communications Server: IP Configuration Guide	
I	• z/OS Security Server RACF Security Administrator's Guide	

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٠	z/OS Communica	tions Server:	IP Migration	and Exploitation
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# IP Services: Multilevel security LU Name Assignment support for TN3270

	<b>Description:</b> In a multilevel security environment, security label checking will further ensure data is not declassified through the TN3270 leg of the connection. In a multilevel security environment, TN3270 ensures that the SECLABEL of the TCP/IP connection and the TN3270 LU Name are equivalent, enabling end-to-end control. This allows SNA applications that engage in multilevel security checking to use the Security Label of the LU Name as if it were the Security Label of the TCP/IP connection.
I	When change was introduced: z/OS V1R5.
I	Reference information:
	• z/OS Communications Server: IP Configuration Reference
	<ul> <li>z/OS Communications Server: IP Configuration Guide</li> </ul>
	<ul> <li>z/OS Planning for Multilevel Security</li> </ul>
	• z/OS Communications Server: IP Migration and Exploitation
IP Services: IF	Pv6 support for SNMP applications
	<b>Description:</b> The SNMP agent is enhanced to allow IPv6 support for SNMP applications. The SNMP agent, osnmp command, Trap Forwarder daemon and Distributed Protocol Interface for SNMP subagents are all enhanced to operate over IPv6 networks and handle IPv6-related management data. The pwtokey and pwchange commands are enhanced to accept IPv6 addresses as input.
I	When change was introduced: z/OS V1R5.
I	Reference information:
l	• z/OS Communications Server: IP Configuration Reference
l	• z/OS Communications Server: IP Configuration Guide
	• z/OS Communications Server: IPv6 Network and Application Design Guide
	• z/OS Communications Server: IP System Administrator's Commands
I	• z/OS Communications Server: IP Migration and Exploitation
IP Services: T	CP/IP subagent
	<b>Description:</b> Communications Server now includes the following enhancements for the TCP/IP subagent:
	<ul> <li>Support for IPv6 MIB data. The IPv6 MIB data is supported in version-neutral MIB objects. Version-neutral MIB objects can support both IPv4 and IPv6 processing. The TCP/IP subagent now supports some version-neutral standard MIB data from the following Internet drafts:</li> </ul>
l	<ul> <li>IP-MIB from draft-ietf-ipv6-rfc2011-update-01.txt</li> </ul>
l	<ul> <li>TCP-MIB from draft-ietf-ipv6-rfc2012-update-01.txt</li> </ul>
l	<ul> <li>IP-FORWARD-MIB from draft-ietf-ipv6-rfc2096-update-02.txt</li> </ul>
	Even though the IPv4-only MIB data in these Internet drafts has been deprecated, the TCP/IP subagent continues to support this data. The ifTable, ifXTable, and ifStackTable from RFC 2233 will now contain IPv6 interface information. The IBM MVS TCP/IP Enterprise-specific MIB has also been enhanced for IPv6 support.

1	• New ibmTcpipMvsPktTraceTable in the IBM MVS TCP/IP Enterprise-specific MIB.
1	<ul> <li>New MVS system name and sysplex name MIB objects in the IBM MVS TCP/IP</li> </ul>
I	Enterprise-specific MIB.
     	<ul> <li>New SACACHETIME parameter on the SACONFIG Profile statement. This parameter permits the TCP/IP subagent cache time to be changed using the subagent's Profile statement. Previously, the only way to change this cache time was by using an snmp set request for MIB object ibmMvsSubagentCacheTime.</li> </ul>
   	<ul> <li>A new error message, EZZ32311, will be issued to the console when the Subagent can not obtain storage to process SNMP requests. The message will be issued once every 15 minutes while the low storage condition exists.</li> </ul>
	<ul> <li>New or changed Dynamic VIPA MIB data in the IBM MVS TCP/IP Enterprise-specific MIB.</li> </ul>
I	<ul> <li>New interface data in the IBM MVS TCP/IP Enterprise-specific MIB.</li> </ul>
I	New TCP connection data in the IBM MVS TCP/IP Enterprise-specific MIB.
1	<ul> <li>The following MIB objects in the IBM MVS TCP/IP Enterprise-specific MIB changed as follows:</li> </ul>
 	<ul> <li>ibmMvsPortOptMaxSegmentSize - the TCP/IP stack no longer supports the OPTMSS parameter on the PORT Profile statement.</li> </ul>
   	<ul> <li>ibmMvsTcpConnOptMaxSegmentSize - the TCP/IP stack no longer supports the SO_OPTMSS socket option and the OPTMSS parameter on the PORT Profile statement.</li> </ul>
1	<ul> <li>ibmMvsPortBindIpAddr - This object was replaced by new objects, ibmMvsPortBindIpAddressType and ibmMvsPortBindIpAddress</li> </ul>
1	<ul> <li>ibmTcpipMvsGatewayTable - This table augments the standard ipForwardTable, which was deprecated.</li> </ul>
1	<ul> <li>ibmTcpipMvsTcpConnTable - This table augments the standard tcpConnTable which was deprecated</li> </ul>
     	• The ifAdminStatus MIB object from the IF-MIB (RFC 2233) will now reflect the desired state of an interface. If a START command has been invoked for an interface, ifAdminStatus will be set to up(1). If an interface has never been started or, if a STOP command has been invoked for an interface, ifAdminStatus will be set to down(2).
I	When change was introduced: z/OS V1R5.
I	Reference information:
I	• z/OS Communications Server: IP Configuration Reference
I	<ul> <li>z/OS Communications Server: IP Configuration Guide</li> </ul>
I	• z/OS Communications Server: IP System Administrator's Commands
I	• z/OS Communications Server: IPv6 Network and Application Design Guide
I	• z/OS Communications Server: IP Migration and Exploitation
IP Services: No	etwork SLAPM2 subagent
   	<b>Description:</b> Communications Server introduces a new Network SLAPM2 subagent replaces the old SLA subagent. The new Network SLAPM2 subagent application (nslapm2) contains the information that can be used to analyze network performance for respective policy.
I	When change was introduced: z/OS V1R5.

When change was introduced: z/OS V1R5.

l	Reference information:		
I	• z/OS Communications Server: IP Config	guration Reference	
l	• z/OS Communications Server: IP Config	guration Guide	
I	• z/OS Communications Server: IP Migra	tion and Exploitation	
IP Services: SI	NMP TN3270 Telnet subagent	:	
   	<b>Description:</b> Communications Server pro- subagent. This subagent provides Telnet t connections by using the SNMP protocol.	vides a new SNMP TN3270 Telnet ransaction data for monitored Telnet	
I	When change was introduced: z/OS V1	R5.	
I	Reference information:		
I	• z/OS Communications Server: IP Config	guration Reference	
l	• z/OS Communications Server: IP Config	guration Guide	
l	• z/OS Communications Server: IPv6 Ne	twork and Application Design Guide	
I	• z/OS Communications Server: IP Migra	tion and Exploitation	
IP Services: os	snmp command		
   	<b>Description:</b> A usability enhancement was made in the way the osnmp command displays MIB objects of type Counter64. They will now be displayed as decimal equivalents of the 64-bit field.		
I	When change was introduced: z/OS V1R5.		
l	Reference information:		
I	• z/OS Communications Server: IP Config	guration Reference	
l	<ul> <li>z/OS Communications Server: IP Configuration Guide</li> </ul>		
l	• z/OS Communications Server: IP Syste	m Administrator's Commands	
I	• z/OS Communications Server: IP Migra	tion and Exploitation	
IP Services: M	IB modules		
           	<b>Description:</b> Communications Server now ships several Enterprise-specific MIB modules that are installed in the /usr/lpp/tcpip/samples HFS directory. Refer to the SNMP topic of <i>z/OS Communications Server: IP System Administrator's Commands</i> for a complete listing of all the enterprise-specific MIB modules shipped with Communications Server. Currently, both an SMIv1 and SMIv2 version is shipped for some of the MIB modules. Support for providing the SMIv1 version of these MIB modules will be dropped in a future release. For the Enterprise-specific MIB modules that are new for z/OS V1R5, only an SMIv2 version is provided. You can use tools such as libsmi to create the SMIv1 equivalent of a MIB module defined in SMIv2.		
I	The following Enterprise-specific MIB mod	lules are new for z/OS V1R5:	
 	Table 2. Enterprise-specific MIB modules that are new for z/OS V1R5 Communications Server		
I	Function	Enterprise-specific MIB module	
I	TN3270 Telnet subagent	mvstn3270.mi2	
I	Network SLAPM2 subagent	slapm2.mi2	
1			

1	When change was introduced: z/OS V1R5.
	<ul> <li>z/OS Communications Server: IP Configuration Reference</li> </ul>
1	<ul> <li>z/OS Communications Server: IP Configuration Guide</li> </ul>
1	<ul> <li>z/OS Communications Server: IP System Administrator's Commands</li> </ul>
I I	• z/OS Communications Server: IP Migration and Exploitation
IP Services: Sy	splex-wide dynamic source VIPAs for TCP connections
 	<b>Description:</b> For clients outside a Parallel Sysplex, Sysplex Distributor provides a single-IP-address appearance to application instances spread across the sysplex. It also distributes incoming work among the various instances. Many applications are part of a cooperative network of applications, and the sysplex applications serving as clients to end users may also have to initiate (client-like) outbound connection requests to cooperating applications. The SOURCEVIPA feature allows applications to attain independence of any physical adapter; however, SOURCEVIPA is limited to statically defined VIPAs within a stack. Different instances of the same application using Sysplex Distributor, and thus having a single IP address for inbound connection requests. These problems are resolved by allowing a Dynamic VIPA (DVIPA) to be used as the source IP address for TCP applications and to have the sysplex stacks collaborate on assigning ephemeral ports to prevent duplicate connection 4-tuples when the same Distributed DVIPA is used as the source address on multiple stacks.
1	Note that the term <i>4-tuples</i> here refers to the source IP address, the source port, the destination IP address, and the destination port.
I	When change was introduced: z/OS V1R4.
     	<ul> <li>Reference information:</li> <li>z/OS Communications Server: IP Migration and Exploitation</li> <li>z/OS Communications Server: IP Configuration Guide</li> <li>z/OS Communications Server: IP Configuration Reference</li> </ul>
IP Services: Sv	/splexports
-         	<b>Description:</b> Sysplex Distributor is enhanced with a facility to allow assignment of ephemeral ports for outbound connections to be managed across the entire sysplex, such that for a particular Distributed DVIPA, a particular port value is assigned to a socket on only one TCP stack in the sysplex. This ensures that inbound connection data can always be uniquely routed to the correct application instance, whether the connection was initiated by the client or by the sysplex application instances.
I	When change was introduced: z/OS V1R4.
   	<ul> <li>Reference information:</li> <li>z/OS Communications Server: IP Migration and Exploitation</li> <li>z/OS Communications Server: IP Configuration Guide</li> <li>z/OS Communications Server: IP Configuration Reference</li> </ul>
IP Services: Sy	splex Wide Security Association (SWSA)
 	<b>Description:</b> Sysplex Wide Security Association (SWSA) extends the use of IPSec tunnels in a sysplex environment. It is available for Dynamic VIPA takeover and for

	Sysplex Distributor. For Dynamic VIPA takeover and giveback, SWSA allows the IPSec tunnel information to move with the Dynamic VIPA instead of terminating the tunnel. For Sysplex Distributor, SWSA does the following:	
	<ul> <li>Allows the IPSec tunnel information to be distributed to the target host, creating end-to-end security</li> </ul>	
1	<ul> <li>Allows the cryptography processing done by IPSec to be distributed to target hosts, thus removing this burden from the distributor host</li> </ul>	
I	When change was introduced: z/OS V1R4.	
	<b>Reference information:</b> <i>z/OS Communications Server: IP Migration and Exploitation.</i>	
IP Services: N	etwork access control	
	<b>Description:</b> z/OS V1R4 Communications Server extends the network access control function first provided in OS/390 V2R10 Communications Server. Permission for users to access certain networks and resources can now be checked inbound as well as outbound. This ensures that network access privileges are checked prior to applications receiving any data for processing. A new ioctl service is provided through z/OS UNIX and it returns Port of Entry information about the peer address associated with a socket suitable for use with RACROUTE VERIFY processing. New parameters are provided on the NETACCESS statement in the TCPIP PROFILE for activating inbound checking.	
I	When change was introduced: z/OS V1R4.	
	<b>Reference information:</b> <i>z/OS Communications Server: IP Migration and Exploitation.</i>	
IP Services: Fast Response Cache Accelerator (FRCA) access control		
     	<b>Description:</b> FRCA access control is a new security function allowing control of access to the TCP/IP stack FRCA services by a Web server application using a security product, such as the z/OS Security Server (RACF). This allows you to control which user IDs may use the FRCA service. This function is provided by way of a new Access Facility (SAF) resource in the SERVAUTH class.	

When change was introduced: z/OS V1R4.

**Reference information:** *z/OS Communications Server: IP Migration and Exploitation.* 

## **IP Services: Resolver enhancements**

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**Description:** The resolver acts on behalf of application programs as a client that accesses name servers for name-to-address or address-to-name resolution. If a name server is not available, the resolver will use local definitions (such as etc/hosts, HOSTS.SITEINFO or HOSTS.ADDRINFO) to resolve the query for the requesting program. TCPIP.DATA statements control how (and if) the resolver uses name Servers. Prior to z/OS V1R2, the resolver function was implemented as part of the various socket APIs (Application Programming Interfaces) available on the z/OS platform. As a result, multiple versions of the resolver function were available, one for each type of socket API supporting resolver calls. All of these resolver libraries were quite similar in their support of resolver functions but had slight differences from an administrative and configuration perspective. For example, the resolver search logic to locate its configuration file (TCPIP.DATA file) varied

depending on whether the application was using the TCP/IP provided Socket APIs or the C/C++ Socket API provided by the LE (Language Environment) component of z/OS. In z/OS V1R2, the various resolver libraries supported by the TCP/IP and LE APIs are now consolidated into a single resolver component. This allows consistent name resolution processing across all applications using the TCP/IP and LE socket APIs. The new consolidated resolver is automatically enabled on z/OS V1R2 and requires a new system address space that is automatically started during UNIX System Services initialization. The consolidated resolver offers several enhancements over previous releases:

- You can now specify TCPIP.DATA statements that will be used regardless of the application's environment or the socket API the application is using. This allows installations to specify TCPIP.DATA statements in single location for the entire operating system image and prevent end-users from being able to override these specifications. This support is provided by a new resolver setup statement, GLOBALTCPIPDATA.
- You can now specify the final search location of where TCPIP.DATA statements are found by using a new resolver setup statement, DEFAULTTCPIPDATA.

#### Notes:

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- The TCPIP.DATA statements can be contained in either an MVS data set or an HFS file
- z/OS V1R2 still supports a separate resolver for Simple Mail Transfer Protocol (SMTP). In addition, the new DNS BIND 9 has a resolver that is used by the DNS BIND 9 utilities (nslookup, nsupdate, and dig). Even though these TCP/IP applications have their own resolver facilities, they support the GLOBALTCPIPDATA and DEFAULTTCPIPDATA specifications.
  - Certain TCPIP.DATA statements can now be updated and placed in effect immediately without requiring applications to be stopped and restarted. This is performed by using the MODIFY RESOLVER, REFRESH command.
  - Support is added for the LOOKUP, SEARCH, SORTLIST and OPTIONS directives by using new statements in the TCPIP.DATA statement. The LOOKUP directive specifies the order in which the Domain Name Server and/or local host tables should be used to satisfy name resolution requests. The SEARCH having to specify a fully qualified domain name (FQDN). The SORTLIST directive allows you to specify a list of subnets and/or networks the resolver should prefer if it receives multiple addresses as the result of a gethostbyname. The OPTIONS directive allows the administrator to specify miscellaneous options, such as the number of dots that can appear in a host name before it is considered a fully qualified name and the ability to turn on an application resolver trace.

In z/OS Communications Server V1R4, the local host table processing of the resolver was modified to introduce:

- A new type of local host table, IPNODES.
- · Changes to the local host table search order.
- A new optional resolver setup statement to specify a global IPNODES table containing IP address to IP host name mapping. This allows an installation to consolidate this information.
- A new optional resolver setup statement to specify a default IPNODES table containing IP address to IP host name mapping. This allows an installation to provide default information in the event an individual user does not maintain a private local host table.

   	<ul> <li>A new optional resolver setup statement to specify the same local host table search order is to be used for resolver queries in both the native MVS and the z/OS UNIX environments.</li> </ul>	
	When change was introduced: Introduced in z/OS V1R2 and enhanced in z/OS V1R4.	
   	<ul> <li>Reference information:</li> <li>z/OS Communications Server: IP Migration and Exploitation</li> <li>z/OS Communications Server: IP Configuration Guide</li> <li>z/OS Communications Server: IP Configuration Reference</li> </ul>	
IP Services: M enhancement	anaged System Infrastructure (msys) for Setup	
	<b>Description:</b> msys for Setup support of Communications Server is enhanced to include configuring a TN3270 Server and reserving an IP port.	
l	When change was introduced: Introduced in z/OS V1R2 and enhanced in z/OS V1R4.	
   	<ul> <li>Reference information:</li> <li>z/OS Communications Server: IP Migration and Exploitation</li> <li>z/OS Communications Server: IP Configuration Guide</li> </ul>	
IP Services: O	SA SNMP subagent support	
     	<b>Description:</b> The OSA product now provides an SNMP subagent, the OSA-Express Direct subagent, that supports management data for OSA-Express adapters. The OSA-Express Direct subagent can be used with the Communications Server SNMP support to retrieve the management data. The OSA-Express Direct subagent communicates directly with the OSA-Express adapters and does not require OSA/SF.	
I	When change was introduced: z/OS V1R4.	
   	<b>Reference information:</b> For a complete understanding of the OSA-Express management data provided by the the OSA-Express Direct subagent, see <i>IBM</i> @server <i>zSeries 990 Open Systems Adapter-Express Customer's Guide and Reference</i> , SA22-7935.	
IP Services: Event trace enhancements		
	<b>Description:</b> The event trace functions (using Component Trace) are enhanced in the following ways:	
	<ul> <li>IPv6 addresses can be specified on the IPADDR trace option keyword to execute traces on IPv6 addresses.</li> </ul>	
	<ul> <li>Captured traces can be further analyzed in a variety of ways by using IPCS.</li> <li>Support is added for IPv4 address prefix</li> </ul>	
1	<ul> <li>Support is added for IPV4 address prenx.</li> <li>The SOCKAPI event trace option was removed from the ALL group option.</li> </ul>	
I	A new event trace option called ND is added for the neighbor discovery function	
I	When change was introduced: z/OS V1R4.	
I	Reference information: z/OS Communications Server: IP Diagnosis Guide.	

## **IP Services: Netstat enhancements**

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**Description:** The Netstat command displays the status of a local host. It has changed as follows:

- It displays the IP configuration setting with the value of Yes or No instead of the value of 00001 or 00000.
- The new INTFName/-K filter is added to the DEVLINKS/-d report to provide the response on the specified link or interface name.
- The ALL/-A, BYTEINFO/-b, and TELNET/-t reports are enhanced to support 64-bit counters when a long format report is requested.
- For TSO NETSTAT, when a long format report is requested, no message identifiers are displayed in the output for those reports that have been modified for IPv6 support. If you have developed REXX programs that issue the NETSTAT command under TSO and parse the output lines based on message identifiers, refer to the TSO NETSTAT command output parsing consideration in *z/OS Communications Server: IP System Administrator's Commands* for more information.
- The following output control options are now available:

#### FORMAT/-M SHORT

Displays the output in the existing IPv4 format.

## FORMAT/-M LONG

Displays the output in the format that supports IPv6 addresses.

These output control options allow the stack to be configured for IPv4-only operation (not IPv6-enabled), while still allowing you to modify programs that rely on Netstat output to update and test new versions of these programs with IPv6-enabled output from Netstat.

- A stack-wide output format parameter (FORMAT SHORT/LONG) can be specified on the IPCONFIG profile statement. It will instruct Netstat to produce output in one of the above formats.
- In addition to the stack-wide FORMAT parameter, a Netstat command line option FORMAT/-M with keyword SHORT/LONG is supported to override the stack-wide parameter. Whenever a user specifies the Netstat command line format option, it overrides the stack-wide format parameter on an IPv4-only stack.

When change was introduced: z/OS V1R4.

**Reference information:** None. (No customer action is necessary to exploit this enhancement. However, there is a migration action related to the changed IP configuration setting.)

## IP Services: TCP/IP support for Simple Network Time Protocol (SNTP)

**Description:** TIMED is a TCP/IP daemon used to provide the time. TIMED gives the time in seconds since midnight 1 January 1900. SNTPD is a new TCP/IP daemon that is also used to provide the time in order to synchronize a network of (S)NTP clients. Simple network time protocol provides for a more accurate time. SNTPD does not replace TIMED but it is the preferred server for synchronizing time in the network.

#### When change was introduced: z/OS V1R4.

## **Reference information:**

- z/OS Communications Server: IP Migration and Exploitation
- z/OS Communications Server: IP Configuration Guide

I	• z/OS Communications Server: IP Configuration Reference		
IP Services: IPv6 support			
	<ul> <li>Description: The IPv6 protocol is now supported in addition to the IPv4 protocol. The following applications and commands have been enhanced to support the IPv6 protocol:</li> <li>FTP server and client</li> <li>The TSO and z/OS UNIX Ping commands</li> <li>The TSO and z/OS UNIX Traceroute commands</li> <li>Some of the Netstat command reports</li> <li>The z/OS UNIX rexec client</li> <li>The inetd, otelnetd, orshd, and orexecd servers</li> <li>TCP/IP IPCS formatters</li> <li>The event trace (CTRACE) and packet trace</li> <li>Note that Open Systems Adapter (OSA) QDIO adapters and new OSA licensed</li> </ul>		
1	the host.		
I	When change was introduced: z/OS V1R4.		
         	<ul> <li>Reference information:</li> <li>z/OS Communications Server: IP Migration and Exploitation</li> <li>z/OS Communications Server: IP Configuration Guide</li> <li>z/OS Communications Server: IP Configuration Reference</li> <li>z/OS Communications Server: IP System Administrator's Commands</li> <li>z/OS Communications Server: IP Diagnosis Guide</li> <li>z/OS Communications Server: IP User's Guide and Commands</li> <li>z/OS Communications Server: IPv6 Network and Application Design Guide</li> </ul>		
IP Services: In	trusion Detection Services		
           	<b>Description:</b> Support for Traffic Regulation Management (TRM) was provided in OS/390 V2R10 Communications Server for regulation of TCP connections on a port basis. TRM is now part of Intrusion Detection Services (IDS). The TCP TR support allows management by application (for example, bound port and destination IP address). This allows different policies to be defined for each application, even though they may be bound to the same destination port. For example, TN3270 and otelnet can both use port 23. In OS/390 V2R10 Communications Server, TRM managed port 23 as a single entity even though the characteristics of the TN3270 and otelnet applications are very different. In z/OS V1R2 Communications Server, TCP TR has the capability to manage these applications separately with a policy unique to each application.		
     	<ul> <li>Additionally, the following new support is provided in z/OS V1R2 Communications Server:</li> <li>Traffic regulation for UDP receive queues</li> <li>Attack detection, reporting, and prevention</li> <li>Scan detection and reporting</li> <li>Tracing and reporting</li> </ul>		
   	The new IDS policy is available only on LDAP servers. TCP TR policy is also supported in LDAP as part of the IDS policy, although the older, flat-file coding for TR policy is still supported for the functions introduced in OS/390 V2R10. A TR		

policy is not displayed by the NETSTAT SLAP/-j command. However, if you want to use any of the new intrusion detection and TR support, be aware that the new functions are only available through LDAP policy.

Most of the syslog daemon (syslogd) messages issued by the traffic regulation management daemon (TRMD) were modified in z/OS V1R2 Communications Server. Some messages were deleted and others were added. See *z/OS Communications Server: IP Messages Volume 4 (EZZ-SNM)* for complete information about the messages associated with the Intrusion Detection Services function.

There is a migration action associated with this enhancement.

When change was introduced: z/OS V1R2.

#### **Reference information:**

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- z/OS Communications Server: IP Migration and Exploitation
- z/OS Communications Server: IP Configuration Guide

## IP Services: Sysplex Distributor policy enhancements

**Description:** In OS/390 V2R10 Communications Server, the Sysplex Distributor was enhanced to select a target stack depending on the quality of service (QoS) fraction and workload manager (WLM) weight. In z/OS V1R2 Communications Server, the Sysplex Distributor is further enhanced to calculate additional QoS fractions per service level, thus allowing the Sysplex Distributor to provide a more efficient and fair distribution of connections.

#### When change was introduced: z/OS V1R2.

#### **Reference information:**

- z/OS Communications Server: IP Migration and Exploitation
- z/OS Communications Server: IP Configuration Guide
- z/OS Communications Server: IP Configuration Reference

## **IP Services: Policy Agent enhancements**

**Description:** The policy schema supported by the Policy Agent for defining policy objects on an LDAP server is enhanced to better match the current RFC draft. Schema enhancements include:

- Improved LDAP retrieval performance
- Tighter integration between policy objects
- The ability to identify any LDAP object as belonging to the generic policy class
- Better search filtering and the ability to differentiate between rule-specific and reusable policy conditions and actions
- Support for the MODIFY commands to immediately refresh policies and to change or query the Policy Agent log level, trace level, or debug level

When change was introduced: z/OS V1R2.

#### **Reference information:**

- z/OS Communications Server: IP Migration and Exploitation
- z/OS Communications Server: IP Configuration Guide
- z/OS Communications Server: IP Configuration Reference

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## **IP Services: OROUTED to OMPROUTE migration**

**Description:** The OROUTED routing daemon supports RIP1 and RIP2 protocols. The OMPROUTE routing daemon also supports RIP1 and RIP2, as well as Open Shortest Path First (OSPF) protocols. A new function is added to OROUTED (invoked with the -c parameter) to make migration to OMPROUTE easier. With the -c parameter, OROUTED takes the routes, interfaces, and filters that currently exist and creates a file that may be used as an OMPROUTE profile. Even though some manual changes to the OMPROUTE profile may be required, this function saves time and effort by having OROUTED perform the configuration conversion. With -c as a start parameter, OROUTED does not modify the IP route table and does not send RIP messages, receive RIP messages, or process RIP information. When change was introduced: Migration to OMPROUTE started in OS/390 V2R6. A migration tool became available in z/OS V1R4. **Reference information:** • For migration steps, see z/OS Communications Server: IP Migration and Exploitation. · For information about the configuration and functional differences between OROUTED and OMPROUTE, see z/OS Communications Server: IP Configuration Reference. IP Services: OMPROUTE to allow RIP1 and RIP2 packets over the same interface Description: Communications Server now allows the OMPROUTE routing daemon to receive RIP1 and RIP2 packets over the same RIP interface. This eases migration in scenarios where networks are being migrated between RIP1 and RIP2 and it allows OMPROUTE to operate with routers that provide different levels of RIP updates. When change was introduced: z/OS V1R2. **Reference information:** • z/OS Communications Server: IP Migration and Exploitation z/OS Communications Server: IP Configuration Guide • z/OS Communications Server: IP Configuration Reference IP Services: Replaceable static routes **Description:** Static routes can be defined as replaceable in BEGINROUTES blocks. As of z/OS V1R2 Communications Server, dynamic routes learned from the OMPROUTE daemon can replace these replaceable static routes. TCP/IP remembers replaceable static routes that have been replaced so they can be re-added to the routing table if the dynamic routes that replaced them are removed. If a static route is not defined as replaceable, it will behave as it did in previous

When change was introduced: z/OS V1R2.

releases and will override all other routes.

#### **Reference information:**

• For migration steps, see *z/OS Communications Server: IP Migration and Exploitation.* 

 For information about coding the new REPLACEABLE parameter on the BEGINROUTES statement for OMPROUTE, see z/OS Communications Server: L IP Configuration Reference. L IP Services: OMPROUTE wildcard IP addressing enhancement I **Description:** The wildcard IP address processing provided by the OMPROUTE routing daemon is enhanced. When OMPROUTE matches interfaces learned from I the TCP/IP stack to wildcard interface definitions in its configuration file, it considers I a wildcard definition whose NAME parameter matches the interface's link name to be a better match than one whose NAME parameter does not match. I When change was introduced: z/OS V1R2. I Reference information: None. (No customer action is necessary to exploit this I I enhancement.) **IP Services: Additional RIP filter for OMPROUTE** L I Description: The OMPROUTE routing daemon introduces a new RIP input filter that allows you to ignore RIP routing table broadcasts from a particular gateway. L When change was introduced: z/OS V1R2. T **Reference information:** L z/OS Communications Server: IP Migration and Exploitation L • z/OS Communications Server: IP Configuration Reference Т IP Services: OSPF MD5 authentication I Description: The OMPROUTE routing daemon implements the Open Shortest Path I First (OSPF) protocol and the Routing Information Protocol (RIP). As of z/OS V1R2, L OMPROUTE can participate in router networks implementing Message Digest (MD5) cryptographic authentication, which is superior to the simple password I method previously available. In addition, you can now define authentication type by interface instead of only by area as in previous releases. This allows greater I flexibility in configuring authentication and eliminates the need to consider I authentication types when defining OSPF areas. L When change was introduced: z/OS V1R2. L Reference information: z/OS Communications Server: IP Migration and I I Exploitation. IP Services: Native socket API TCP\_NODELAY support T Description: The Nagle algorithm (RFC 896) can be toggled on and off at the I socket layer. Turning off the Nagle algorithm can result in better response time for L some interactive applications. The TCP NODELAY option is now supported on I SETSOCKOPT and GETSOCKOPT API calls for the following APIs: Т TCP/IP C-sockets (non-UNIX sockets) L Sockets Extended assembler macro API L Sockets Extended Call API L • CICS sockets (both call and C) Т When change was introduced: z/OS V1R2. I **Reference information:** 

l	• z/OS Communications Server: IP Migration and Exploitation
l	• z/OS Communications Server: IP Application Programming Interface Guide
I	• z/OS Communications Server: IP CICS Sockets Guide
IP Services: Ne	etstat filter enhancements
	<b>Description:</b> The Netstat commands have been enhanced to allow a choice to include or exclude the TN3270 server connections from the netstat ALL/-A, ALLCONN/-a, CONN/-c, BYTEINFO/-b, CLIENTS/-e, and SOCKETS/-s reports. The following Netstat entries include new and changed filter options:
1	<ul> <li>TSO NETSTAT command: ALL, ALLCONN, BYTEINFO, CLIENTS, CONN, and SOCKETS options</li> </ul>
	<ul> <li>z/OS UNIX onetstat/netstat command: -A, -a, -b, -c, e, and -s options</li> </ul>
	<ul> <li>MVS D TCPIP,,NETSTAT command: ALLCONN, BYTEINFO, CONN, and SOCKETS options</li> </ul>
	In addition, the existing filter support for CLIENT/-E, IPADDR/-I, and PORT/-P is enhanced to work for netstat SOCKETS/-s so that the netstat SOCKETS/-s report can provide the response on the specified client name, IP address, or port number. The existing filter support for IPADDR/-I, and PORT/-P is enhanced to work for netstat ALL/-A so that the netstat ALL/-A report can provide the response on the specified IP address or port number.
	Controlling access to Netstat command output can be added by defining security product resources. You can define generic or discrete profiles in the SERVAUTH class to control users' access to the Netstat command output. See the Netstat command section of <i>z/OS Communications Server: IP System Administrator's Commands</i> for more information about defining these security product resources.
I	When change was introduced: z/OS V1R2.
	<ul> <li>Reference information:</li> <li>z/OS Communications Server: IP Migration and Exploitation</li> <li>z/OS Communications Server: IP System Administrator's Commands</li> <li>z/OS Communications Server: IP Configuration Reference</li> </ul>
IP Services: Ne	etstat performance counters
	<b>Description:</b> The Netstat commands have been enhanced to show performance characteristics and identify performance problems. The following netstat entries include new and changed performance options:
l	<ul> <li>TSO NETSTAT command: ALL, DEVLINKS, HELP, and STATS options</li> </ul>
	<ul> <li>z/OS UNIX onetstat/netstat command: -A, -d, -s, and -? options</li> </ul>
	<ul> <li>MVS D TCPIP,,NETSTAT command: STATS option; and MVS D TCPIP,,HELP command: STATS option</li> </ul>
I	When change was introduced: z/OS V1R2.
	<ul> <li>Reference information:</li> <li>z/OS Communications Server: IP Migration and Exploitation</li> <li>z/OS Communications Server: IP System Administrator's Commands</li> <li>z/OS Communications Server: IP Configuration Reference</li> </ul>

## IP Services: Restrict access to Netstat commands

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**Description:** There is a new way to control access to the Netstat command at both the overall command level and command option level. You can permit or disallow user access to specific Netstat options or resources

#### When change was introduced: z/OS V1R2.

#### **Reference information:**

- z/OS Communications Server: IP Migration and Exploitation
- z/OS Communications Server: IP System Administrator's Commands
- z/OS Communications Server: IP Configuration Guide

## IP Services: z/OS UNIX RSHD Kerberos support

**Description:** Kerberos is a network authentication protocol. It is designed to provide strong authentication for client/server applications using secret-key cryptography. The Kerberos support provides greater security for certain applications and allows the use of these applications to secure data traffic in the network.

#### When change was introduced: z/OS V1R2.

#### **Reference information:**

- z/OS Communications Server: IP Migration and Exploitation
- z/OS Communications Server: IP Configuration Reference

## **IP Services: Application-driven policy classification**

**Description:** Based on the content of data being delivered from a given server, users can assign multiple quality of service (QoS) levels for outgoing traffic that an application generates. For example, a user can assign specific QoS levels to selected Web addresses that the IBM HTTP Server processes. This allows users to prioritize the outgoing traffic for the IBM HTTP Server based on the business priorities associated with different Web addresses.

Language Environment and z/OS UNIX API SENDMSG has a new option called **ip\_qos\_classification\_data**. It is for ancillary data. The sendmsg() API extensions are only applicable to the Language Environment and z/OS UNIX APIs. They are not supported for some APIs, including the EZASMI macro API, Call instruction API, REXX sockets, PASCAL sockets, CICS sockets, and IMS sockets.

#### When change was introduced: z/OS V1R2.

#### **Reference information:**

- z/OS Communications Server: IP Migration and Exploitation
- z/OS Communications Server: IP Configuration Reference

## IP Services: Virtual LAN priority tagging

**Description:** Quality of Service (QoS) user priorities assigned to IP packets based on policy definitions can be mapped to user priorities on directly-attached LANs. This means when the Type of Service (ToS) byte, also known as the Differentiated Services (DS) field, is assigned to outbound IP packets using service policy definitions, the ToS/DS values can be mapped to user priorities for directly-attached LANs. This allows assigned user priorities to be propagated through such networks, resulting in no loss of priority information for data being served by z/OS.

I	When change was introduced: z/OS V1R2.
   	<ul> <li>Reference information:</li> <li>z/OS Communications Server: IP Migration and Exploitation</li> <li>z/OS Communications Server: IP Configuration Reference</li> </ul>
IP Services: Pa	acket trace enhancements
       	<ul> <li>Description: In z/OS V1R2 Communications Server, the CTRACE packet trace formatter was rewritten to provide additional reports and outputs, including:</li> <li>A one-line summary report</li> <li>Rewritten formatters for application packet data</li> <li>Additional statistical reports</li> <li>Reassembly of IP packets session reports</li> <li>Reformatted trace data for input to Network Associates' Sniffer Pro</li> <li>Export of trace data that can be used for additional analysis</li> </ul>
I	When change was introduced: z/OS V1R2.
I	Reference information: z/OS Communications Server: IP Diagnosis Guide.
IP Services: Fa	ast connection reset for Sysplex Distributor
         	<b>Description:</b> The fast connection reset after system failure function is an enhancement to Sysplex Distributor (introduced in OS/390 V2R10) and VIPA Takeover (introduced in OS/390 V2R8). This enhancement allows the client stack to notify the client application of a system failure of a sysplex target stack for the distributed DVIPAs being maintained by the routing stack. This improves availability and allows quicker initiation of connection failure recovery. This function only applies to the sysplex stacks for the distributed DVIPAs being maintained by VIPAs being maintained by the routing stack.
I	When change was introduced: z/OS V1R2.
1	<b>Reference information:</b> None. (No customer action is necessary to exploit this enhancement.)
IP Services: Hi	perSockets
       	<b>Description:</b> HiperSockets is a zSeries hardware feature that provides very high-speed, low-latency IP message passing between logical partitions (LPARs) on the same central electronics complex (CEC). (Latency is the time interval between the instant when a call for data is initiated and the instant when the data transfer is completed.) HiperSockets is an interface to device driver software and is similar to the Queued Direct I/O (QDIO) interface used with the OSA-Express adapter with Fast Ethernet and Gigabit Ethernet.
I	When change was introduced: z/OS V1R2.
     	<ul> <li>Reference information:</li> <li>z/OS Communications Server: IP Migration and Exploitation</li> <li>z/OS Communications Server: IP Configuration Reference</li> <li>z/OS Communications Server: IP Configuration Guide</li> <li>z/OS Communications Server: SNA Operation</li> <li>z/OS Communications Server: SNA Resource Definition Reference</li> </ul>

IP Services: Efficient routing using HiperSockets Accelerator		
   	<b>Description:</b> HiperSockets Accelerator support allows you to concentrate external network traffic over a single OSA-Express QDIO connection and then accelerates (speeds up) the routing over a HiperSockets link, bypassing the TCP/IP stack (IP forwarding process).	
I	When change was introduced: z/OS V1R2.	
   	<ul> <li>Reference information:</li> <li>z/OS Communications Server: IP Migration and Exploitation</li> <li>z/OS Communications Server: IP Configuration Reference</li> <li>z/OS Communications Server: IP Configuration Guide</li> </ul>	
IP Services: Connection load balancing using Sysplex Distributor in a		
   	<b>Description:</b> Sysplex Distributor can now perform the Service Manager function for the Cisco Multi-Node Load Balancer (MNLB) for any desired distributable Dynamic VIPAs. You can use a combination of the Sysplex Distributor and Cisco's forwarding agents to provide workload balancing.	
I	When change was introduced: z/OS V1R2.	
   	<ul> <li>Reference information:</li> <li>z/OS Communications Server: IP Migration and Exploitation</li> <li>z/OS Communications Server: IP Configuration Reference</li> <li>z/OS Communications Server: IP Configuration Guide</li> </ul>	
IP Services: CICS sockets listener enhancements		
   	<b>Description:</b> The CICS sockets listener is enhanced to allow more flexibility in scheduling CICS transactions using TCP/IP sockets while minimizing changes required by client applications.	
I	When change was introduced: z/OS V1R2.	
   	<ul> <li>Reference information:</li> <li>z/OS Communications Server: IP Migration and Exploitation</li> <li>z/OS Communications Server: IP CICS Sockets Guide</li> </ul>	
IP Services: SMF recording enhancements		
   	<b>Description:</b> System management facilities (SMF) recording is enhanced, providing additional SMF information about stack and application processing and providing it in a more standardized format. This enhancement introduces format type 119 resources.	
I	When change was introduced: z/OS V1R2.	
   	<ul> <li>Reference information:</li> <li>z/OS Communications Server: IP Migration and Exploitation</li> <li>z/OS MVS System Management Facilities (SMF)</li> <li>z/OS Communications Server: IP Configuration Guide</li> </ul>	

IP Services: SMTP exit to filter unwanted mail		
           	<b>Description:</b> z/OS V1R2 Communications Server introduces enhancements to the Simple Mail Transfer Protocol (SMTP) exit. If you are using the SMTPPROC application that was supplied with your installation, you can now design an SMTP exit to inspect and filter mail sent through SMTPPROC, thus controlling the influx of unwanted or harmful mail (commonly referred to as spam) into your network. This is a benefit because it allows the exit to refuse these items (based on criteria you define) before they consume processing, storage, and human time resources. Additionally, one of the features of the SMTPPROC program.	
I	When change was introduced: z/OS V1R2.	
     	<ul> <li>Reference information:</li> <li>z/OS Communications Server: IP Migration and Exploitation</li> <li>z/OS Communications Server: IP User's Guide and Commands</li> <li>z/OS Communications Server: IP Configuration Guide</li> <li>z/OS Communications Server: IP Configuration Reference</li> </ul>	
IP Services: In	nprove TCP/IP storage utilization management	
   	<b>Description:</b> Several enhancements provide more effective monitoring and management of storage used by TCP/IP. These enhancements allow you to do the following:	
     	<ul> <li>Monitor TCP/IP storage usage with a new operator command. This command displays the amount of common (CSA) storage and authorized subpool private storage that TCP/IP is utilizing, including high water mark usage to identify peak workload storage utilization. This data can be very helpful in capacity planning for storage.</li> </ul>	
           	• Set limits on the amount of CSA and authorized subpool private storage that TCP/IP can utilize. These limits are automatically monitored by TCP/IP and messages are issued when these resources become constrained. Note that these new limits are not tuning controls for TCP/IP, rather they are defensive controls that can be used to help avoid overall system failures as a result of TCP/IP using excessive amounts of common or private storage. For proper TCP/IP operations, sufficient storage needs to be available. Therefore, it is recommended that users perform a careful examination of their system's TCP/IP storage requirements prior to specifying these storage limits.	
I	When change was introduced: z/OS V1R2.	
   	<ul> <li>Reference information:</li> <li>z/OS Communications Server: IP Migration and Exploitation</li> <li>z/OS Communications Server: IP Configuration Reference</li> </ul>	
IP Services: Enterprise Extender performance enhancements		
   	<b>Description:</b> The performance of Enterprise Extender (EE) is improved by reducing the path length of route lookups for EE traffic when the destination IP address changes.	
I	When change was introduced: z/OS V1R2.	
	<b>Reference information:</b> None. (No customer action is necessary to exploit this enhancement.)	

## **IP Services: Enhanced CLAW packing**

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**Description:** Common Link Access to Workstation (CLAW) support is enhanced to fully exploit the Datagram Packing feature of the Cisco 7200 and 7500 series routers. The support also allows buffer sizes of up to 60 KB. To enable this feature, you must update the CLAW device statement in PROFILE.TCPIP. You must also update the CLAW statement within the Cisco router. You do not need to change anything to operate in nonpacked mode; NONE is the default for the CLAW DEVICE statement and it runs the device in nonpacked mode.

When change was introduced: z/OS V1R2.

## **Reference information:**

- z/OS Communications Server: IP Migration and Exploitation
- z/OS Communications Server: IP Configuration Guide
- z/OS Communications Server: IP Configuration Reference

## IP Services: OSA-Express token ring support

**Description:** Communications Server now supports an OSA-Express with token ring attachment, allowing users of OSA-Express access to either 16 MB or 100 MB token ring networks. Users with access to token ring networks can now take advantage of the highly optimized data-transfer interface of Queued Direct I/O (QDIO). Among the advantages of QDIO are the IP Assist features of Address Resolution Protocol (ARP) Offload, packet filtering, MAC handling by the OSA-Express, OSA-Express routing, and the use of the Self-Timed Interconnect (STI) bus. Prior to this support, users with token ring networks could not use high speed token ring switches because OSA-Express has no token ring attachment and OSA-2 only has support for 4 MB and 16 MB switches.

Communications Server also allows defining the OSA-Express as a LAN Channel Station (LCS) device. This allows you to migrate from your existing OSA token ring attachments to OSA-Express without changing your profile definitions, but without the advantages of QDIO.

When change was introduced: z/OS V1R2.

## **Reference information:**

- z/OS Communications Server: IP Migration and Exploitation
- z/OS Communications Server: IP Configuration Guide
- z/OS Communications Server: IP Configuration Reference
- zSeries: OSA-Express Customer's Guide and Reference
- IBM @server zSeries 990 Open Systems Adapter-Express Customer's Guide and Reference, SA22-7935
- IP Services: Changes to EZAZSSI

**Description:** The restartable VMCF/TNF sample started procedure, EZAZSSI, has changed. The nodename parameter, P, now defaults to the value of the z/OS system symbol &SYSNAME. If the name you are currently specifying for the P parameter when you issue the S EZAZSSI command is the same as the &SYSNAME value, then you no longer have to specify the P parameter when starting EZAZSSI

- When change was introduced: z/OS V1R2.
- Reference information:

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- z/OS Communications Server: IP Migration and Exploitation
- z/OS Communications Server: IP Configuration Guide

## **IP Services: IPSec enhancements**

**Description:** Path maximum transmission unit (MTU) discovery is now allowed when using IPSec connections. This enhancement allows the optimization of the size of the data sent and the reduction of fragmentation, reassembly, and retransmissions.

When change was introduced: z/OS V1R2.

## **Reference information:**

- z/OS Communications Server: IP Migration and Exploitation
- z/OS Communications Server: IP Configuration Guide

## IP Services: TCP configuration options

**Description:** The TCP TIMESTAMP option and the FINWAIT2 configurable timer option are added to the TCPCONFIG profile statement.

When change was introduced: z/OS V1R2.

#### **Reference information:**

- z/OS Communications Server: IP Migration and Exploitation
- z/OS Communications Server: IP Configuration Guide
- z/OS Communications Server: IP Configuration Reference

## **IP Services: Network Print Facility move**

**Description:** Network Print Facility (NPF) redirects output from printers managed by LU0, LU1, LU3, JES2, and JES3 to printers on any TCP/IP host. NPF was previously shipped as an optional feature. In z/OS V1R4, NPF is merged into the Communications Server base element. As a result, you no longer have to order a feature to obtain this function; the function is included in all orders because base elements are included in all orders. This change will not affect your operations.

When change was introduced: z/OS V1R4.

**Reference information:** None. (No customer action is necessary to exploit this enhancement.)

## IP Services: GUIs to configure policies

Description: There are two new GUIs in z/OS V1R2 to configure policies:

- zIDS Manager for z/OS Communications Server. zIDS is a policy manager GUI that enables centralized configuration of Intrusion Detection policy for z/OS V1R2 using LDAP as a policy repository. It provides a user-friendly interface with help panels to prevent network administrators from having to know LDAP policy schema and the complexity of directly writing to the LDAP server. Its ease of use and centralized management allow faster deployment of IDS policy that, as a result, can better protect the integrity of the system.
  - *Quality of Service Manager for z/OS Communications Server.* This download enables networking QoS policy management across data centers, assigning a variety of QoS service levels to different traffic. Network administrators use this tool to generate QoS policy and have that policy stored in an LDAP server. The LDAP server can then be read by Policy Agent to configure policies.
| I               | When change was introduced: z/OS V1R2.   |
|-----------------|--|
| <br>            | Reference information:<br>http://www.ibm.com/software/network/commserver/downloads/.                         |
| IP Services: F  | TP server and client enhancements  |
| 1               | <b>Description:</b> The following File Transfer Protocol (FTP) functions are new in z/OS V1R4:               |
| 1               | <ul> <li>FTP support for substitution characters during EBCDIC/ASCII single-byte<br/>translations</li> </ul> |
| 1               | Enhanced FTP activity logging  |
| I               | Changed behavior of login failure replies  |
| I               | <ul> <li>Support for Chinese standard GB18030 provided by codepage IBM-5488</li> </ul>                       |
| I               | Enhancements to FTP server user exits  |
| I               | IPv6 support for FTP   |
| I               | The following FTP functions are new in z/OS V1R2:  |
| 1               | Enhancing FTP server security  |
|                 | FTP Restrict DIR output  |
|                 | FTP Surrogate RACF support   |
|                 | Socksify FTP client  |
|                 | ILS enablement for FIP   |
| 1               | Kerberos support for the FTP server and client   |
| 1               | FIP ISPF statistics  |
|                 | User-level FTP server options  |
|                 | FIP Stream mode restart     FIP DEC undetee  |
|                 | • FTP RFC updates  |
|                 | • FTP Native ASCII support   |
|                 | • FTP catalog access   |
| 1               | FIP trace enhancements   |
| I               | When change was introduced: z/OS V1R2 or z/OS V1R4, as stated above.   |
|                 | <b>Reference information:</b> <i>z/OS Communications Server: IP Migration and Exploitation.</i>              |
| IP Services: To | elnet server and client enhancements   |
| I               | Description: The following Telnet functions are new in z/OS V1R4:  |
| I               | <ul> <li>Port qualification by link name or destination IP address</li> </ul>                                |
| I               | Printer enhancements   |
| I               | Parameter placement enhancements   |
| I               | <ul> <li>New DEBUG option to suppress the connection dropped error messages</li> </ul>                       |
| I               | New QINIT option for default applications  |
| I               | LU mapping enhancements  |
| I               | TN3270 SSL to use TLS  |
| I               | The following Telnet functions are new in z/OS V1R2:   |
| I               | <ul> <li>z/OS UNIX Telnet (otelnetd) server – Kerberos support</li> </ul>                                    |
|                 |  |

I	•	TN3270 diagnostics enhancements
I	•	TN3270E RFC 2355 SNA extensions
I	•	TN3270 profile and display enhancements
I	•	Express Logon Feature using TN3270E Server on z/OS
I	w	Vhen change was introduced: z/OS V1R2 or z/OS V1R4, as stated above.
 	R E	<b>teference information:</b> <i>z/OS Communications Server: IP Migration and</i> Exploitation.
I	IP Services: SNN	MP server and client enhancements
	<b>D</b> քս	<b>Description:</b> The following Simple Network Management Protocol (SNMP) unctions are new in z/OS V1R2:
Ι	•	SNMP security enhancements
Ι	•	SNMP Community MIB
Ι	•	SNMP Dynamic VIPA MIB enhancements
Ι	•	SNMP OSA-Express MIB enhancements
I	•	SNMP TCP/IP performance counters
I	w	Vhen change was introduced: z/OS V1R2.
 	R E	<b>leference information:</b> <i>z</i> /OS Communications Server: IP Migration and Exploitation.
I	IP Services: BIN	D-based DNS name server enhancements
	D m 4. se na st B C	<b>Description:</b> In z/OS V1R2, a port of the BIND-based version 9 name server was nade. It is known as the BIND 9-based name server and is different from the BIND .9.3-based name server that existed in previous releases. Both modes of the name erver are available through one command interface. The BINDF 9 mode of the ame server allows for greater security, has IPv6 support, and brings an industry tandard Dynamic DNS (DDNS) to the zSeries platform. However, when run in BIND 9 mode, the name server does not have DNS/WLM capability, nor is it ompatible with prior Dynamic DNS (DDNS) support.
     	Ir al re re si	n z/OS V1R4, the BIND 9 name server is upgraded to the BIND 9.2 level. This llows DNS communication from server-to-server and from client- (utilities and esolvers) to-server over IPv6 connections, with additional configuration options elating to IPv6 connections and server tuning. In z/OS V1R2, the name server upported IPv6 resource records but was unable to communicate over IPv6.
I	W	Vhen change was introduced: z/OS V1R2 and z/OS V1R4, as stated above.
 	R E	<b>Reference information:</b> <i>z/OS Communications Server: IP Migration and</i> Exploitation.
	SNA Services: A	PPN trace enhancement

**Description:**Communications Server introduces an enhancement to APPN tracing to aid in accurately diagnosing problems with an APPN LU-LU session. The enhancement consists of a new subtrace option (TGVC) that traces the TG Vectors sent for Request Route, Recompute Route, Request TG Vectors, and Cache Data messages.

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I	When change was introduced: z/OS V1R5.
I	Reference information:
I	• z/OS Communications Server: SNA Operation
I	• z/OS Communications Server: SNA Migration and Exploitation
SNA Services:	CSDUMP command enhancements
   	<b>Description:</b> Prior to z/OS V1R5, the MODIFY CSDUMP command set triggers to take dumps but it did not issue a message to indicate the reason of the dump. Furthermore, there was no way to display current triggers or to allow the removal of a trigger when it was no longer needed.
	Communications Server enhances the CSDUMP command in the following ways:
1	<ul> <li>The CSDUMP processing will issue a new message that indicates the reason why a CSDUMP was triggered.</li> </ul>
	• The MODIFY CSDUMP command is also enhanced to allow the option to remove any or all of the existing CSDUMP triggers.
1	<ul> <li>A new DISPLAY CSDUMP command is available to display the current CSDUMP triggers.</li> </ul>
I	When change was introduced: z/OS V1R5.
I	Reference information:
I	z/OS Communications Server: SNA Operation
1	z/OS Communications Server: SNA Migration and Exploitation
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SNA Services:	DLUR message enhancements
SNA Services:	<b>DLUR message enhancements</b> <b>Description:</b> Communications Server introduces new messages for DLUR connectivity:
SNA Services:	<ul> <li>DLUR message enhancements</li> <li>Description: Communications Server introduces new messages for DLUR connectivity:</li> <li>DLUS accounting messages</li> </ul>
SNA Services:	<ul> <li>DLUR message enhancements</li> <li>Description: Communications Server introduces new messages for DLUR connectivity:</li> <li>DLUS accounting messages</li> <li>New messages are issued when a DLUR served physical unit begins or ends communication with its DLUS. In addition, if an INOP occurs that results in the inactivation of the SSCP to PU session, a new message is issued to identify the DLUR of the PU.</li> </ul>
SNA Services:	<ul> <li>DLUR message enhancements</li> <li>Description: Communications Server introduces new messages for DLUR connectivity:</li> <li>DLUS accounting messages</li> <li>New messages are issued when a DLUR served physical unit begins or ends communication with its DLUS. In addition, if an INOP occurs that results in the inactivation of the SSCP to PU session, a new message is issued to identify the DLUR of the PU.</li> <li>DLUS serviceability aid</li> </ul>
SNA Services:	<ul> <li>DLUR message enhancements</li> <li>Description: Communications Server introduces new messages for DLUR connectivity:</li> <li>DLUS accounting messages</li> <li>New messages are issued when a DLUR served physical unit begins or ends communication with its DLUS. In addition, if an INOP occurs that results in the inactivation of the SSCP to PU session, a new message is issued to identify the DLUR of the PU.</li> <li>DLUS serviceability aid</li> <li>When a negative response is received for a request, such as an ACTLU, DACTLU, ACTPU, or DACTPU, a message group is issued to indicate the failure. This message group begins with IST1139I. Communications Server adds a new message to this message group to identify the name of the DLUR when the resource identified in IST1139I is served by a DLUR.</li> </ul>
SNA Services:	<ul> <li>DLUR message enhancements</li> <li>Description: Communications Server introduces new messages for DLUR connectivity:</li> <li>DLUS accounting messages</li> <li>New messages are issued when a DLUR served physical unit begins or ends communication with its DLUS. In addition, if an INOP occurs that results in the inactivation of the SSCP to PU session, a new message is issued to identify the DLUR of the PU.</li> <li>DLUS serviceability aid</li> <li>When a negative response is received for a request, such as an ACTLU, DACTLU, ACTPU, or DACTPU, a message group is issued to indicate the failure. This message group begins with IST1139I. Communications Server adds a new message to this message group to identify the name of the DLUR when the resource identified in IST1139I is served by a DLUR.</li> <li>When change was introduced: z/OS V1R5.</li> </ul>
SNA Services:	<ul> <li>DLUR message enhancements</li> <li>Description: Communications Server introduces new messages for DLUR connectivity:</li> <li>DLUS accounting messages <ul> <li>New messages are issued when a DLUR served physical unit begins or ends communication with its DLUS. In addition, if an INOP occurs that results in the inactivation of the SSCP to PU session, a new message is issued to identify the DLUR of the PU.</li> <li>DLUS serviceability aid</li> <li>When a negative response is received for a request, such as an ACTLU, DACTLU, ACTPU, or DACTPU, a message group is issued to indicate the failure. This message group begins with IST1139I. Communications Server adds a new message to this message group to identify the name of the DLUR when the resource identified in IST1139I is served by a DLUR.</li> </ul> </li> <li>When change was introduced: z/OS V1R5.</li> <li>Reference information:</li> </ul>
SNA Services:	<ul> <li>DLUR message enhancements</li> <li>Description: Communications Server introduces new messages for DLUR connectivity:</li> <li>DLUS accounting messages</li> <li>New messages are issued when a DLUR served physical unit begins or ends communication with its DLUS. In addition, if an INOP occurs that results in the inactivation of the SSCP to PU session, a new message is issued to identify the DLUR of the PU.</li> <li>DLUS serviceability aid</li> <li>When a negative response is received for a request, such as an ACTLU, DACTLU, ACTPU, or DACTPU, a message group is issued to indicate the failure. This message group begins with IST1139I. Communications Server adds a new message to this message group to identify the name of the DLUR when the resource identified in IST1139I is served by a DLUR.</li> <li>When change was introduced: z/OS V1R5.</li> <li>Reference information:</li> <li>z/OS Communications Server: SNA Messages</li> </ul>
SNA Services:	<ul> <li>DLUR message enhancements</li> <li>Description: Communications Server introduces new messages for DLUR connectivity:</li> <li>DLUS accounting messages <ul> <li>New messages are issued when a DLUR served physical unit begins or ends communication with its DLUS. In addition, if an INOP occurs that results in the inactivation of the SSCP to PU session, a new message is issued to identify the DLUR of the PU.</li> <li>DLUS serviceability aid</li> <li>When a negative response is received for a request, such as an ACTLU, DACTLU, ACTPU, or DACTPU, a message group is issued to indicate the failure. This message group begins with IST1139I. Communications Server adds a new message to this message group to identify the name of the DLUR when the resource identified in IST1139I is served by a DLUR.</li> </ul> </li> <li>When change was introduced: z/OS V1R5.</li> <li>Reference information: <ul> <li>z/OS Communications Server: SNA Messages</li> </ul> </li> </ul>
SNA Services:	<ul> <li>DLUR message enhancements</li> <li>Description: Communications Server introduces new messages for DLUR connectivity:</li> <li>DLUS accounting messages <ul> <li>New messages are issued when a DLUR served physical unit begins or ends communication with its DLUS. In addition, if an INOP occurs that results in the inactivation of the SSCP to PU session, a new message is issued to identify the DLUR of the PU.</li> <li>DLUS serviceability aid <ul> <li>When a negative response is received for a request, such as an ACTLU, DACTLU, ACTPU, or DACTPU, a message group is issued to indicate the failure. This message group begins with IST1139I. Communications Server adds a new message to this message group to identify the name of the DLUR when the resource identified in IST1139I is served by a DLUR.</li> </ul> </li> <li>When change was introduced: z/OS V1R5.</li> <li>Reference information: <ul> <li>z/OS Communications Server: SNA Messages</li> </ul> </li> <li>Enterprise Extender enhancements</li> <li>Description: Communications Server enhances Enterprise Extender (EE) in the following areas:</li> </ul></li></ul>

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A new message has been introduced to inform the operator when a dial fails or a connection INOPs over a virtual routing node (VRN).

Prior to this enhancement, retries for a dial failure or an INOP for an existing connection that was routed over a connection network link would repeatedly fail without the operator knowing what virtual routing node was being used.

#### EE dial usability enhancement for Dynamic PUs

A new type of model PU can be defined for use as the model for dynamic non-connection-network PUs used for Enterprise Extender on the host receiving the dial. This allows the user flexibility in coding certain operands for this type of dynamic PU, which previously used default characteristics.

Prior to this enhancement, having the same set of default characteristics used for each dynamically-created non-connection-network Enterprise Extender PU did not allow the user the flexibility to tailor values such as TG characteristics, the disconnect timer delay, or whether to attempt redial when connections for these dynamic PUs failed.

#### • Multiple VRNs for Enterprise Extender

z/OS V1R2 CS provided an enhancement to allow Enterprise Extender connection networks to span multiple APPN subnetworks and/or NETIDs. In z/OS V1R2 CS, you were limited to one local and one global connection network for Enterprise Extender connectivity. Communications Server lifts this restriction. In addition, IPADDR (representing the local static VIPA address to be used for this Enterprise Extender connection) or HOSTNAME (representing the name to be resolved into the local static VIPA address) may now be coded on the Enterprise Extender GROUP definition statement. This allows Enterprise Extender connections to communicate from this host through multiple static VIPAs.

#### IPv6 and firewall support

Communications Server provides the following capabilities:

- Support is added to enable the use of IPv6 addressing for Enterprise Extender connections.
- The capability to specify a hostname, instead of an IP address for Enterprise Extender definitions, is now provided. The remote endpoint receives the partner's hostname and performs name-to-address resolution on the hostname to obtain the correct IP address for Enterprise Extender connection establishment in a network where firewalls and network address translation is used. The ability to exchange hostnames, instead of explicit IP addresses, allows Enterprise Extender nodes to co-exist in a network where network address translation is used.

A new option, HOSTNAME, can be specified on definitions for the **local** host by the following:

- Start option
- GROUP in XCA major node

HOSTNAME can continue to be specified on definitions for the remote host on the PATH statement in the switched major node. The value specified for HOSTNAME on the PATH statement must now be no longer than 64 characters, however.

The use of HOSTNAME is not limited to Global Virtual Routing Nodes (GVRNs), but can also be used for local VRN connections and even predefined connections. The hostname processing is available with both IPv4 and IPv6 protocols.

• New buffer pools

   		Two new buffer pools, T1BUF and T2BUF, have been added. Within the HPR-RTP component and when applicable, a T1BUF or T2BUF will be acquired in lieu of a TIBUF. Therefore, the usage of the T1BUF and T2BUF pools will be inversely proportional to the usage of the TIBUF pool.
 		The default values assigned to these two pools are intentionally conservative; therefore, monitoring the usage of these pools is recommended.
   		You can use T1BUF regardless of whether you are using Enterprise Extender. T2BUF, however, exclusively supports Enterprise Extender over an QDIO/iQDIO device driver.
   		You can monitor your buffer pool storage by using the DISPLAY BFRUSE command. You may modify the buffer pools to use your own definitions or you may choose to use the defaults.
I		When change was introduced: z/OS V1R5.
I		Reference information:
I		<ul> <li>z/OS Communications Server: IP Configuration Guide</li> </ul>
I		<ul> <li>z/OS Communications Server: IP Configuration Reference</li> </ul>
I		<ul> <li>z/OS Communications Server: SNA Resource Definition Reference</li> </ul>
I		<ul> <li>z/OS Communications Server: SNA Operation</li> </ul>
I		<ul> <li>z/OS Communications Server: SNA Network Implementation Guide</li> </ul>
I		• z/OS Communications Server: IP System Administrator's Commands
I		• z/OS Communications Server: SNA Messages
I		• z/OS Communications Server: SNA Migration and Exploitation
I	SNA Services:	RTP display enhancement
   		<b>Description:</b> Communications Server enhances the D NET,RTPS command. This enables an operator to filter the HPR pipe displays and limit the output of the display.
 		New filters were added to allow for displaying RTPS by characteristics associated with the first hop:
I		TG number
I		• CPNAME
I		Adjacent Link Station name
I		When change was introduced: z/OS V1R5.
 		<b>Reference information:</b> This improvement is automatically implemented and you do not need to reference another document.
	SNA Services: enhancements	Session setup and problem determination
		<ul> <li>Description: Communications Server provides three areas of enhancement for session setup and problem determination:</li> <li>DSIRFMSG start option         Enhances the ability to receive the IST663I message group when the search to locate a session partner fails. DSIRFMSG controls whether the IST663I message group is displayed for searches that may not result in a session being established, such as searches that result when an application program issues INQUIRE OPTCD=APPSTAT.     </li> </ul>

 	<ul> <li>Allow non-sysplex network nodes (NNs) for generic resource (GR) end nodes (ENs)</li> </ul>
   	This enhancement allows the generic resource function on an end node to continue to operate while being served by a network node that is not in the same (or any) sysplex.
         	Prior to this enhancement, the network node server for end nodes running generic resource applications had to be connected to the same coupling facility structure as the served end nodes. Two network node servers in each sysplex configuration were required to avoid a single point of failure. With this enhancement, you are allowed the flexibility of having a backup network node server that is not connected to the same sysplex as the served end nodes. The applications on the served end nodes continue to support the generic resource function, including session level load balancing.
	SSCPORD search option
   	This search option provides VTAM the ability to search ADJSSCP tables in a specified order. This allows for more granular control over network search order for resources. SSCPORD can be specified as a VTAM start option or in the ADJSSCP table as an operand on the NETWORK and CDRM statements.
Ι	When change was introduced: z/OS V1R5.
	Reference information:
	<ul> <li>z/OS Communications Server: SNA Resource Definition Reference</li> </ul>
	<ul> <li>z/OS Communications Server: SNA Migration and Exploitation</li> </ul>
SNA Services:	Sift-down support for model major nodes
   	LU definition statements in the model major node. LU keywords may be coded on a new GROUP definition statement so they can sift down to subsequent LU definition statements. This can help to reduce repetitive definitions for model LUs.
Ι	When change was introduced: z/OS V1R5.
I	Reference information:
I	• z/OS Communications Server: SNA Resource Definition Reference
I	<ul> <li>z/OS Communications Server: SNA Migration and Exploitation</li> </ul>
SNA Services:	Storage management enhancements
	<b>Description:</b> Communications Server introduces a new VTAM modify command to allow the IO Buffer pool expansion limit parameter to be modified without the need to recycle VTAM. Prior to this enhancement, when the IO Buffer pool expanded to its defined limit, VTAM stopped sending and receiving data and frequently had to be recycled to recover and to increase the IO buffer pool specifications.
Ι	When change was introduced: z/OS V1R5.
I	Reference information:
I	• z/OS Communications Server: SNA Operation
I	• z/OS Communications Server: SNA Resource Definition Reference
I	• z/OS Communications Server: SNA Migration and Exploitation

## SNA Services: Support for concurrent APING commands

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**Description:** Communications Server includes enhanced support for APING commands, as follows:

- More than one Display APING command can be active concurrently. This means you can now issue a subsequent D APING if the first one has not completed. This benefits testing by allowing the exchange of data over several sessions to various target LUs or to the same LU.
- Enhances the existing Display APINGDTP command to provide information on active sessions with the APINGD transaction program, allowing quicker operator termination of transactions which may be hung.
- Two new commands, DISPLAY APINGTP and MODIFY APINGTP, provide the same control and display capabilities for the APING command transaction program that already existed for the APINGD target transaction program. These new commands allow the setting and displaying of the instance limit for the APING command transaction program, and give the ability to optionally see the session identifier of each session that is being used for APING transactions. The maximum number of sessions that VTAM displays for the D,NET APINGTP command can be limited by the MAX operand.
- Allows suppression of iteration statistics messages.

When change was introduced: z/OS V1R5.

#### **Reference information:**

- z/OS Communications Server: SNA Operation
- z/OS Communications Server: SNA Migration and Exploitation

#### SNA Services: SWNORDER enhancements

**Description:** The SWNORDER and DLRORDER parameters that can be specified as start options or on the XCA and NCP major nodes have been enhanced to allow greater control over PU selection during connection processing. To accomplish this, a second operand has been added to the existing format. This new operand can restrict the selection of a PU for the connection to the value specified by the first operand. By specifying SWNORDER and DLRORDER on the XCA or NCP major nodes, the start option value can be overridden on a line-by-line basis.

Prior to this enhancement, when a node dialed in and the PU was not found using STATNID, VTAM could find a PU using the CPNAME even though SWNORDER was defined to use STATNID first. The connection was established, even though the IDBLK/IDNUM did not match the found PU's definition. Later, when the resource that the PU definition represented attempted a connection, the connection failed because the PU is already in use. This enhancement will eliminate this availability problem.

The MODIFY VTAMOPTS command may be used to change either or both parameters of the SWNORDER or DLRORDER start option while VTAM is active.

When change was introduced: z/OS V1R5.

#### Reference information:

- z/OS Communications Server: SNA Resource Definition Reference
- z/OS Communications Server: SNA Migration and Exploitation

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# **SNA Services: Trace performance enhancements**

**Description:** Communications Server introduces a new VTAM internal trace record, COPY, in the data space trace table. This new trace record contains statistical information about the amount of trace copied to the data space table, ISTITDS1, from the ECSA trace table. This will assist in determining the status and efficiency of the copying of trace records to the trace data space.

**Reference information:** This improvement is automatically implemented and you do not need to reference another document.

#### SNA Services: Transmission subsystem enhancements

**Description:** Communications Server enhances SNA transmission subsystems in the following three areas:

- "HPR resequencing optimization"
- "MAXSLOW parameter for slowdown monitoring"
- "HPDT packing" on page 61

#### HPR resequencing optimization

The HPR resequencing optimization solution in Communications Server significantly improves inbound processing of out-of-order and segmented HPR packets. HPR often uses unreliable or multi-link transmission group connections which tend to drop or cause out-of-order presentation of packets to the destination RTP endpoint.

HPR resequencing optimization also provides for enhanced serviceability of the HPR out-of-order sequence queue with the addition of two new VIT records (DAPT and OOSx). These records are added to the HPR VIT option.

#### When change was introduced: z/OS V1R5.

#### **Reference information:**

- z/OS Communications Server: SNA Operation
- *z/OS* Communications Server: SNA Migration and Exploitation

#### MAXSLOW parameter for slowdown monitoring

**Description:** Communications Server provides new slowdown monitoring and operator awareness for XCA subchannels by introducing a MAXSLOW parameter to allow a second time value. This second time value is the number of seconds an XCA subchannel is allowed to remain in a slowdown condition before the operator is notified of the slowdown condition. The default value for detecting an extended period of an XCA subchannel slowdown is 180 seconds.

Prior to this function, an operator could not determine and was not made aware that an XCA subchannel was in slowdown.

The MAXSLOW parameter is specified on the XCA port definition statement where a CUADDR is specified.

When change was introduced: z/OS V1R5.

#### **Reference information:**

- z/OS Communications Server: SNA Operation
- z/OS Communications Server: SNA Resource Definition Reference
- z/OS Communications Server: SNA Migration and Exploitation

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1	<ul> <li>z/OS Communications Server: SNA Diagnosis Vol 1, Techniques and Procedures</li> <li>z/OS Communications Server: SNA Migration and Exploitation</li> </ul>
SNA Services:	Improve diagnostics for DLC dumps
	<b>Description:</b> During recovery, the dump process may dump additional information requiring fewer problem recreations to obtain problem documentation. For dumps generated from VTAM data link layer (DLC) processes, in some cases, both VTAM and TCP address spaces will be dumped. In Communications Server, the VIT dataspace and TCP/IP CTRACE dataspace may also be included in the dump. This provides a more useful dump.
1	<b>Reference information:</b> This improvement is automatically implemented and you do not need to reference another document.
SNA Services:	OSA performance enhancements
   	Communications Server introduces new TCP/IP configuration parameters that can override the values on the QDIOSTG and IQDIOSTG VTAM start options on a per-device basis. This allows you to better tune the system to optimize Communications Server fixed storage utilization.
I	When change was introduced: z/OS V1R5.
	Reference information:
I	z/OS Communications Server: SNA Operation
	• z/OS Communications Server: IP Configuration Reference
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I	• z/OS Communications Server: SNA Migration and Exploitation
SNA Services:	• z/OS Communications Server: SNA Migration and Exploitation VTAM INOPDUMP enhancement
SNA Services:	<ul> <li>z/OS Communications Server: SNA Migration and Exploitation</li> <li>VTAM INOPDUMP enhancement</li> <li>Description: VTAM INOPDUMP was enhanced in z/OS V1R4 Communications Server. In z/OS V1R5, it is further enhanced by introducing more granular control of whether an inoperative condition (InOp) will result in a dump being taken. This granularity is provided by the introduction of a new, separately controlled InOpCode function. InOpDump continues to control the scope of the resources that are enabled for dumping and InOpCode controls the conditions for which these resources will initiate a dump.</li> </ul>
SNA Services:	<ul> <li>Z/OS Communications Server: SNA Migration and Exploitation</li> <li>VTAM INOPDUMP enhancement</li> <li>Description: VTAM INOPDUMP was enhanced in z/OS V1R4 Communications Server. In z/OS V1R5, it is further enhanced by introducing more granular control of whether an inoperative condition (InOp) will result in a dump being taken. This granularity is provided by the introduction of a new, separately controlled InOpCode function. InOpDump continues to control the scope of the resources that are enabled for dumping and InOpCode controls the conditions for which these resources will initiate a dump.</li> <li>Each InOp reason code used by VTAM is now assigned a dump attribute that can be set to either DUMPENABLE or DUMPDISABLE. The InOpCode function is used to alter and display these dump attributes.</li> </ul>
SNA Services:	<ul> <li>Z/OS Communications Server: SNA Migration and Exploitation</li> <li>VTAM INOPDUMP enhancement</li> <li>Description: VTAM INOPDUMP was enhanced in z/OS V1R4 Communications Server. In z/OS V1R5, it is further enhanced by introducing more granular control of whether an inoperative condition (InOp) will result in a dump being taken. This granularity is provided by the introduction of a new, separately controlled InOpCode function. InOpDump continues to control the scope of the resources that are enabled for dumping and InOpCode controls the conditions for which these resources will initiate a dump.</li> <li>Each InOp reason code used by VTAM is now assigned a dump attribute that can be set to either DUMPENABLE or DUMPDISABLE. The InOpCode function is used to alter and display these dump attributes.</li> <li>When an InOp occurs, a dump is taken only when both of the following conditions are true:</li> </ul>
SNA Services:	<ul> <li>Z/OS Communications Server: SNA Migration and Exploitation</li> <li>VTAM INOPDUMP enhancement</li> <li>Description: VTAM INOPDUMP was enhanced in z/OS V1R4 Communications Server. In z/OS V1R5, it is further enhanced by introducing more granular control of whether an inoperative condition (InOp) will result in a dump being taken. This granularity is provided by the introduction of a new, separately controlled InOpCode function. InOpDump continues to control the scope of the resources that are enabled for dumping and InOpCode controls the conditions for which these resources will initiate a dump.</li> <li>Each InOp reason code used by VTAM is now assigned a dump attribute that can be set to either DUMPENABLE or DUMPDISABLE. The InOpCode function is used to alter and display these dump attributes.</li> <li>When an InOp occurs, a dump is taken only when both of the following conditions are true:</li> <li>The resource is enabled for InOpDump.</li> </ul>
SNA Services:	<ul> <li>Z/OS Communications Server: SNA Migration and Exploitation</li> <li>VTAM INOPDUMP enhancement         Description: VTAM INOPDUMP was enhanced in z/OS V1R4 Communications         Server. In z/OS V1R5, it is further enhanced by introducing more granular control of         whether an inoperative condition (InOp) will result in a dump being taken. This         granularity is provided by the introduction of a new, separately controlled InOpCode         function. InOpDump continues to control the scope of the resources that are         enabled for dumping and InOpCode controls the conditions for which these         resources will initiate a dump.     </li> <li>Each InOp reason code used by VTAM is now assigned a dump attribute that can         be set to either DUMPENABLE or DUMPDISABLE. The InOpCode function is used         to alter and display these dump attributes.</li> <li>When an InOp occurs, a dump is taken only when both of the following conditions         are true:         <ul> <li>The resource is enabled for InOpDump.</li> <li>The dump attribute for the specific InOp reason is DUMPENABLED.</li> </ul> </li> </ul>
SNA Services:	<ul> <li>Z/OS Communications Server: SNA Migration and Exploitation</li> <li>VTAM INOPDUMP enhancement</li> <li>Description: VTAM INOPDUMP was enhanced in z/OS V1R4 Communications Server. In z/OS V1R5, it is further enhanced by introducing more granular control of whether an inoperative condition (InOp) will result in a dump being taken. This granularity is provided by the introduction of a new, separately controlled InOpCode function. InOpDump continues to control the scope of the resources that are enabled for dumping and InOpCode controls the conditions for which these resources will initiate a dump.</li> <li>Each InOp reason code used by VTAM is now assigned a dump attribute that can be set to either DUMPENABLE or DUMPDISABLE. The InOpCode function is used to alter and display these dump attributes.</li> <li>When an InOp occurs, a dump is taken only when both of the following conditions are true:</li> <li>The resource is enabled for InOpDump.</li> <li>The dump attribute for the specific InOp reason is DUMPENABLED.</li> <li>Default dump attributes are provided automatically and internally. These defaults allow the InOpDump function to operate as in previous releases. A handful of InOp codes exists whose dump attribute defaults to DUMPDISABLE but the majority of InOp codes default to DUMPENABLE.</li> </ul>

I	When change was introduced: z/OS V1R5.
   	<ul> <li>Reference information:</li> <li>z/OS Communications Server: SNA Operation</li> <li>z/OS Communications Server: SNA Resource Definition Reference</li> <li>z/OS Communications Server: SNA Migration and Exploitation</li> </ul>
SNA Services:	<ul> <li>IBM @server zSeries 990 HiperSockets enhancements</li> <li>Description: In Communications Server, the following HiperSockets enhancements are available with and exclusive to the IBM @server zSeries 990:</li> <li>Spanned channels</li> <li>Increased number of HiperSockets CHPIDs (iQDIO Internal LANs) The number of Internal LANs that can be configured is increased from 4 to 16.</li> <li>Increased number of supported TCP/IP stacks The number of supported TCP/IP stacks</li> </ul>
         	<ul> <li>iQDIO STAFD codes support this function. The first three were introduced in z/OS V1R2 CS. The last three are new in z/OS V1R5 CS:</li> <li>X'0065' iQDIO Activation Prohibited</li> <li>X'0066' iQDIO CHPID Ambiguous</li> <li>X'0067' iQDIO Subchannel Devices Not Available</li> <li>X'0068' iQDIO CHPID conflicts with sysplex IQDCHPID</li> <li>X'0069' iQDIO processor is not IQD capable</li> <li>X'006A' processor is MCSS capable but internal CHID is not available</li> </ul>
           	<ul> <li>When change was introduced: z/OS V1R5.</li> <li>Reference information: <ul> <li>z/OS Communications Server: IP and SNA Codes</li> <li>z/OS Communications Server: IP Migration and Exploitation</li> <li>z/OS Communications Server: IP Configuration Guide</li> <li>z/OS HCD User's Guide</li> <li>z/OS Communications Server: SNA Migration and Exploitation</li> </ul> </li> </ul>
SNA Services:	Enterprise Extender dial processing enhancements Description: Dial processing for Enterprise Extender connections is enhanced to attempt automatic redial both in the case where an initial dial fails and in the case where an existing connection fails.
   	When change was introduced: z/OS V1R4. Reference information: z/OS Communications Server: SNA Migration and Exploitation.

# SNA Services: Enterprise Extender addressing enhancement for logical lines and PUs

     		<b>Description:</b> The addressing for Enterprise Extender's (EE's) logical lines and physical units (PUs) is enhanced; their assigned element addresses are now extended element addresses. This is reflected in the displays seen with messages IST1863I and IST1864I in response to a DISPLAY VTAMSTOR,RESOURCE or a DISPLAY VTAMSTOR,NETADDR command.
 		This enhancement alleviates the constraint of network addresses for EE by expanding the network address allocations above the 64 KB line, up to 16 MB.
Ι		When change was introduced: z/OS V1R4.
 		<b>Reference information:</b> None. (No customer action is necessary to exploit this enhancement.)
Ι	SNA Services:	Enable HPR-only VRNs for interchange sessions
		<b>Description:</b> Prior to z/OS V1R4 Communications Server, you could not configure interchange nodes (ICNs) with links to some types of connection networks (such as ATM and Enterprise Extender connection networks) due to a configuration restriction that did not allow ICNs to exploit high-performance routing (HPR) over connection networks for sessions that cross from APPN into subarea. (ICNs could compute session paths through these connection networks for other APPN network nodes or end nodes that have links to them. However, the ICNs themselves could not activate a link to these types of connection networks. Instead, ICNs had to predefine links to all other nodes on the connection network, or allow APPN to compute session paths that include additional nodes.)
   		z/OS V1R4 Communications Server eliminates this restriction for Enterprise Extender connection networks. In addition, this function also allows HPR to be used (instead of ISR) over other types of connection networks (like token-ring) for sessions that cross from APPN into subarea.
Ι		When change was introduced: z/OS V1R4.
   		<ul> <li>Reference information:</li> <li>z/OS Communications Server: SNA Operation</li> <li>z/OS Communications Server: SNA Resource Definition Reference</li> </ul>
     	SNA Services:	<b>DISPLAY ID</b> = <i>rtpname</i> <b>diagnostic enhancement</b> <b>Description:</b> Additional high performance routing (HPR) diagnostic information is available for display for a rapid transport protocol (RTP) physical unit. A new operand on the DISPLAY ID= <i>rtpname</i> command, HPRDIAG, specifies whether the additional data is to be displayed.
Ι		When change was introduced: z/OS V1R4.
   		<ul> <li>Reference information:</li> <li>z/OS Communications Server: SNA Messages</li> <li>z/OS Communications Server: SNA Operation</li> </ul>
	SNA Services:	SRB mode dump enhancement Description: Dump processing improved when running in service request block

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suspends processing until the data is captured. This prevents the loss of data during the dump process and therefore requires fewer re-creates. Furthermore, in some cases, both VTAM and TCP address spaces are now dumped, making the dump more useful.
 When change was introduced: z/OS V1R4.
 Reference information: None. (No customer action is necessary to exploit this enhancement.)

# SNA Services: Increase maximum value for AUTOGEN on XCA major nodes

**Description:** The maximum value for the **num\_stmts** parameter for the AUTOGEN operand on the external communication adapter (XCA) major node is increased from 4096 to 65536. Increasing the number of line and PU statements that may be generated for each GROUP in an XCA major node allows you to use AUTOGEN to eliminate the requirement of defining multiple GROUPs or predefining all line and PU names when more than 4096 Enterprise Extender connection partners exist.

When change was introduced: z/OS V1R4.

**Reference information:** *z/OS Communications Server: SNA Resource Definition Reference.* 

#### SNA Services: VIT data timestamp enhancement

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**Description:** The VTAMMAP VITAL dump formatting tool now includes estimated timestamps for the VTAM internal trace (VIT) records extracted from both internal VITs (ECSA and data space). These timestamps are approximated using times saved in VTAM internal control blocks and made available during dump formatting to the VIT Analysis Tool (VITAL). The actual timestamps contained in the dump record the times when certain landmark events occurred in writing the internal VIT records, such as the time that each VIT wrapped and the time that data from the ECSA VIT was last copied to the data space VIT.

This enhancement benefits you because approximated timestamps in the VITAL output, while not necessarily representing the actual clock time when events occurred, can be used to specify, as input to VITAL, start and stop times for subsets of records that you might wish to extract to another data set. This was not possible prior to z/OS V1R4 because all VIT records extracted by the VITAL function contained the same timestamp.

When change was introduced: z/OS V1R4.

#### **Reference information:**

- z/OS Communications Server: SNA Diagnosis Vol 1, Techniques and Procedures
- z/OS Communications Server: SNA Diagnosis Vol 2, FFST Dumps and the VIT

# SNA Services: VARY ACT, UPDATE command for CDRSC major nodes enhancement

**Description:** The VARY ACT,UPDATE command is enhanced to allow specification of a cross-domain resource (CDRSC) major node. You can now update a CDRSC major node to add or modify a CDRSC without having to inactivate the entire major node, thereby eliminating the disruption of all existing sessions using the CDRSC resources under the node.

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When change was introduced: z/OS V1R4.

Reference information: z/OS Communications Server: SNA Operation.

# SNA Services: OPEN application control block (ACB) limit increase

**Description:** Application capacity through VTAM is increased to a new limit of 1 044 480. Prior to z/OS V1R4, the limit was approximately 65 000 open application control blocks (ACBs) at a time.

When change was introduced: z/OS V1R4.

**Reference information:** None. (No customer action is necessary to exploit this enhancement.)

# SNA Services: NQNMODE support for Directory Services (DS) database entries

**Description:** NQNMODE support is added to Directory Services (DS) through enhancement of the existing predefined CDRSC process. When CPNAME= is coded on a CDRSC, the NQNMODE value is passed to DS during CDRSC processing. When DS performs a database query using an alias name (a resource name that does not have an authentic NETID), if a predefined entry is found, then DS uses the predefined NETID for all search tasks and sets the NETID indicator to authentic.

In addition, the predefined CDRSC process is enhanced with the addition of NATIVE and SUBAREA operands to improve APPN and subarea search efficiency for predefined resources.

When change was introduced: z/OS V1R4.

**Reference information:** *z/OS Communications Server: SNA Resource Definition Reference.* 

# SNA Services: APPN topology traces enhancements

**Description:** Traces have been added to provide a record of the creation, update, and deletion of Topology and Routing Services (TRS) topology records. Topology tracing is done in the following locations:

- In an NDREC (node record) trace table following the NDREC control block, where the creation and update of a node record is recorded.
- In a TGREC (TG record) trace table following the TGREC control block, where the creation and update of a TG record is recorded.
- In a common TRS trace table, where the deletion of NDRECs and TGRECs is recorded.

Users of APPN will notice an increase in storage utilization because VTAM will now allocate an additional one to ten 4 KB pages for the table of topology deletions, 110 bytes per node record for the NDREC traces, and 180 bytes per TG record for the TGREC traces.

A message will now be issued when one page of storage is full and an attempt to allocate an additional page of storage for TRS topology trace entries fails: IST12601 type TRUNCATED -INSUFFICIENT STORAGE In the message, *type* indicates the specified storage that cannot be allocated, in this case TRS TRACE TABLE.

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When change was introduced: z/OS V1R2 by APAR OW51867.

**Reference information:** None. (No customer action is necessary to exploit this enhancement.)

# SNA Services: VTAM INOPDUMP enhancement

**Description:** The VTAM INOPDUMP function is enhanced to more granularly control which resources are affected by the function. This is done by allowing the function to be activated or inactivated based on a transport resource list entry (TRLE). For example, INOPDUMP can now be generally inactive, yet active for a specific TRLE. This prevents dumps from being taken when inoperative conditions occur on links other than those targeted by this function.

You can use the MODIFY INOPDUMP command to alter the TRLE InOpDump status for a TRLE that is not active, as long as the TRLE is contained in the TRL major node. The status is saved and put into effect when the TRLE becomes active.

Identification of additional normal inoperative conditions has resulted in the internal suppression of INOPDUMP for these conditions.

New DISPLAY INOPDUMP and MODIFY INOPDUMP commands also allow you to display and modify the INOPDUMP setting. Display and modification of INOPDUMP is still supported through the DISPLAY VTAMOPTS and MODIFY VTAMOPTS commands, and that mechanism is functionally equivalent to the new method. Both methods set or reset INOPDUMP globally and for each TRLE in the TRL major node.

The responses to the MODIFY commands differ primarily when the TRL major node is unavailable. If the TRL major node is unavailable, the MODIFY INOPDUMP response includes:

IST1865I GLOBAL INOPDUMP = xxx

while the MODIFY VTAMOPTS variation provides the same response as previous releases. The MODIFY VTAMOPTS variation ends its response with: IST2231 MODIFY COMMAND COMPLETED

while the MODIFY INOPDUMP response ends with: IST223I MODIFY INOPDUMP COMMAND COMPLETED

The responses to the two display commands are significantly different. The response to the DISPLAY VTAMOPTS,OPTION=INOPDUMP command is not changing. The response to the DISPLAY INOPDUMP command includes IST097I, IST350I, IST1865I, possibly some 1866I messages, and IST314I.

When change was introduced: z/OS V1R4.

**Reference information:** 

- z/OS Communications Server: SNA Messages
- z/OS Communications Server: SNA Operation

# **Communications Server** SNA Services: CNN routing failure message Description: A new message group, IST1774I, is issued on the composite network node (CNN) when the following conditions are met: An optimal route through a CNN is not chosen during session activation A new start option, CNNRTMSG, is coded as CNNRTMSG=NOSUPP Session activation completes Note that message group IST1774I is not issued when the CNN host is a rapid transport protocol (RTP) endpoint or an intermediate node on an RTP connection for the session. The IST1774I message group can be controlled through the use of the message flooding prevention table. The information displayed in the message group might be helpful when tuning APPN routes. When change was introduced: z/OS V1R2. **Reference information:** z/OS Communications Server: SNA Resource Definition Reference • z/OS Communications Server: SNA Operation • z/OS Communications Server: SNA Messages • z/OS Communications Server: SNA Messages SNA Services: Display topology database update (TDU) statistics Description: A new display TDU statistics function allows users to display VTAM's TDU processing information that can be used to detect a TDU war in the network, thus aiding in diagnosis. The resources being contended can be identified, and depending on the nature of the problem, the origin of the TDU war can be isolated. The command that displays the new statistics is D TOPO, LIST=TDUINFO. When change was introduced: z/OS V1R2. **Reference information:** z/OS Communications Server: SNA Messages z/OS Communications Server: SNA Operation SNA Services: Display APPN Class of Service Description: The display APPN Class of Service (CoS) function allows operators to issue a display command to obtain the currently active APPN Class of Service table entries and the last APPNCOS table that was used to create or update each entry. The information displayed can be used for problem determination on session related problems. **Note:** The display APPN Class of Service function is only valid on VTAM nodes supporting APPN functions.

When change was introduced: z/OS V1R2.

Reference information: z/OS Communications Server: SNA Operation.

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# SNA Services: Enterprise Extender global connection network enhancements

   		<b>Description:</b> Enterprise Extender connection networks can now span multiple APPN subnetworks and NETIDs. This enables users to obtain dynamic direct links between network nodes (NNs) and end nodes (ENs) across a common IP network (either the public Internet or intranet).
 		Note that a connection network is a representation of a shared access transport facility (SATF), such as a local area network (LAN).
I		When change was introduced: z/OS V1R4.
   		<ul> <li>Reference information:</li> <li>z/OS Communications Server: SNA Resource Definition Reference z/OS Communications Server: SNA Network Implementation Guide</li> </ul>
   	SNA Services:	<b>Generic resource affinity management enhancements</b> <b>Description:</b> This is a new API feature that allows application programs to control the ownership of the generic resource (GR) affinity on an individual LU session partner basis.
I		When change was introduced: z/OS V1R2.
   		<ul> <li>Reference information: See the LUAFFIN topics in:</li> <li>z/OS Communications Server: SNA Programming</li> <li>z/OS Communications Server: SNA Programmer's LU 6.2 Guide</li> <li>z/OS Communications Server: SNA Programmer's LU 6.2 Reference</li> </ul>
	SNA Services:	Model application trace enhancements
   		<b>Description:</b> Users can now modify trace options on dynamically created applications by specifying the name of the model application on a MODIFY TRACE or MODIFY NOTRACE command.
I		When change was introduced: z/OS V1R2.
I		Reference information: z/OS Communications Server: SNA Operation.
	SNA Services:	<b>DLC work unit tracking</b> <b>Description:</b> The DISPLAY TRL command is enhanced to provide a CONGESTED indicator to alert you when a specific I/O device has an excessive amount of queued outbound work. In addition, you can display current and historical count details for a specific device by using DISPLAY TRL,TRLE= <i>trlename</i> . Using this display along with other tools, such as tuning statistics, allows you to monitor a device and determine if this congestion is associated with system storage constraints or shortages.
Ι		When change was introduced: z/OS V1R2.
   		<ul> <li>Reference information:</li> <li>z/OS Communications Server: SNA Migration and Exploitation</li> <li>z/OS Communications Server: SNA Operation</li> </ul>

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# SNA Services: Support for coupling facility duplexing

**Description:** Support for system-managed duplexing rebuilds to Communications Server coupling facility structures is provided. This support, also known as coupling facility (CF) duplexing, provides robust failure recovery capability by allowing fallback to the unaffected structure instance. The duplexed copy of the structure is created in advance of any failures and is maintained in a synchronized duplexed state during normal operation.

#### When change was introduced: z/OS V1R2.

#### **Reference information:**

- "System-managed duplexing rebuild" on page 3
- z/OS MVS Setting Up a Sysplex

## SNA Services: HPR route test support

**Description:** The high performance routing (HPR) route test support function allows you to test the performance of a rapid transport protocol (RTP) connection. Any RTP connection that has an endpoint in a VTAM node (all the RTP connections that are displayed in response to a DISPLAY RTPS command) can be specified as the subject of an HPR route test. New operands, ID and TEST, on the DISPLAY RTP command initiate the HPR route test. When the test completes, the results are presented asynchronously to the operator console. These results show the time, in milliseconds, that it took for a test packet to traverse each hop in the path for that RTP connection. You can use this information to identify links that are performing poorly and to assist in diagnostic action.

#### When change was introduced: z/OS V1R2.

#### **Reference information:**

- z/OS Communications Server: SNA Diagnosis Vol 1, Techniques and Procedures
- z/OS Communications Server: SNA Messages
- z/OS Communications Server: SNA Operation

# SNA Services: CP-CP diagnostic enhancements

**Description:** Operators can now issue a new command, DISPLAY CPCP, to obtain detailed CP-CP session status for adjacent nodes. The information displayed can be used for problem determination on CP-CP session related problems.

When change was introduced: z/OS V1R2.

Reference information: z/OS Communications Server: SNA Operation.

# Cryptographic Services new functions to consider

This section describes new Cryptographic Services functions in z/OS.

# ICSF: PCI X Cryptographic Coprocessor (PCIXCC) support

**Description:** PCI X Cryptographic Coprocessor (PCIXCC) support is new. The coprocessor is an optional feature and only available on the z990 server. Requires that CP Assist for Cryptographic Functions be enabled.

When change was introduced: z/OS V1R4 Web deliverable - z990 crytographic support (FMID HCR770A).

1	Reference information: • z/OS Cryptographic Services ICSE Overview
1	<ul> <li>z/OS Cryptographic Services ICSF Application Programmer's Guide</li> </ul>
1	z/OS Cryptographic Services ICSF Administrator's Guide
ICSF: Pass ph	rase initialization
	Description: Pass phrase initialization now allows initialization of the PKDS.
1	When change was introduced: z/OS V1R4 Web deliverable - z990 crytographic support (FMID HCR770A).
 	<b>Reference information:</b> <ul> <li>z/OS Cryptographic Services ICSF Administrator's Guide</li> </ul>
	TH parameter
	<b>Description:</b> CKTAUTH, a new parameter in the installation options data set, decides if authentication will be performed for every CKDS record read from DASD.
 	When change was introduced: z/OS V1R4 Web deliverable - z990 crytographic support (FMID HCR770A).
I	Reference information:
I	• z/OS Cryptographic Services ICSF System Programmer's Guide.
ICSF: CP Assi	ist for Cryptographic Functions (CPACF) support
   	<b>Description:</b> CP Assist for Crypto Functions (CPACF) support is new. The feature enables clear key DES and TDES instructions on all CPs. Only available on a z990 server.
Ι	When change was introduced: z/OS V1R4 Web deliverable.
I	Reference information:
I	<ul> <li>z/OS Cryptographic Services ICSF Overview</li> </ul>
ICSF: User De	fined Extension (UDX) support
       	<b>Description:</b> User Defined Extensions (UDX) support was first provided in z/OS V2R10. It allows you to request implementation of a customized cryptographic callable service. UDXs are ICSF functions developed for your installation with the help of IBM Global Services. With z/OS V1R2 and the z900 server, and with a special contract with IBM, you can develop and load your own UDXs. UDX support requires an IBM 4758 PCI Cryptographic Coprocessor (PCICC).
1	When change was introduced: z/OS V1R2.
1	
1	Reference information:
   	<ul> <li>Reference information:</li> <li>For details about managing UDXs, see <i>z/OS Cryptographic Services ICSF</i> <i>Administrator's Guide</i>.</li> </ul>
       	<ul> <li>Reference information:</li> <li>For details about managing UDXs, see <i>z/OS Cryptographic Services ICSF Administrator's Guide</i>.</li> <li>For details about installation-defined callable services and a description of the UDX parameter in the installation options data set, see <i>z/OS Cryptographic Services ICSF System Programmer's Guide</i>.</li> </ul>

version of the zSeries User Defined Extensions Reference and Guide and the Т Release x Custom Software Developer's Toolkit Guide as well as other T publications related to the IBM 4758 PCI Cryptographic Coprocessor. Т ICSF: PCI Cryptographic Accelerator (PCICA) support I **Description:** PCI Cryptographic Accelerator (PCICA) support is new. If a PCI Cryptographic Accelerator is available, clear RSA key processing in the CSFDPKD service is routed to the PCI Cryptographic Accelerator. When change was introduced: z/OS V1R2. **Reference information:**  z/OS Cryptographic Services ICSF Overview • z/OS Cryptographic Services ICSF Application Programmer's Guide ICSF: Pass phrase initialization I **Description:** Pass phrase initialization now allows uninitialized PCI Cryptographic Coprocessors to be initialized without processing all Cryptographic Coprocessors. A new panel option, Initialize New PCICC Only, has been added to the Pass Phrase Initialization panel to allow the initialization of the new PCI Cryptographic Coprocessors. When change was introduced: z/OS V1R2. 1 **Reference information:** z/OS Cryptographic Services ICSF System Programmer's Guide. **ICSF:** Reencipher and activate a PKDS Description: Support to reencipher and activate a PKA cryptographic key data set (PKDS) has been added to the Master Key Management panels. The new utility, CSFPUTIL, can also be used to reencipher the PKDS from the old asymmetric-keys master key to the current master key and to activate the reenciphered PKDS. Toleration APAR OW49386 in available on OS/390 V2R10 and z/OS V1R1 to activate the reenciphered PKDS. Note: PCICCs are required to reencipher a PKDS but not to activate a reenciphered PKDS. When change was introduced: z/OS V1R2. Reference information: z/OS Cryptographic Services ICSF System Programmer's Guide. **ICSF:** Setup and customization enhancements Т Description: Samples have been provided to simplify the setup of ICSF: A sample ICSF options data set, CSFPRM01, is added to SYS1.SAMPLIB for the purpose of setting master keys by means of batch processing. This sample supports ICSF setup for Internet delivery. A sample CKDS allocation job (member CSFCKDS) is added to SYS1.SAMPLIB. A sample PKDS allocation job (member CSFPKDS) is added to SYS1.SAMPLIB. · Samples for CSFSTART (ICSF startup procedures) have been added. · Sample JCL (CSFSETMK) for Internet delivery default pass phrase is added. 1

I	When change was introduced: z/OS V1R3.	
I I	<b>Reference information:</b> <i>z/OS</i> Cryptographic Services ICSF System Programmer's Guide.	
<ul> <li>ICSF: RMF pe</li> <li>services</li> </ul>	rformance measurements added to selected ICSF	
	<ul> <li>Description: ICSF provides performance measurements on selected ICSF services and functions that use the DES and SHA-1 algorithms. Support is added to the following ICSF callable services:</li> <li>Encipher (CSNBENC)</li> <li>Decipher (CSNBDEC)</li> <li>MAC generate (CSNBMGN)</li> <li>MAC verify (CSNBMVR)</li> <li>One-way hash (CSNBOWH)</li> <li>Encrypted PIN translate (CSNBPTR)</li> <li>Encrypted PIN verify (CSNBPVR)</li> </ul>	
l I	When change was introduced: z/OS V1R3 and rolled back to z/OS V1R2 by APAR OW51003.	
I	Reference information: z/OS RMF Report Analysis.	
ICSF: Usabilit	<ul> <li>y enhancements to ICSF TSO/E panels</li> <li>Description: ICSF TSO/E panels are improved in the following ways:</li> <li>Coprocessor management functions are combined onto one panel.</li> </ul>	
	<ul> <li>Master key management and cryptographic key data set utilities are combined onto one panel. This panel includes:         <ul> <li>CKDS initialization</li> <li>Clear master key entry</li> <li>Hardware status</li> </ul> </li> </ul>	
I	<ul> <li>TKE TSO/E utilities are combined onto one panel.</li> </ul>	
I	The primary panel is simplified	
I	<ul> <li>A new utility is added to generate master key values from a pass phrase.</li> </ul>	
Ι	When change was introduced: z/OS V1R3.	
I	<b>Reference information:</b> z/OS Cryptographic Services ICSF Administrator's Guide.	
ICSF: PKDSCACHE parameter		
   	<b>Description:</b> PKDSCACHE, a new parameter in the installation options data set, defines the size of the PKA key data set (PKDS) cache in records. The PKDS cache improves performance because it facilitates access to frequently-used records.	
I I	When change was introduced: z/OS V1R2 and rolled back to OS/390 V2R10 and z/OS V1R1 by APAR OW48568.	
I	Reference information: z/OS Cryptographic Services ICSF Administrator's Guide.	

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# **ICSF: DOMAIN parameter**

**Description:** DOMAIN is a parameter in the installation options data set that specifies the number of the domain that you want to use to start ICSF. You can specify only one domain in the options data set. Beginning with z/OS V1R2, DOMAIN is an optional parameter. The DOMAIN parameter is only required if more than one domain is specified as the usage domain on the PR/SM<sup>™</sup> panels or if running in native mode.

If DOMAIN is specified in the options data set, it will be used and it must be one of the usage domains for the LPAR. If DOMAIN is not specified in the options data set, ICSF determines which domains are available in this LPAR. If only one domain is defined for the LPAR, ICSF uses it. If more than one is available, ICSF issues error message CSFM409E.

If you run ICSF in compatibility or coexistence mode, you cannot change the domain number without re-IPLing the system. A re-IPL ensures that a program does not access a cryptographic service with a key that is encrypted under a different master key.

When change was introduced: z/OS V1R2.

**Reference information:** *z/OS Cryptographic Services ICSF System Programmer's Guide.* 

# **ICSF: MAXLEN parameter**

# **Description:** MAXLEN is a parameter in the installation options data set that specifies the maximum length of characters in a text string, including any necessary padding, for some callable service requests. Beginning with z/OS V1R2, the value limit (2147483647) is enforced, MAXLEN is no longer displayed on the Installation Option Display panel, and MAXLEN checking is eliminated from the following callable services:

- CSNBENC and CSNBENC1
- CSNBDEC and CSNBDEC1
- CSNBMGN and CSNBMGN1
- CSNBMVR and CSNBMVR1
- CSNBCTT and CSNBCTT1
- CSNBMDG and CNSBMDG1

#### When change was introduced: z/OS V1R2.

**Reference information:** *z/OS Cryptographic Services ICSF System Programmer's Guide.* 

# PKI Services: Support for mandatory extension for the generation of certificates

<b>Description:</b> PKI Services is enhanced to add or update support for mandatory extension for the generation of certificates, as follows:
• KeyUsage
ExtKeyUsage
CertificatePolicies
AuthorityInfoAccess
CRLDistributionPoints
Certificate lifecycle

I		When change was introduced: z/OS V1.5.
I		Reference information:
I		• z/OS Security Server RACF Macros and Interfaces
I		• z/OS Security Server RACF Command Language Reference
I		<ul> <li>z/OS Security Server RACF Messages and Codes</li> </ul>
I		<ul> <li>z/OS Security Server RACF Auditor's Guide</li> </ul>
I		<ul> <li>z/OS Security Server RACF Diagnosis Guide</li> </ul>
Ι		<ul> <li>z/OS Security Server RACF Callable Services</li> </ul>
Ι		• z/OS Cryptographic Services PKI Services Guide and Reference
Pł	KI Services: (	Certificate revocation list (CRL) distribution points
     		<b>Description:</b> If your PKI Services installation is very active, many certificates can be in a revoked status at any one time. This can cause the certificate revocation list (CRL) to become large and consume additional resources to applications that process it. Consider customizing CRL distribution points to publish partial CRLs if you estimate your average number of revoked non-expired certificates to be greater than 500 at any given time.
I		When change was introduced: z/OS V1.5.
		<b>Reference information:</b> <i>z</i> /OS Cryptographic Services PKI Services Guide and Reference.
P	KI Services: I	Nultiple application domains
		<b>Description:</b> You can isolate the PKI Services application used by your PKI administrators from your end users, and customize unique application domains for each end user group. By creating multiple application sections in the PKI Services template file (pkiserv.tmpl), you can provide a unique URL to each end user group, allowing you to standardize the content of certificates created by each group.
I		When change was introduced: z/OS V1.5.
 		<b>Reference information:</b> <i>z/OS Cryptographic Services PKI Services Guide and Reference.</i>
Pł	KI Services: I	Parallel Sysplex support
         		<b>Description:</b> This support lets you take advantage of a Parallel Sysplex environment to start multiple independent instances of the PKI Services daemon on different images in the sysplex, and to configure PKI Services to run in parallel, acting on one common data store. Using a sysplex requires setting up VSAM record-level sharing (RLS). The vosview and iclview utilities are updated with new parameters to support VSAM RLS. A new <b>SharedVSAM</b> parameter is added to the pkiserv.conf configuration file in the ObjectStore section. Using a sysplex also entails using the sample job IKYRVSAM to reallocate the PKI Services VSAM data sets in a storage class defined for RLS.
I		When change was introduced: z/OS V1R4.
		<b>Reference information:</b> <i>z</i> /OS Cryptographic Services PKI Services Guide and Reference.

Reference.

# PKI Services: e-mail notification for completed certificate requests and expiration warnings

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   	<b>Description:</b> To provide a mechanism to notify your clients through e-mail when their certificates are ready for retrieval or are about to expire, e-mail notification support is added. This support includes the following changes:
 	<ul> <li>NotifyEmail is a new optional user input field for the non-SAF certificate request web pages and the R_PKIServ callable service (IRRSPX00).</li> </ul>
	<ul> <li>The pkiserv.conf configuration file is changed as follows:         <ul> <li>In the CertPolicy section, the ExpireWarningTime parameter is added.</li> <li>In the General section, the following parameters are new:                 <ul> <li>ReadyMessageForm notification sent when certificate is ready for retrieval</li> <li>RejectMessageForm notification sent when certificate request is rejected</li> <li>ExpiringMessageForm notification sent when certificate is expiring.</li> </ul> </li> </ul> </li> </ul>
	When change was introduced: z/OS V1R4.
   	<ul> <li>Reference information:</li> <li>z/OS Cryptographic Services PKI Services Guide and Reference</li> <li>z/OS Communications Server: IP Configuration Guide</li> </ul>
	PKI Services: Support for MAIL, STREET, and POSTALCODE qualifiers for distinguished names
   	<b>Description:</b> PKI Services has added MAIL, STREET, and POSTALCODE qualifiers for distinguished names. This helps to differentiate distinguished names. A corresponding enhancement is the addition of Email, Street, and PostalCode named fields in various TEMPLATES sections of the pkiserv.tmpl certificate templates file.
I	When change was introduced: z/OS V1R4.
 	<b>Reference information:</b> <i>z/OS</i> Cryptographic Services PKI Services Guide and Reference.
	<b>PKI Services: Using encrypted passwords for your LDAP servers</b> Description: The LDAP interface requires the caller to authenticate (bind) to the directory either anonymously or using a distinguished name and passwords. Before z/OS V1R4, the passwords (for multiple directories) were stored in clear text in the pkiserv.conf configuration file. Starting in V1R4, you can optionally encrypt and store the passwords in the PROXY segment of general resource profiles.
   	You can store binding information either in the IRR.PROXY.DEFAULTS profile in the FACILITY class or in one or more profiles defined in the LDAPBIND class. The <b>BindProfile1</b> parameter has been added to the pkiserv.conf file to specify the name of the LDAP bind profile containing the bind information.
I	When change was introduced: z/OS V1R4.
   	<ul> <li>Reference information:</li> <li>z/OS Integrated Security Services LDAP Server Administration and Use</li> <li>z/OS Cryptographic Services PKI Services Guide and Reference</li> </ul>

# PKI Services: Storing serial number and event files in the VSAM object store

**Description:** To simplify setup, PKI Services is enhanced to store serial number and event files in the VSAM object store. Previously, PKI Services stored these files as separate files, and the ObjectStore section of the pkiserv.conf configuration file specified the path and file name stem by including the **Name** and **Path** keywords.

When change was introduced: z/OS V1R4.

**Reference information:** *z/OS Cryptographic Services PKI Services Guide and Reference.* 

# System SSL: New Secure Socket Layer APIs

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**Description:** In addition to the System SSL APIs provided in OS/390 V2R10 so that applications can securely communicate over an open communication network using the SSL protocol, a new suite of APIs has been introduced to allow applications greater flexibility to define secure socket communication attributes and to position the APIs for future functional enhancements. You should migrate existing applications to the new APIs and use the new APIs in all new applications. The OS/390 V2R10 APIs have been deprecated and will not be updated in the future.

#### When change was introduced: z/OS V1R2.

**Reference information:** To implement the new APIs, see *z/OS System Secure Sockets Layer Programming*. The C++ samples shipped with the product have been updated to exploit the new secure socket layer APIs.

# System SSL: Transport Layer Security (TLS) Version 1.0 (RFC 2246)

**Description:** System SSL now supports Transport Layer Security (TLS) Version 1.0. SSL is a protocol developed by Netscape to perform highly secure and encrypted data transmission. Transport Layer Security (TLS) is an upwardly-compatible successor to SSL developed by the Internet Engineering Task Force (IETF). The selection of SSL or TLS is negotiated during the SSL "handshake".

To exploit the TLS V1.0 protocol, you must specify it on either the **gsk\_attribute\_set\_enum** or **gsk\_initialize** API.

When change was introduced: TLS support was added to the gsk\_attribute\_set\_enum API in z/OS V1R2 and to the deprecated gsk\_initialize API in z/OS V1R4.

Reference information: z/OS System Secure Sockets Layer Programming.

#### System SSL: certificate management APIs

**Description:** In addition to the secure socket layer APIs to provide functionality so that applications can securely communicate over an open communication network using either the SSL or TLS protocols, a new suite of APIs has been introduced to allow application writers the ability to exploit functions other than the typical SSL functions. These functions include:

• The ability to create and manage key database files in a function similar to the SSL **gskkyman** utility.

	<ul> <li>The ability to use certificates stored in the key database file or key ring for purposes other than SSI</li> </ul>
'     	<ul> <li>Addition of basic PKCS #7 message support to provide application writers a mechanism to communicate with another application through the PKCS #7 standard. These APIs build and process the PKCS #7 messages.</li> </ul>
I	When change was introduced: z/OS V1R4.
I	Reference information: z/OS System Secure Sockets Layer Programming.
I	System SSL: IPv6 support for System SSL
   	<b>Description:</b> This support allows System SSL to be used in an IPv6 network configuration. It also enables System SSL to support both IPv4 and IPv6 Internet protocol addresses.
I	When change was introduced: z/OS V1R4.
I	Reference information: z/OS System Secure Sockets Layer Programming.
I	System SSL: Sysplex session ID caching
	<b>Description:</b> Sysplex session cache support makes SSL V3.0 and Transport Layer Security (TLS) V1.0 server session information available across a sysplex. An SSL session established with a server on one system in the sysplex can be resumed using a server on another system in the sysplex. This can be accomplished as long as the SSL client presents the session identifier obtained for the first session when initiating the second session.
I	When change was introduced: z/OS V1R4.
I	Reference information: z/OS System Secure Sockets Layer Programming.
I	System SSL: Serviceability enhancements
     	<b>Description:</b> System SSL is enhanced to support two types of debugging. It continues to support the environment variable setting, and adds debugging through a started task. The started task will allow for more dynamic component debug tracing. Debug tracing has also been enhanced to support different debug levels (such as entry and exit to dumps).
   	The enhanced debug capabilities provide a mechanism for customers to provide service personnel with information about their failing scenarios. In addition, the started task provides applications that do not have control over environment variable settings to request tracing.
I	When change was introduced: z/OS V1R4.
 	<b>Reference information:</b> For information about SSL tracing, see <i>z/OS System</i> Secure Sockets Layer Programming.
I	System SSL: User ID support of RACF key rings
   	<b>Description:</b> This support allows SSL applications that are using a RACF Security Authorization Facility (SAF) key ring to no longer be required to be the owner of the SAF key ring. With the appropriate SAF permissions, a user ID belonging to the executing application does not have to be the owner of the key ring. A non-owner is

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I	to be shared among applications that do not need the certificate's private key. For
	applications that do not need to have certificates with private keys, this helps to simplify the administration of key rings.
Ι	When change was introduced: z/OS V1R4.
I	<b>Reference information:</b> z/OS System Secure Sockets Layer Programming.
Ι	System SSL: RSA private keys stored in ICSF
     	<b>Description:</b> In OS/390 V2R8, System SSL added support that allowed the RACDCERT command to be used to manage an SSL application's private keys and certificates. RACDCERT allows a certificate's private key to be stored either directly in the RACF database or in ICSF. However, the OS/390 V2R8 System SSL support was restricted to cases where a certificate's private key is stored in the RACF
	database. With z/OS V1R4, support is introduced that will allow a certificate's private key to reside in ICSF.
I	When change was introduced: z/OS V1R4.
	<b>Reference information:</b> z/OS System Secure Sockets Layer Programming.
Ι	System SSL: Support a list of LDAP servers
	<b>Description:</b> You can now specify a list of LDAP servers to be used for storing certificate revocation lists (CRLs), and SSL will try to connect to each server in the list until a connection is obtained. You specify the list of LDAP servers on either the <b>gsk_initialize</b> or <b>gsk_attribute_set_buffer</b> APIs. When certificate validation is being performed, this list will be used to determine which LDAP server to connect to for the CRL information. This enhancement also provides greater availability by not being dependent on a single LDAP server.
Ι	When change was introduced: z/OS V1R4.
	<b>Reference information:</b> z/OS System Secure Sockets Layer Programming.
Ι	System SSL: gskkyman certificate creation
   	<b>Description:</b> The <b>gskkyman</b> command now generates only X.509 Version 3 certificates but accepts X.509 Version 1 and X.509 Version 2 certificates when imported from another source.

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- When change was introduced: z/OS V1R4.
- Reference information: z/OS System Secure Sockets Layer Programming.

#### System SSL: Digital Signature Standard (DSS) certificates I

**Description:** System SSL now supports Digital Signature Standard (DSS) certificates defined by Federal Information Processing Standard (FIPS) 186-1. These certificates are created through the gskkyman certificate management utility and can be used to authenticate the client application during the SSL handshake when client authentication is requested.

- When change was introduced: z/OS V1R4.
  - **Reference information:** *z/OS System Secure Sockets Layer Programming.*

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# System SSL: Enhanced PKCS#12 support

**Description:** System SSL PKCS#12 file support (import/export) through the **gskkyman** command is updated to the latest RFC levels. This upgrade enhances the ability of System SSL to interoperate with other certificate management products.

When change was introduced: z/OS V1R4.

Reference information: z/OS System Secure Sockets Layer Programming.

#### System SSL: Enhanced environment close

**Description:** System SSL now permits existing connections to remain active and run to completion after their SSL environment is closed. This removes the requirement that the customer application must manage the SSL environment until all SSL connections have been closed.

When change was introduced: z/OS V1R4.

Reference information: z/OS System Secure Sockets Layer Programming.

#### System SSL: Toleration for recycled LDAP Server

**Description:** An LDAP Server containing information about certificate revocations lists can now be recycled after the SSL environment is defined. Previously, you had to restart the SSL application after recycling the LDAP server.

When change was introduced: z/OS V1R2.

Reference information: z/OS System Secure Sockets Layer Programming.

# System SSL: C++ SSL samples

**Description:** The sample C++ SSL files are no longer in the document *z/OS System Secure Sockets Layer Programming.* The files are shipped in the directory /usr/lpp/gskssl/examples and exploit the new API suite.

When change was introduced: z/OS V1R2.

**Reference information:** For a description of the samples provided in /usr/lpp/gskssl/examples, see *z/OS System Secure Sockets Layer Programming*. (There is no description in /usr/lpp/gskssl/examples.)

# System SSL: Java SSL samples

 I
 Description: The sample Java SSL files are no longer in the document z/OS

 System Secure Sockets Layer Programming. The files are shipped in the directory

 /usr/lpp/gskssl/examples/java.

 I
 When change was introduced: z/OS V1R2.

 I
 Reference information: For a description of the samples provided in

 /usr/lpp/gskssl/examples/java, see z/OS System Secure Sockets Layer

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 Programming. (There is no description in /usr/lpp/gskssl/examples/java.)

# System SSL: CRL caching performance enhancement

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**Description:** Today, SSL supports certificate revocation lists (CRLs) stored in an LDAP Server. Each time a certificate needs to be validated, a request is made to the LDAP Server to get the list of CRLs. This enhancement caches CRL lists locally instead of fetching them from the LDAP Server each time they are needed. This improves performance and alleviates the need to contact the LDAP Server each time certificate validation needs to be performed.

When change was introduced: z/OS V1R4.

Reference information: z/OS System Secure Sockets Layer Programming.

#### System SSL: Certificate revocation list support added

**Description:** Support is added for certificate revocation lists created through either (1) the Tivoli Public Key Infrastructure product or (2) the PKI Services component of the z/OS Security Server base element.

When change was introduced: z/OS V1R2.

**Reference information:** None. (No customer action is necessary to exploit this enhancement.)

# System SSL: AES Symmetric Cipher for SSL V3 and TLS connections

**Description:** System SSL supports the Advanced Encryption Standard (AES), which provides data encryption using 128-bit or 256-bit keys for SSL V3.0 and TLS V1.0 connections. To exploit this function, the AES cipher value must be specified on either the **gsk\_attribute\_set\_buffer** or **gsk\_secure\_soc\_init** APIs.

#### When change was introduced: z/OS V1R4.

**Reference information:** For more information about the APIs, see *z/OS System Secure Sockets Layer Programming.* 

#### **DFSMS** new functions to consider

This section describes new DFSMS functions in z/OS.

#### Basic partitioned access method enhancements for UNIX files

Description: In previous releases, BPAM had the following limitations:

- · BPAM could not access UNIX files.
- BPAM had a concatenation limit of about 120 PDS extents and entire PDSE data sets.
- · All members had the same security setting.

You can use the basic partitioned access method (BPAM), basic sequential access method (BSAM), queued sequential access method (QSAM), virtual storage access method (VSAM), or z/OS UNIX System Services (z/OS UNIX) to access UNIX files. With these BPAM enhancements for z/OS V1R5, you can do the following:

• Use BPAM for reading UNIX files, without requiring changes to existing programs.

BPAM treats UNIX directories as if they were a PDS or PDSE. BPAM treats UNIX files as if they were members. The UNIX files can be regular files, hard links, symbolic links, or named pipes.

I	<ul> <li>Include a UNIX directory in a JCL DD statement using the PATH keyword.</li> </ul>
1	• Use partitioned concatenations of up to 255 PDS extents, PDSEs, and UNIX directories in any combination.
I	• BPAM verifies that you have UNIX read access to the requested members (files).
I	When change was introduced: z/OS V1R5.
       	<ul> <li>Reference information:</li> <li>z/OS DFSMS Migration</li> <li>z/OS DFSMSdfp Using DFSMSdfp in the z/OS V1R5 Environment</li> <li>z/OS DFSMS: Using Data Sets</li> <li>z/OS DFSMSdfp Advanced Services</li> <li>z/OS MVS JCL Reference</li> <li>z/OS UNIX System Services User's Guide</li> </ul>
Catalog enhand	cements
	Description: The catalog enhancements include the following changes:
   	• <b>JOBCAT and STEPCAT</b> : Originally, the JOBCAT and STEPCAT DD statements were needed to handle usability problems of volume ownership before Integrated Catalog Facility (ICF) became available.
   	Because JOBCAT and STEPCAT DD statements are no longer needed, they are disabled by default. You have the option to enable or disable JOBCAT and STEPCAT DD statements.
 	SYMREC Records: Previously, the return and reason codes did not provide enough information for users to correct certain catalog errors. New information in the SYMREC records helps you diagnose and resolve certain
 	<ul> <li>Abnormal End of Service Task in Recall: Originally, the DFSMS MODIFY</li> <li>CATALOG command allowed users to end a service task abnormally using the</li> </ul>
   	END or ABEND commands. However, if the active service task was waiting for processing in the user address space to proceed, the system did not abnormally end the task.
 	The new FORCE keyword on the MODIFY CATALOG command allows you to end abnormally the service task even if it is in recall.
   	• Reduced Purges of Virtual Lookaside Facility Cache for Shared Catalogs: Previously, the system unnecessarily purged the Virtual Lookaside Facility (VLF) cache when users were creating new catalog entries regularly.
 	If you use VLF caching for catalogs regularly, this enhancement purges only necessary entries from the catalogs.
   	• Automatic AUTOADD Enablement: Previously, an operator had to enter a command to enable the AUTOADD function. AUTOADD enables enabled coupling facility support of enhanced catalog sharing (ECS) for eligible catalogs.
   	You can specify AUTOADD at the time of installation to enable AUTOADD when the catalog address space (CAS) makes the first connection to the coupling facility.
1	When change was introduced: z/OS V1R5.
1	Reference information:
I	z/OS DFSMS Migration
 	<ul> <li>z/OS DFSMSdfp Using DFSMSdfp in the z/OS V1R5 Environment</li> <li>z/OS DFSMS: Managing Catalogs</li> </ul>

I	<ul> <li>z/OS DFSMS: Using Data Sets</li> </ul>
I	z/OS MVS JCL Reference
I	<ul> <li>z/OS DFSMSdfp Diagnosis Reference</li> </ul>
I	<ul> <li>z/OS DFSMSdfp Storage Administration Reference</li> </ul>
I	CVAF re-indexing of online volumes
i	<b>Description:</b> When a volume table of contents (VTOC) index becomes disabled
İ	you must rebuild the index using the ICKDSF BUILDIX IX command.
I	This enhancement ensures continuous application availability and restores
I	application performance by allowing you to rebuild the index more quickly. All
1	systems can continue to use that volume without interruption to other applications,
	except for a brief pause during the index rebuild. (The system does not allow read or write access to the VTOC and index during the rebuilding of the index.)
I	In addition, this enhancement allows you to issue the ICKDSF REFORMAT
I	commands while the volumes remain online to all sharing systems. These
1	REFORMAT commands refresh the VTOC (RVTOC), extend the VTOC
1	(EXIVIOC), and extend the index (EXIINDEX). Previously, the volume had to be
	work.
	When change was introduced: z/OS V1R5.
I	Reference information:
I	<ul> <li>z/OS DFSMS Migration</li> </ul>
	Device Support Facilities User's Guide and Reference     (22 DECM2 // Living DECM2 // Living CO2 MADE Environment)
1	<ul> <li>z/OS DESMSatp Using DESMSatp in the z/OS V1R5 Environment</li> <li>z/OS DESMSatp Advanced Services (z/OS V1R2)</li> </ul>
	<ul> <li>z/OS MVS Diagnosis: Reference</li> </ul>
1	DFSMS fast replication enhancement
I	<b>Description:</b> The term fast replication refers to the FlashCopy function supported
 	by IBM Enterprise Storage Server (ESS) disk and the SnapShot <sup>™</sup> function supported by IBM RAMAC Virtual Array (RVA) disk.
I	DESMShem is enhanced to use volume-level fast replication to create backup
i	versions for sets of storage groups. A set of storage groups is defined through a
I	new SMS construct termed 'copy pool'. The new DFSMShsm FRBACKUP
I	command creates a fast replication backup version for each volume in every
1	storage group defined within a copy pool. When creating a fast replication backup
1	version, control is returned to the user after a fast replication relationship has been
I I	for a large number of volumes within a small time frame. Volumes that have a fast
i	replication backup version can be recovered either individually or at the copy pool
I	level with the new DFSMShsm FRRECOV command. The new DFSMShsm
I	FRDELETE command deletes unneeded fast replication backup versions. The
1	DFSMShsm HOLD, RELEASE, LIST, QUERY and REPORT commands and
1	ARCX I RCI macro are enhanced to work with the new fast replication backup
	runs under DB2 can use this function to back up data.
I	When change was introduced: z/OS V1R5.
	-

Reference information:

	<ul> <li>z/OS DFSMS Migration</li> <li>z/OS DFSMS Installation Exits</li> <li>z/OS DFSMSdfp Diagnosis Reference</li> <li>z/OS DFSMSdfp Storage Administration Reference</li> <li>z/OS DFSMSdss Storage Administration Guide</li> <li>z/OS DFSMSdss Storage Administration Reference</li> <li>z/OS DFSMShsm Implementation and Customization Guide</li> <li>z/OS DFSMShsm Managing Your Own Data</li> <li>z/OS DFSMShsm Storage Administration Guide</li> <li>z/OS DFSMShsm Storage Administration Reference</li> </ul>
DFSMSdss ph	ysical data set DUMP and RESTORE enhancements
	<ul> <li>Description: DFSMSdss physical data set DUMP and RESTORE commands have been enhanced in the z/OS V1R5 release to provide processing for extended-format VSAM data sets. These commands are used as follows to provided a dump or restore of extended-format VSAM data sets:</li> <li>Use the physical data set DUMP command</li> </ul>
	<ul> <li>Use the physical data set RESTORE command to restore extended-format VSAM data sets that were dumped using:</li> <li>physical data set DUMP</li> </ul>
l	<ul> <li>full volume DUMP</li> </ul>
l	When change was introduced: z/OS V1R5.
	<ul> <li>Reference information:</li> <li>z/OS DFSMS Migration</li> <li>z/OS DFSMSdss Storage Administration Reference</li> <li>z/OS DFSMSdss Storage Administration Guide</li> </ul>
DFSMSdss us	e of 64-bit real storage
	<b>Description:</b> Previously, OS/390 V2R10 introduced z/Architecture which provided 64-bit real storage support. DFSMSdss did not support 64-bit real storage at that time.
	In z/OS V1R5, DFSMSdss exploits the 64-bit real storage to allow users to take advantage of the 64-bit real storage on the zSeries hardware. Sixty-four bit real storage enables DFSMSdss to obtain input/output (I/O) buffers backed anywhere in 64-bit real storage, either greater than or less than 2 GB.
	The length of the ADRUFO parameter list has been increased in z/OS V1R5 and in APAR OW57347 for previous releases to support new functions. Your installation exit ADRUIXIT or user interaction module (UIM) might need to be recompiled with the updated ADRUFO macro.
I	When change was introduced: z/OS V1R5.
	<ul> <li>Reference information:</li> <li>z/OS DFSMS Migration</li> <li>z/OS DFSMSdss Storage Administration Reference</li> <li>z/OS DFSMS Installation Exits</li> <li>z/OS MVS JCL Reference</li> </ul>

DFSMSdss R	EPLACEUnconditional Keyword
	<b>Description:</b> The logical data set COPY and RESTORE commands can be used to rename and replace an existing data set name with a new name.
I	When change was introduced: z/OS V1R5.
   	<ul> <li>Reference information:</li> <li>z/OS DFSMSdss Storage Administration Reference</li> <li>z/OS DFSMShsm Storage Administration Guide</li> </ul>
DFSMShsm C	DS/EA using CDSQ or CDSR serialization
   	<b>Description:</b> DFSMShsm provides VSAM KSDS extended addressability (EA) capabilities that use any of the following methods for accessing its control data sets (CDS):
I	Record level sharing (RLS) access mode
I	CDSQ serialization
I	CDSR serialization
     	VSAM EA capabilities allow each migration control data set (MCDS), backup control data set (BCDS), and offline control data set (OCDS) cluster to exceed the 4 GB size. The MCDS and BCDS can span up to four unique KSDS clusters. The OCDS is limited to a single cluster. You must use the same serialization technique to access all CDSs.
I	When change was introduced: z/OS V1R5.
       	<ul> <li>Reference information:</li> <li>z/OS DFSMS Migration</li> <li>z/OS DFSMShsm Implementation and Customization Guide</li> <li>z/OS DFSMShsm Storage Administration Reference</li> <li>z/OS DFSMShsm Storage Administration Guide</li> <li>z/OS DFSMShsm Data Recovery Scenarios</li> </ul>
DFSMShsm m	nigration installation exits
     	<b>Description:</b> Prior to z/OS V1R5, the ARCMDEXT and ARCMMEXT installation exits were only invoked for volume processing, not for data set processing using the HMIGRATE command, the MIGRATE DATASETNAME command, or the ARCHMIG macro. DFSMShsm invoked ARCMDEXT when a data set command requested that a data set migrate from a level 0 volume to a DFSMShsm level 1 or level 2 volume.
   	Beginning with z/OS V1R5, DFSMShsm invokes the ARCMDEXT and ARCMMEXT installation exits for a data set migration that is the result of a command migrate request. A data set migration command with the ML2 keyword causes DFSMShsm to invoke ARCMMEXT when a data set that is already on ML1 migrates to ML2.
I	When change was introduced: z/OS V1R5.
     	<ul> <li>Reference information:</li> <li>z/OS DFSMS Migration</li> <li>z/OS DFSMS Installation Exits</li> <li>z/OS DFSMShsm Managing Your Own Data</li> <li>z/OS DFSMShsm Storage Administration Guide</li> <li>z/OS DFSMShsm Storage Administration Reference</li> </ul>

# DFSMShsm RACF FACILITY class enhancement

	<b>Description:</b> DFSMShsm provides a way to protect all DFSMShsm command access through the use of RACF FACILITY class profiles. An active RACF FACILITY class establishes the security environment. An active FACILITY class means that DFSMShsm uses RACF protection for all commands instead of using only simple AUTH command protection.
   	To use RACF FACILITY class checking, the RACF FACILITY class must be active when DFSMShsm is started. If the RACF FACILITY class is active, the following processing occurs:
	<ul> <li>DFSMShsm uses RACF FACILITY class checking for all authorized and user commands</li> </ul>
	DFSMShsm honors profiles in the FACILITY class that are added or modified
	<ul> <li>The ABACKUP and ARECOVER commands are only authorized with the use of the RACF FACILITY class. Neither the AUTH command nor the UID startup procedure parameter can override the RACF FACILITY class definition.</li> </ul>
	If RACF FACILITY class is not active, DFSMShsm uses AUTH or UID to process all storage administrator commands.
l	When change was introduced: z/OS V1R5.
l	Reference information:
l	<ul> <li>z/OS DFSMShsm Implementation and Customization Guide</li> </ul>
	<ul> <li>z/OS DFSMShsm Storage Administration Guide</li> </ul>
	<ul> <li>z/OS DFSMShsm Storage Administration Reference</li> </ul>
	<ul> <li>z/OS DFSMShsm Managing Your Own Data</li> </ul>
	z/OS DFSMS Migration
DFSMSrmm m	anaging data sets and volumes in a set
	<b>Description:</b> With the introduction of this function, customers can use the DFSMSrmm ISPF dialog to perform the following actions:
	Search for all data sets in a multi-volume set.
l	Change all volumes in a multi-volume set.
l	Release all volumes in a multi-volume set.
l	<ul> <li>Delete all volumes in a multi-volume set.</li> </ul>
I	When change was introduced: z/OS V1R3.
   	<ul> <li>Reference information:</li> <li>z/OS DFSMS Migration</li> <li>z/OS DFSMSrmm Guide and Reference</li> </ul>
Enhanced data	a integrity for sequential data sets
	<b>Description:</b> Users can concurrently access a shared sequential data set on DASD for output or update processing. You allocate a shared data set with DISP=SHR. In some cases, the programs are designed to share data sets. In other cases, the programs are not designed for sharing data. Therefore, concurrent users might accidentally lose or destroy data, because one user could overwrite another user's updates.

   	Data integrity for sequential data sets has been enhanced in z/OS DFSMS V1R5. When you activate the enhanced data integrity function, you can prevent accidental data loss by setting the sharing specifications for sequential data sets that are opened for output or update.
   	Applications can exclude their sequential data sets from the enhanced data integrity function. If the data integrity function reports a violation because a program is opening a sequential data set for writing when it is already open for writing, you can choose to:
	Request that OPEN processing abend.
	Issue a warning message.
I	When change was introduced: z/OS V1R5.
	<ul> <li>Reference information:</li> <li>z/OS DFSMS Migration</li> <li>z/OS DFSMSdfp Using DFSMSdfp in the z/OS V1R5 Environment</li> <li>z/OS DFSMS: Using Data Sets</li> <li>z/OS DFSMSdfp Storage Administration Reference</li> <li>z/OS MVS Initialization and Tuning Reference</li> <li>z/OS MVS Programming: Authorized Assembler Services Guide</li> <li>z/OS MVS System Management Facilities (SMF)</li> </ul>
File sequence	number greater than 9999
   	<b>Description:</b> Beginning with z/OS V1R5, the maximum value of the file sequence number for a data set on a tape volume has increased from 9999 to 65 535 for the following media:
 	<ul> <li>IBM standard label (SL) tapes including standard user label tape (SUL) and leading tape mark (LTM)</li> </ul>
1	Unlabeled (NL) tapes
I	Bypass label processing (BLP)
   	<b>DFSMSdfp:</b> This enhancement allows you to stack files on tape volumes so that you can fully use large capacity tape cartridges. The enhancement is available only for SL, SUL, LTM, and NL tapes. The ISO/ANSI (AL) labeled tapes do not allow a file sequence number greater than 9999.
   	While the JCL LABEL parameter limits you to a maximum of 9999, you can implement this enhancement by using the OPEN macro if the data set is cataloged, or by using both the RDJFCB macro and the OPEN, TYPE=J macro if the data set is not cataloged.
I	DFSMShsm: The following changes are implemented for ABARS processing:
   	<ul> <li>The ABARS INCLUDE data set can include cataloged data sets that reside on tape. ABARS can back up and recover a cataloged tape data set with a file sequence number greater than 9999.</li> </ul>
     	• The ABARS ACCOMPANY data set includes cataloged tape data sets. ABARS does not back up those data sets. Instead, you supply the tape that contains the data sets. At the recovery site, ABARS needs to only catalog the data sets. ABARS ensures that a recovery site can successfully recatalog and open an ACCOMPANY tape data set whose file sequence number is greater than 9999.
	<b>DFSMSrmm:</b> The increased maximum file sequence number allows you to stack files on tape volumes to fully use large capacity tape cartridges.

I	When change was introduced: z/OS V1R5.
           	<ul> <li>Reference information:</li> <li>z/OS DFSMS Migration</li> <li>z/OS DFSMSdfp Using DFSMSdfp in the z/OS V1R5 Environment</li> <li>z/OS DFSMS: Using Data Sets</li> <li>z/OS DFSMSdfp Diagnosis Reference</li> <li>z/OS DFSMShsm Storage Administration Guide</li> <li>z/OS DFSMSrmm Application Programming Interface</li> <li>z/OS DFSMSrmm Guide and Reference</li> <li>z/OS DFSMSrmm Implementation and Customization Guide</li> <li>z/OS DFSMSrmm Reporting</li> </ul>
Media types	and recording technologies expanded to 255
       	<b>Description:</b> When the system-managed tape library was originally designed, it supported up to 8 media types and 15 recording technologies. Four of the eight media types (MEDIA1/CST, MEDIA2/ECCST, MEDIA3/HPCT, and MEDIA4/EHPCT) and five of the 15 recording technologies (18-TRACK, 36-TRACK, 128-TRACK, 256-TRACK, and 384-TRACK) are used today. The tape library now supports 255 media types and recording technologies to allow you to easily use additional media types and recording technologies as they become available.
I	When change was introduced: z/OS V1R5.
     	<ul> <li>Reference information:</li> <li>z/OS DFSMS Migration</li> <li>z/OS DFSMS Installation Exits</li> <li>z/OS DFSMS: Managing Catalogs</li> <li>z/OS DFSMShsm Diagnosis Reference</li> </ul>
Name-hiding	g function
     	<b>Description:</b> In previous releases, you could read the VTOC, VTOC index, or list the names of all cataloged data sets. DFSMS listed data set names in Interactive System Productivity Facility (ISPF) reports, such as Dslist, in ISMF, or using the IEHLIST utility. The names were listed without regard to whether the user had the appropriate authority to access the data sets in the list.
   	In z/OS V1R5, the RACF name-hiding function allows a security administrator to prevent unauthorized users from obtaining data set names that they do not already know. If the user's request includes the data set name, the system does not hide the name.
     	When the name-hiding function is active, DFSMS does not display the names of cataloged data sets unless you have READ access authority to that data set. To open the VTOC or VTOC index, you need access authority to the RACF FACILITY class STGADMIN.IFG.READVTOC. <i>volser</i> . The catalog displays the names of data sets to which you have read access. You can protect the catalog information using ALTER authority to the catalog.
       	The name-hiding function applies only to a request in which the data set name is not fully qualified (the name is generic). If you have just the generic data set name, you cannot obtain information about the data set. If you have the fully-qualified data set name, you can obtain information about the data set even if you do not have access to it. IBM0.TEST.DATA is an example of a fully-qualified data set name. IBM0.* is an example of a generic data set name.
Use the RACF SETROPTS MLNAMES command to activate the name-hiding function.

When change was introduced: z/OS V1R5.

### **Reference information:**

- z/OS DFSMS Migration
- z/OS DFSMSdfp Using DFSMSdfp in the z/OS V1R5 Environment
- z/OS DFSMS: Using Data Sets
- z/OS DFSMSdfp Diagnosis Reference
- z/OS DFSMSdfp Storage Administration Reference
- z/OS DFSMSdss Storage Administration Guide
- z/OS DFSMShsm Storage Administration Guide
- z/OS DFSMSrmm Application Programming Interface
- z/OS DFSMSrmm Guide and Reference
- z/OS DFSMSrmm Implementation and Customization Guide
- z/OS Planning for Multilevel Security
- z/OS Security Server RACF Auditor's Guide
- z/OS Security Server RACF Command Language Reference
- z/OS Security Server RACF Security Administrator's Guide

### OAM object enhancements

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**Description:** The improved volume management function allows OAM to expire object tape volumes and to expire tape and optical volumes that belong to object backup storage groups. This function significantly reduces the amount of private storage that the OAM address space uses at larger installations.

OAM expires objects based on the management class criteria that you specify. When an OAM object is expired, all copies of the object are deleted. OAM expires all tape and optical volumes that are associated with the primary object storage group or any object backup storage group. All objects on a volume must be expired or moved before a volume can be expired. This expiration criteria applies to all objects that exist on a volume. OAM recycles and deletes tape and optical volumes after it moves all expired objects off of the volumes.

In addition, improved volume management allows you to perform the following functions:

- Recycle and delete tape and optical volumes once OAM has successfully moved all objects off of them.
- Delete volumes after OAM has successfully completed recovery of a volume and allows you to stop volume recovery that is already in progress.
- · Manage OSMC cycles better.

For DFSMSrmm, this enhancement provides the ability to recycle object tape volumes, as well as, optical volumes belonging to backup object storage groups. When a volume is released from DFSMSdfp, DFSMSrmm is now able to release the volume.

#### When change was introduced: z/OS V1R5.

### **Reference information:**

- z/OS DFSMS Migration
- z/OS DFSMS OAM Planning, Installation, and Storage Administration Guide for Object Support
- z/OS DFSMS Introduction

     	<ul> <li>z/OS DFSMSdfp Diagnosis Reference</li> <li>z/OS DFSMSdfp Storage Administration Reference</li> <li>z/OS DFSMSrmm Guide and Reference</li> <li>z/OS DFSMSrmm Implementation and Customization Guide</li> <li>z/OS and z/OS.e Planning for Installation</li> </ul>
SMS	availability and usability enhancements
I	Description: With these SMS enhancements, you can perform the following tasks:
   	<ul> <li>Change the setting for generation data set (GDS) reclaim processing, without having to IPL the system. By default, SMS automatically reclaims GDSs. You can choose whether to disallow automatic reclaiming of GDSs.</li> </ul>
   	<ul> <li>Save the current active control data set (ACDS) as a source control data set (SCDS) so that you do not have to redefine your base configuration if an SCDS and its backups are lost. You also can save all the changes made to the active configuration in the SCDS.</li> </ul>
 	<ul> <li>Perform space management when you are notified that a storage group has exceeded its high allocation threshold when SMS detects it.</li> </ul>
         	<ul> <li>Implement the storage group sequence order that your ACS storage group selection routines specify. Organize your storage groups based on a common characteristic, such as data set size. For example, you have three storage groups called SSG for small data sets, MSG for medium data sets, and LSG for large data sets. SMS directs all small data sets to the SSG storage group until it runs out of space. SMS directs all medium data sets to the MSG storage group until it runs out of space. SMS directs all large data sets to LSG storage group.</li> </ul>
   	<ul> <li>Use automation products to intercept new messages that SMS writes to the hardcopy log when SMS is unable to extend a data set to a new volume. You can make more space available to the storage group in the following ways:</li> </ul>
I	<ul> <li>By invoking DFSMShsm space management on the storage group.</li> </ul>
I	<ul> <li>By adding new volumes to the new storage group.</li> </ul>
I	When change was introduced: z/OS V1R5.
         	<ul> <li>Reference information:</li> <li>z/OS DFSMS Migration</li> <li>z/OS DFSMSdfp Using DFSMSdfp in the z/OS V1R5 Environment</li> <li>z/OS DFSMS Access Method Services for Catalogs</li> <li>z/OS DFSMS: Managing Catalogs</li> <li>z/OS DFSMS: Using Data Sets</li> <li>z/OS DFSMSdfp Storage Administration Reference</li> <li>z/OS MVS Initialization and Tuning Reference</li> </ul>
Strip	bing enhancements to extended-format sequential data sets
     	<b>Description:</b> Previously, a striped, extended-format sequential data set could be allocated with a maximum of 16 stripes, which limited the maximum data set size to 16 volumes. When the space on these volumes was filled, DFSMS could not extend the data set any further. To increase the size of the data set, you need to allocate it with more stripes.
   	Beginning with z/OS V1R5, an extended-format sequential data set can have a maximum of 59 stripes and, thus, a maximum of 59 volumes. This feature allows you to create a much larger striped, extended-format sequential data set. An extended-format, striped sequential data set supports up to 4 GB blocks. Although

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volumes, you can extend the data set on the original volumes. An extended-format sequential data set can have a maximum of 7257 extents (123 times 59). When DFSMS extends the data set, DFSMS obtains space on all volumes for the data set. Thus, the total quantity of storage is 59 times what could be acquired on a single volume without striping.

### When change was introduced: z/OS V1R5.

#### **Reference information:**

- z/OS DFSMS Migration
- z/OS DFSMSdfp Using DFSMSdfp in the z/OS V1R5 Environment
- z/OS DFSMS: Using Data Sets
- z/OS DFSMSdfp Storage Administration Reference
- z/OS DFSMShsm Storage Administration Reference

### VSAM enhancements

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**Description:** z/OS DFSMS V1R5 includes the following VSAM enhancements:

### • Enhanced data integrity for VSAM data sets with alternate indexes:

In previous releases, when local shared resource buffers were in short supply and numerous alternate indexes existed, VSAM attempted to back out prior updates. This attempt failed because of the insufficient buffer space. Therefore, a data integrity problem occurred because the alternate indexes were not synchronized with the base VSAM cluster.

In z/OS V1R5, VSAM determines the number of resources required to complete upgrading on all the alternate indexes defined for the base VSAM cluster. If there are not enough resources, the request fails and the application is given the option of retrying the failed request.

### • VSAM extent reduction:

VSAM data sets have a limit of 255 extents. Up to 123 of those extents can be on each volume.

In z/OS V1R5, the system consolidates adjacent extents for extended-format VSAM data sets when extending on the same volume. The new extent is incorporated into the previous extent, thus saving one in the extent count. For instance, the old extent begins on cylinder 6, track 0, and ends on cylinder 9, track 14, and the new extent begins on cylinder 10, track 0, and ends on cylinder 12, track 14. The two extents are combined into one extent beginning on cylinder 6, track 0, and ending on cylinder 12, track 14. Instead of two extents, there is only one extent.

This enhancement attempts to reduce the number of extents so as not to approach the limit of 255 extents for VSAM data sets. Also, this enhancement allows more growth in VSAM data sets. VSAM extent reduction is automatic and requires no customer action.

#### Multiple-line VSAM messages:

In previous releases, VSAM messages that were too long for one line were broken into multiple single-line messages. Unrelated messages sometimes appeared between the VSAM messages, making it difficult for the operator to read the message log.

In z/OS V1R5, VSAM writes each message as a multiple-line message on adjacent lines so that the user can interpret the information more easily and quickly. Unrelated messages no longer appear between the lines of a multiple-line VSAM message. Multiple-line VSAM messages also allow automation programs to take action based on the composite message.

I	When change was introduced: z/OS V1R5.
     	<ul> <li>Reference information:</li> <li>z/OS DFSMS Migration</li> <li>z/OS DFSMSdfp Using DFSMSdfp in the z/OS V1R5 Environment</li> <li>z/OS DFSMS: Using Data Sets</li> <li>z/OS DFSMSdfp Storage Administration Reference</li> <li>z/OS DFSMShsm Storage Administration Reference</li> </ul>
DFSMStvs	
   	<b>Description:</b> DFSMStvs enables you to run batch VSAM processing concurrently with CICS online transactions. You can run multiple batch jobs and online transactions against the same VSAM data, in data sets defined as recoverable, with concurrent updates. DFSMStvs offers these features:
1	<ul> <li>Concurrent shared update of VSAM recoverable data sets across CICS transactions and batch applications</li> </ul>
	<ul> <li>Ability to run multiple batch jobs concurrently instead of serially</li> </ul>
I	<ul> <li>Logging, commit, and backout functions</li> </ul>
	<ul> <li>24 x 7 CICS Transaction Server (TS) applications</li> </ul>
 	<ul> <li>Data sharing across CICS TS applications, batch applications, and local or distributed object-oriented (OO) applications</li> </ul>
     	Building on the functionality of VSAM RLS, DFSMStvs provides transactional capability within the file system. If a batch job fails during concurrent shared updates of recoverable VSAM data sets, DFSMStvs provides the services to back out any changes that the batch job made automatically, restoring the data to the state it was in at the last synchronization point (commit or back out).
I	You can use DFSMStvs in two major areas:
     	<ul> <li>Transactional processing provides data sharing for recoverable resources. Transactional processing ensures that the data is kept in sync while multiple parties update the data and ensures data integrity if a job or system failure occurs. Products such as CICS, IMS, and DB2 provide a transactional environment.</li> </ul>
     	• Transactional recovery isolates the changes made to recoverable resources into logical units of work that are recoverable. When a transaction makes a change, only that transaction can update the changed data. After DFSMStvs commits the transaction, all data associated with that logical unit of work is available to other transactions for update.
     	DFSMStvs also supports forward recovery logging for data sets that are defined as forward recoverable (the LOG parameter value is ALL). If data is lost or damaged, you can restore it from a backup, and you can use a forward recovery utility such as CICS VSAM Recovery (CICSVR) to reapply changes that were made since the last backup.
     	CICSVR automates the recovery of lost or damaged VSAM data sets. It determines what CICS journals and VSAM backups are needed, and it constructs the recovery jobs. CICSVR provides automated complete recovery, forward recovery, and backout functions. CICSVR VSAM batch logging is available with CICS VSAM Recovery V3R1.
I	When change was introduced: z/OS V1R4.

I	Reference information:
I	z/OS DFSMS Migration
I	<ul> <li>z/OS DFSMS: Using Data Sets</li> </ul>
I	CICSVR V3R1 Implementation Guide
I	<ul> <li>z/OS MVS Initialization and Tuning Reference</li> </ul>
I	z/OS MVS JCL Reference
I	<ul> <li>z/OS MVS Programming: Resource Recovery</li> </ul>
I	<ul> <li>z/OS MVS Setting Up a Sysplex</li> </ul>
Ι	<ul> <li>z/OS MVS System Commands</li> </ul>
Ι	Catalog customer satisfaction
 	<b>Description:</b> Catalog customer satisfaction improves your ability to self-diagnose problems when using catalog functions. The benefits are:
 	<ul> <li>Operator console responses to catalog address space (CAS) commands now contain additional information.</li> </ul>
 	<ul> <li>Discarded queued operator commands that are addressed to the CAS are now highlighted.</li> </ul>
 	<ul> <li>The storage administrator can control syntax checking of data set names in the catalog</li> </ul>
I	When change was introduced: z/OS V1R3.
I	Reference information:
I	<ul> <li>z/OS DFSMSdfp Diagnosis Reference</li> </ul>
I	<ul> <li>z/OS DFSMS: Managing Catalogs</li> </ul>
I	<ul> <li>z/OS DFSMS: Using Data Sets</li> </ul>
Ι	z/OS DFSMS Migration
Ι	Catalog usage threshold
	<b>Description:</b> Previously, when a catalog filled up the last extent, an error occurred trying to add a new record to the catalog. Those errors caused serious problems ranging from failed applications to a sysplex shutting down. Your installation can specify when to issue a warning message about catalogs that are becoming full. You can set an extent threshold that triggers a warning message when a catalog reaches a specified percentage of the maximum number of extents. This warning message reduces the likelihood of system outages because catalogs become full without warning.
Ι	When change was introduced: z/OS V1R3 (PTF UW88213 for APAR OW54162).
I	Reference information:
I	<ul> <li>z/OS DFSMSdfp Using DFSMSdfp in the z/OS V1R5 Environment</li> </ul>
I	<ul> <li>z/OS DFSMS: Managing Catalogs</li> </ul>
I	<ul> <li>z/OS MVS System Messages, Vol 7 (IEB-IEE)</li> </ul>
I	z/OS DFSMS Migration
Ι	OAM multiple object backup
 	<b>Description:</b> With OAM multiple object backup, you can physically separate backup copies of objects based on the object storage group to which the object belongs.

   	You can direct your backup copies of objects to different media types, including optical or tape, based on the definitions for the target object backup storage group that will contain the backup copy.
       	The multiple object backup storage group capability allows you to make a second backup copy of objects. You can use OAM to create up to two backup copies of objects using current fields in the SMS management class construct and by specifying a first and a second object backup storage group for your object storage groups in the CBROAMxx member of PARMLIB. Additionally, you can direct OAM to write the first and second backup copies on the same removable media type or on different removable media types.
     	Finally, with this function, OAM improves the overall reliability and usability of the volume recovery utility. OAM provides a full list of volumes required to accomplish a recovery beyond the previous limit of 70 144 objects that can be recovered during a single invocation of the recovery utility. Additionally, during a volume recovery, OAM provides improved informational messages. It also provides the ability to obtain statistics on the volume recovery.
Ι	When change was introduced: z/OS V1R3.
I	Reference information:
I	<ul> <li>z/OS DFSMS: Implementing System-Managed Storage</li> </ul>
I	<ul> <li>z/OS DFSMS OAM Application Programmer's Reference</li> </ul>
	<ul> <li>z/OS DFSMS OAM Planning, Installation, and Storage Administration Guide for Object Support</li> </ul>
1	<ul> <li>z/OS DFSMSdfp Storage Administration Reference</li> </ul>
I	<ul> <li>z/OS MVS System Messages, Vol 4 (CBD-DMO)</li> </ul>
I	z/OS DFSMS Migration
VSAM in	dex control interval size calculation
 	<b>Description:</b> DFSMS has changed the way it calculates the control interval size (CISIZE) for the following VSAM data set types with index components:
I	<ul> <li>Key-sequenced data sets (KSDS)</li> </ul>
I	Alternate indexes
I	Variable-length relative record data sets (VRRDS)
       	An index record describes all of the CIs in a CA for the data component of a VSAM data set. When you define a VSAM data set, the CI size used is the larger of what you specify in the allocation or the size that DFSMS calculates. Therefore, the size that you specify is not necessarily used. This change might cause problems for users of local shared resources (LSR) because they must choose their buffer pool sizes for BLDVRP before running applications such as IMS or CICS.
I	When change was introduced: z/OS V1R3 (Flash10180).
I	Reference information:
	<ul> <li>z/OS DESMS: Using Data Sats</li> </ul>
1	$\sim 2/00$ DESMS Migration
I	· 2/05 DESING MIGRANON

# VSAM key-range specifications is obsoleted

Ι

	<b>Description:</b> The KEYRANGE parameter is no longer available. The value of key-ranges as a feature of VSAM key-sequenced data sets has diminished significantly with the introduction of new DASD cached controllers, improved SMS DASD performance parameters, and VSAM data striping.
     	Starting with z/OS V1R3, you cannot specify KEYRANGE on the IDCAMS DEFINE and IMPORT commands. This change applies to any new data set created by the IDCAMS DEFINE or IMPORT commands. This change also applies to data sets that are reorganized using any of the following commands: • EXPORT
1	<ul><li>IMPORT</li><li>REPRO, DELETE, and DEFINE</li></ul>
1	Existing key-range data sets continue to work without change. However, you cannot define new key-range data sets.
I	When change was introduced: z/OS V1R3.
 	<b>Reference information:</b> • z/OS DFSMS Access Method Services for Catalogs
I I	<ul> <li>z/OS DFSMSdfp Diagnosis Reference</li> <li>z/OS DFSMS: Managing Catalogs</li> </ul>
 	<ul> <li>z/OS DFSMS: Using Data Sets</li> <li>z/OS DFSMShsm Implementation and Customization Guide</li> </ul>
l I	<ul> <li>z/OS DFSMShsm Storage Administration Reference</li> <li>z/OS DFSMS Migration</li> </ul>
DFSMSrmm ba	ackup at anytime
	<b>Description:</b> In the past, you could not start a backup of the DFSMSrmm control data set if DFSMSrmm inventory management was already running. Likewise, you could not start inventory management if a backup was already running. With this enhancement, you no longer need to wait for inventory management to complete before you start a backup. You can start a backup if inventory management is already running. You can also start inventory management if a backup up the control data set.
1	When change was introduced: z/OS V1R3 by D-APAR (PTFs UA90010, UA90011, and UA90012).
I	Reference information:
I	<ul> <li>z/OS DFSMSrmm Application Programming Interface</li> </ul>
	z/OS DFSMSrmm Guide and Reference
	z/OS DFSMSrmm Implementation and Customization Guide
1	<ul> <li>z/OS DFSMS Migration</li> </ul>
DFSMSrmm du	uplicate volume support
	<b>Description:</b> With this enhancement, you can now place duplicate volumes under

**Description:** With this enhancement, you can now place duplicate volumes under DFSMSrmm management. Without the ability to use duplicate volumes within

   	DFSMSrmm, you could only process a duplicate volume outside of DFSMSrmm management by using the DFSMSrmm EDGUX100 exit to request that DFSMSrmm ignore the volume.
1	When change was introduced: z/OS V1R3 by D-APAR (PTFs UA90010, UA90011, and UA90012).
I	Reference information:
I	• z/OS DFSMSrmm Application Programming Interface
I	• z/OS DFSMSrmm Guide and Reference
I	<ul> <li>z/OS DFSMSrmm Implementation and Customization Guide</li> </ul>
I	<ul> <li>z/OS MVS System Messages, Vol 5 (EDG-GFS)</li> </ul>
I	z/OS DFSMS Migration
DFSMSrmm c	ommand authorization using data set names
   	<b>Description:</b> DFSMSrmm provides capabilities to control command authorization. You can specify the DFSMSrmm EDGRMMxx parmlib OPTION COMMANDAUTH command to control command authorization to use either volume ownership or data set names, or a combination of both.
1	When change was introduced: z/OS V1R3 by D-APAR (PTFs UA90010, UA90011, and UA90012)
I	Reference information:
	• z/OS DFSMSrmm Application Programming Interface
I	z/OS DFSMSrmm Guide and Reference
I	• z/OS DFSMSrmm Implementation and Customization Guide
	<ul> <li>z/OS MVS System Messages, Vol 5 (EDG-GFS)</li> </ul>
I	z/OS DFSMS Migration
DFSMSrmm d	efault media name
   	<b>Description:</b> DFSMSrmm provides capabilities to set a default media name for your installation that is used when adding a volume, defining a pool, or using the DFSMSrmm utility EDGINERS to initialize or erase volumes.
1	When change was introduced: z/OS V1R3 by D-APAR (PTFs UA90010, UA90011, and UA90012)
I	Reference information:
I	• z/OS DFSMSrmm Application Programming Interface
1	• z/OS DFSMSrmm Guide and Reference
I	• z/OS DFSMSrmm Implementation and Customization Guide
1	<ul> <li>z/OS MVS System Messages, Vol 5 (EDG-GFS)</li> </ul>
I	z/OS DFSMS Migration
DFSMSrmm T	SO/E help packaging enhancement
   	<b>Description:</b> You no longer need to copy DFSMSrmm TSO/E help into SYS1.HELP or to concatenate the SYS1.SEDGHELP library because DFSMSrmm TSO/E help is now included in SYS1.HELP with the rest of DFSMS.
I	When change was introduced: z/OS V1R3

	Reference information:
I	• z/OS DFSMSrmm Implementation and Customization Guide
I	z/OS DFSMS Migration
I	DFSMSrmm ACS pooling control enhancements
       	<b>Description:</b> DFSMSrmm automatic class selection (ACS) pooling control enhancements have been made so you can enable or disable ACS processing introduced with OS/390 V2R10. Use this enhancement to control DFSMSrmm support for pre-ACS processing and to control assignment of storage group and management class. You can set up DFSMSrmm to call SMS ACS processing to use your ACS routine management class and storage group values instead of vital record specification management values and scratch pools.
Ι	When change was introduced: z/OS V1R3
Ι	Reference information:
I	z/OS DFSMSrmm Reporting
I	z/OS DFSMSrmm Guide and Reference
I	• z/OS DFSMSrmm Implementation and Customization Guide
I	<ul> <li>z/OS MVS System Messages, Vol 5 (EDG-GFS)</li> </ul>
I	z/OS DFSMS Migration
Ι	DFSMSrmm reporting enhancements
	<b>Description:</b> DFSMSrmm reporting enhancements simplify the task of obtaining information about data sets and volumes using DFSMSrmm reporting utilities. You can now create an extract data set of the DFSMSrmm control data set that contains an extended record. The extended record combines data set and volume information into a single record. Additionally, the DFSMSrmm-supplied sample EDGRRPTE exec that uses the extract data set as input has been enhanced as part of this new function.
I	part of this new function.
	When change was introduced: z/OS V1R3
	When change was introduced: z/OS V1R3 Reference information:
   	When change was introduced: z/OS V1R3 Reference information: • z/OS DFSMSrmm Reporting
	<ul> <li>When change was introduced: z/OS V1R3</li> <li>Reference information: <ul> <li>z/OS DFSMSrmm Reporting</li> <li>z/OS DFSMSrmm Implementation and Customization Guide</li> </ul> </li> </ul>
	<ul> <li>When change was introduced: z/OS V1R3</li> <li>Reference information: <ul> <li>z/OS DFSMSrmm Reporting</li> <li>z/OS DFSMSrmm Implementation and Customization Guide</li> <li>z/OS DFSMS Migration</li> </ul> </li> </ul>
	When change was introduced: z/OS V1R3 Reference information: • z/OS DFSMSrmm Reporting • z/OS DFSMSrmm Implementation and Customization Guide • z/OS DFSMS Migration DFSMSrmm recording the data set expiration date
	<ul> <li>When change was introduced: z/OS V1R3</li> <li>Reference information: <ul> <li>z/OS DFSMSrmm Reporting</li> <li>z/OS DFSMSrmm Implementation and Customization Guide</li> <li>z/OS DFSMS Migration</li> </ul> </li> <li>DFSMSrmm recording the data set expiration date <ul> <li>Description:In the past, DFSMSrmm maintained the expiration date for volumes. DFSMSrmm recorded the volume expiration date as the highest expiration date of the data sets that reside on the volume. There was no easy way to know the expiration dates for individual data sets on a volume. You had to manage data sets on a volume based on the volume expiration date rather than the individual data set expiration date. With greater capacity tape media and products that can stack multiple volumes on the same media, you need to better manage the data sets on a volume. DFSMSrmm now records the expiration date for data sets during output processing.</li> <li>Add expiration dates for data sets.</li> </ul> </li> </ul>

I	<ul> <li>Better determine how to retain multiple files on a volume.</li> </ul>
I	<ul> <li>Move data sets to other volumes more effectively.</li> </ul>
1	<ul> <li>Group data sets more effectively by using of tape stacking products from vendors who use the expiration date information to group data sets.</li> </ul>
   	You can also write Restructured Extended Executor (REXX) execs or use the DFSMSrmm application programming interface to obtain information about data set expiration dates.
     	The way that DFSMSrmm maintains and uses the expiration date for volumes is unchanged. DFSMSrmm records the expiration date for a date set but does not use the expiration date to determine data set retention. A data set VRS that specifies UNTILEXPIRED still uses the volume expiration date to determine VRS retention of a data set.
I	When change was introduced: z/OS V1R3.
     	<ul> <li>Reference information:</li> <li>z/OS DFSMS Migration</li> <li>z/OS DFSMSrmm Application Programming Interface</li> <li>z/OS DFSMSrmm Command Reference Summary</li> <li>z/OS DFSMSrmm Guide and Reference</li> <li>z/OS DFSMSrmm Reporting</li> </ul>
DFSMSrmm	report generator enhancements
 	<b>Description:</b> The customer can perform the following tasks by using the DFSMSrmm Report Generator Enhancements.
I	<ul> <li>Selection criteria with substring comparison</li> </ul>
I	<ul> <li>Selection criteria with comparison to the actual date</li> </ul>
I	<ul> <li>Selection criteria with field to field comparison</li> </ul>
I	<ul> <li>Visibility of fields that are used for comparison</li> </ul>
I	<ul> <li>Visibility of the ISPF skeleton name used</li> </ul>
I	<ul> <li>Optional step for creating the extract data</li> </ul>
I	<ul> <li>Improved performance with member selection</li> </ul>
I	<ul> <li>Improved ordering of selected columns</li> </ul>
I	<ul> <li>Improved default handling of report libraries</li> </ul>
I	Break totals when grouping is used
I	When change was introduced: z/OS V1R3.
   	<ul> <li>Reference information:</li> <li>z/OS DFSMS Migration</li> <li>z/OS DFSMSrmm Reporting</li> </ul>
IBM TotalSt	orage Enterprise Tape System 3592
     	<b>Description:</b> The IBM TotalStorage Enterprise Tape System 3592 Model J tape drive reduces data storage costs by increasing media capacity. The model J1A is designed for use in the stand-alone environment or tape library environments (automated or manual) and does not have a cartridge loader. The 3592 Model J tape drives offer these features:
	or scaling for capacity using the full 300 GB of physical tape.

         	<ul> <li>Reads and writes EFMT1 (enterprise format 1) recording technology.</li> <li>Uses the enterprise tape cartridge (MEDIA5) physical media providing 300 GB of uncompressed capacity and 900 GB (assuming a 3:1 compression ratio) of compressed capacity depending on the type of data written.</li> <li>Emulates 3590-1 Model B1<i>x</i> or 3490E tape drives.</li> <li>Can be used in a stand-alone environment or in an SMS tape library environment.</li> <li>Coexists with 3490E and 3590 devices in the 3494 automated tape library.</li> <li>Coexists with 3490E, and 3590 devices in a manual tape library.</li> </ul>
I	Reference information:
1	<ul> <li>z/OS DFSMS Software Support for IBM TotalStorage Enterprise Tape System 3592</li> </ul>
 	<ul> <li>z/OS DFSMS Access Method Services for Catalogs</li> <li>z/OS DESMS Installation Exits</li> </ul>
	<ul> <li>z/OS DFSMS Migration</li> <li>z/OS DFSMS Migration</li> </ul>
 	<ul> <li>z/OS DFSMS OAM Planning, Installation, and Storage Administration Guide for Object Support</li> </ul>
1	<ul> <li>z/OS DFSMS OAM Planning, Installation, and Storage Administration Guide for Tape Libraries</li> </ul>
	z/OS DFSMSdfp Storage Administration Reference
1	<ul> <li>z/OS DFSMSrmm Guide and Reference</li> <li>z/OS DFSMSrmm Command Reference Summary</li> </ul>
l	z/OS DFSMSrmm Application Programming Interface
1	<ul> <li>Z/OS DFSMSrmm Reporting</li> <li>EREP Reference</li> </ul>
1	z/OS JES3 Initialization and Tuning Guide
1	<ul> <li>z/OS MVS Initialization and Tuning Reference</li> <li>z/OS MVS Programming: Authorized Assembler Services Guide</li> </ul>
Fibre Channel	Protocol
     	<b>Description:</b> IBM has enhanced peer-to-peer remote copy (PPRC) to use the Fibre Channel Protocol (FCP) of the Enterprise Storage Server as the communications link between the PPRC primary and PPRC secondary computers. These enhancements include establishing paths, deleting paths, and querying paths using the World Wide Node Name (WWNN) instead of control unit (CU) serial number.
 	When change was introduced: z/OS V1R3 (ships 11/21/03 as an SPE on OS/390 V2R10 and z/OS V1R3, and on ICKDSF Release 17).
   	<ul> <li>Reference information:</li> <li>z/OS DFSMS Migration</li> <li>z/OS DFSMS Advanced Copy Services</li> <li>Device Support Facilities User's Guide and Reference</li> </ul>
Large volume	support
	<b>Description:</b> Volume sizes as large as 24 GB and 32 760 cylinders are now supported, allowing you to access a larger amount of data than before. You can configure IBM 3390 Model 9 devices on the Enterprise Storage Server to have up to 32 760 cylinders per device.
I	When change was introduced: z/OS V1R3.

     	<ul> <li>Reference information:</li> <li>z/OS DFSMS Migration</li> <li>z/OS DFSMShsm Storage Administration Reference</li> <li>IBM TotalStorage ESS DFSMS Software Support Reference</li> <li>IBM TotalStorage ESS User's Guide</li> </ul>
RLS coupling	facility caching enhancements
   	<b>Description:</b> VSAM record-level sharing (RLS) coupling facility caching enhancements allow you to specify the amount of data that is cached in the coupling facility (CF) cache structure defined to DFSMS.
I	When change was introduced: z/OS V1R3.
   	<ul> <li>Reference information:</li> <li>z/OS DFSMS Migration</li> <li>z/OS DFSMSdfp Storage Administration Reference</li> </ul>
	<b>Description:</b> VSAM record-level sharing (RLS) lock table coupling facility (CF) duplexing provides support in the following circumstances:
   	<ul> <li>A validity check function during the user-managed rebuild and lock structure ALTER process. This validity-check ensures that the new lock structure has enough free space for locking to proceed.</li> </ul>
 	<ul> <li>System-managed duplexing rebuild function for coupling facility (CF) lock structures</li> </ul>
I	When change was introduced: z/OS V1R3.
   	<ul> <li>Reference information:</li> <li>z/OS DFSMS Migration</li> <li>z/OS DFSMSdfp Storage Administration Reference</li> <li>z/OS MVS Programming: Sysplex Services Guide</li> </ul>
SMS miscellar	neous enhancements
I	Description: The following enhancements are now provided with DFSMSdfp:
 	<ul> <li>Automation assistance. With this support, selected volume selection failure messages are written to a hardcopy log, as well as to the job log.</li> </ul>
     	• <i>Extend storage groups.</i> This enhancement allows the storage administrator to define another storage group name when defining a storage group. The second storage group is called the extend storage group. The extend storage group is used during extend processing for data set end-of-volume processing if the currently allocated storage group does not have sufficient space.
     	• Overflow storage groups. This enhancement allows the storage administrator to designate certain storage groups as overflow storage groups. These overflow storage groups are used during primary space allocation if the volumes in the nonoverflow storage groups are full (above the space allocation threshold).
     	• Data set separation. This enhancement allows the storage administrator to designate groups of data sets to be kept separate at the physical control unit (PCU) level for high availability. Failure isolation means to keep volumes, control units, storage subsystems, and paths to the controllers separate. That way, if one control unit fails, the sysplex can access the data sets on the other control unit.

I	Note that lower-level systems do not recognize the new parameters for data set
	separation. You should retain the IGDSMSxx or IEASYSyy parmlib definitions of
1	• SMS-managed data set EXPDT/RETPD. This support recognizes the EXPDT and
	RETPD parameters on the DD statement of an existing (DISP=OLD)
I	SMS-managed data set, as limited by the data set's management class.
	EXPDT/RETPD is recognized under the following circumstances:
	<ul> <li>The data set is open for output processing.</li> </ul>
 	<ul> <li>The calculated date is within the bounds of the expiration data/retention period limitations in the management class for the data set.</li> </ul>
	• SMF records. If data set allocation fails because of insufficient space, the system
	writes a new SMF record type 42, subtype 10. This SMF record contains the
1	– Job name
	– Program name
	- Step name
	– DD name
1	<ul> <li>Data set name</li> <li>Bequested space quantity</li> </ul>
1	<ul> <li>Data class</li> </ul>
1	<ul> <li>Management class</li> </ul>
I	<ul> <li>Storage group</li> </ul>
1	<b>Recommendation:</b> Use dynamic volume count instead of volume count to save space in the catalog.
I	When change was introduced: z/OS V1R3.
I	Reference information:
	z/OS DFSMS Migration
1	z/OS DFSMSdtp Storage Administration Reference
DFSMSdss FC	NOCOPY/FCWITHDRAW enhancement
       	<b>Description:</b> This enhancement provides the capability to use the IBM Enterprise Storage Server (ESS) FlashCopy <sup>®</sup> FCNOCOPY facility during a DFSMSdss COPY FULL operation and to withdraw the FlashCopy relationship at the completion of a DFSMSdss DUMP FULL operation. This enhancement can improve overall ESS performance due to decreased subsystem resource usage. Prior to this enhancement, when DFSMSdss used FlashCopy to perform a full volume COPY operation, the background task was unconditionally started.
1	When change was introduced: z/OS V1R3 but rolled back to OS/390 V2R10 by APAR OW50446.
   	<ul> <li>Reference information:</li> <li>z/OS DFSMS Migration</li> <li>z/OS DFSMSdss Storage Administration Guide</li> <li>z/OS DFSMSdss Storage Administration Reference</li> </ul>

• z/OS DFSMS Advanced Copy Services

# **DFSMSdss HFS logical copy**

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Description: The COPY command can now be used by DFSMSdss to process a hierarchical file system (HFS) data set. Previously, DFSMSdss users had to use two commands, DUMP and RESTORE, to process an HFS data set.

	When change was introduced: z/OS V1R3.
   	<ul> <li>Reference information:</li> <li>z/OS DFSMSdss Storage Administration Guide</li> <li>z/OS DFSMSdss Storage Administration Reference</li> </ul>
DFSMSdss e	nhanced dump conditioning
   	<b>Description:</b> Prior to the introduction of dump conditioning, DFSMSdss required that you specify the COPYVOLID keyword on the COPY command when performing a full volume copy of an SMS-managed volume. This resulted in the target volume being varied offline automatically due to a duplicate volume serial.
   	The COPY command has a new keyword, DUMPCONDITIONING, which is added as a means to perform a full volume COPY operation that allows both the source and target volumes to remain online, so that full volume DUMP operations can be performed against the source data on an intermediary target location.
   	The DUMPCONDITIONING keyword specifies that you want to create a copy of the source volume for backup purposes, not for the purpose of using the target volume for general applications.
1	The two COPY command keywords, DUMPCONDITIONING and COPYVOLID, are mutually exclusive.
1	When change was introduced: z/OS V1R3 but rolled back to OS/390 V2R10 by APARs OW45674 and OW48234.
   	<ul> <li>Reference information:</li> <li>z/OS DFSMSdss Storage Administration Guide</li> <li>z/OS DFSMSdss Storage Administration Reference</li> </ul>
DFSMShsm o	common recall queue
DFSMShsm o	<b>Common recall queue</b> <b>Description:</b> The common recall queue (CRQ) is a single recall queue that is shared by multiple DFSMShsm hosts. The CRQ enables the recall workload to be balanced across each of these hosts. This queue is implemented through the use of a coupling facility (CF) list structure. Prior to this enhancement, recall requests were processed only by the host on which they were initiated.
DFSMShsm o	Common recall queue Description: The common recall queue (CRQ) is a single recall queue that is shared by multiple DFSMShsm hosts. The CRQ enables the recall workload to be balanced across each of these hosts. This queue is implemented through the use of a coupling facility (CF) list structure. Prior to this enhancement, recall requests were processed only by the host on which they were initiated. The Coupling Facility Structure Sizer (CFSIZER) tool can assist in determining the size of the CF list structure. You can find the tool at http://www.ibm.com/eserver/zseries/cfsizer/.
DFSMShsm o	<ul> <li>Description: The common recall queue (CRQ) is a single recall queue that is shared by multiple DFSMShsm hosts. The CRQ enables the recall workload to be balanced across each of these hosts. This queue is implemented through the use of a coupling facility (CF) list structure. Prior to this enhancement, recall requests were processed only by the host on which they were initiated.</li> <li>The Coupling Facility Structure Sizer (CFSIZER) tool can assist in determining the size of the CF list structure. You can find the tool at http://www.ibm.com/eserver/zseries/cfsizer/.</li> <li>When change was introduced: z/OS V1R3.</li> </ul>
DFSMShsm o	<ul> <li>common recall queue</li> <li>Description: The common recall queue (CRQ) is a single recall queue that is shared by multiple DFSMShsm hosts. The CRQ enables the recall workload to be balanced across each of these hosts. This queue is implemented through the use of a coupling facility (CF) list structure. Prior to this enhancement, recall requests were processed only by the host on which they were initiated.</li> <li>The Coupling Facility Structure Sizer (CFSIZER) tool can assist in determining the size of the CF list structure. You can find the tool at http://www.ibm.com/eserver/zseries/cfsizer/.</li> <li>When change was introduced: z/OS V1R3.</li> <li>Eeference information:</li> <li>z/OS DFSMS Migration</li> <li>z/OS DFSMShsm Implementation and Customization Guide</li> <li>z/OS DFSMShsm Storage Administration Reference</li> </ul>
DFSMShsm of	<ul> <li>Description: The common recall queue (CRQ) is a single recall queue that is shared by multiple DFSMShsm hosts. The CRQ enables the recall workload to be balanced across each of these hosts. This queue is implemented through the use of a coupling facility (CF) list structure. Prior to this enhancement, recall requests were processed only by the host on which they were initiated.</li> <li>The Coupling Facility Structure Sizer (CFSIZER) tool can assist in determining the size of the CF list structure. You can find the tool at http://www.ibm.com/eserver/zseries/cfsizer/.</li> <li>When change was introduced: z/OS V1R3.</li> <li>Reference information: <ul> <li>z/OS DFSMS Migration</li> <li>z/OS DFSMShsm Implementation and Customization Guide</li> <li>z/OS DFSMShsm Storage Administration Reference</li> </ul> </li> </ul>

1	<ul> <li>Assign volumes to bins in volume serial number sequence and bin number sequence</li> </ul>
1	Redirect and reassign moving volumes
	<ul> <li>Obtain information about where volumes reside and where they are moving to or moving from</li> </ul>
I	Perform storage location management by location
 	These enhancements must be manually enabled and once they are enabled, they cannot be disabled.
 	When change was introduced: Introduced in OS/390 V2R10 by APAR OW49863 and integrated into z/OS V1R3.
     	<ul> <li>Reference information:</li> <li>z/OS DFSMS Migration</li> <li>z/OS DFSMSrmm Implementation and Customization Guide</li> <li>For instructions on how to enable these enhancements, see APAR OW49863 and EDGDOCS.</li> </ul>
DFSMSrmm su	upport for using storage locations as home locations
	<b>Description:</b> This enhancement consists of the following functions:
	Enabling storage locations to be used as home locations
	<ul> <li>Enhancing DFSMSrmm TSO/E subcommands so that the creating system ID can be specified</li> </ul>
 	When change was introduced: OS/390 V2R10 by APAR OW48921, integrated in z/OS V1R3.
	Reference information:
	z/OS DFSMS Migration
 	<ul> <li>z/OS DFSMSrmm Implementation and Customization Guide</li> <li>z/OS DFSMSrmm Guide and Reference</li> </ul>
Coupled exten	ded remote copy
       	<b>Description:</b> An enhancement to extended remote copy (XRC) called coupled extended remote copy (CXRC) allows XRC sessions to be coupled together to guarantee that all volumes are consistent to the same time across all coupled XRC sessions. With CXRC, the size of configurations that XRC can handle increases. CXRC can support installations that have thousands of volumes, whereas XRC is designed to support installations that have hundreds of volumes.
I	When change was introduced: z/OS V1R3.
   	<ul> <li>Reference information:</li> <li>z/OS DFSMS Migration</li> <li>z/OS DFSMS Advanced Copy Services</li> </ul>
CONFIGHFS e	nhancements
   	<b>Description:</b> The CONFIGHFS command is supported from clients as well as from the server. HFS sysplex sharing allows support of the CONFIGHFS command for any system in a sysplex, regardless of which system issued the command. The

   	CONFIGHS command can now be issued from any system within a sysplex at z/OS V1R3 or later, assuming that the system on which the file system is mounted is also running z/OS V1R3 or later.
I	When change was introduced: z/OS V1R3.
   	<ul> <li>Reference information:</li> <li>z/OS DFSMS Migration</li> <li>z/OS UNIX System Services Command Reference</li> </ul>
Dynamic volu	me count
   	<b>Description:</b> Previously, you could specify volume count in the data class. Volume count specifies the maximum number of SMS-managed volumes that a data set can span, unless they are overridden by sustained data rate or increased by using the IDCAMS ADDVOL function.
       	As of z/OS V1R3, you can also specify dynamic volume count in the data class. Dynamic volume count also determines the maximum number of volumes that a data set can span. Dynamic volume count enables dynamic addition of volumes to a DASD data set without increasing the number of candidate volumes stored in the catalog. You can specify a value for dynamic volume count, a data class space constraint relief subparameter, so that SMS can determine the number of volumes that a VSAM base cluster or a non-VSAM data set can span. The number can be 1 – 59, with 1 as the default value and 59 as the z/OS volume limit.
     	A new SMF record subtype is now created if an allocation fails because of insufficient space, SMF 42 subtype 10. These records are only produced for failures, not if the allocation succeeded due to an overflow pool being selected. SMF 42 subtype 10 records are not produced in response to EOV or EOD ABENDs.
I	When change was introduced: z/OS V1R3.
   	<ul> <li>Reference information:</li> <li>z/OS DFSMS Migration</li> <li>z/OS DFSMSdfp Storage Administration Reference</li> </ul>
VSAM striped	data set enhancements
   	<b>Description:</b> VSAM striped data sets no longer require contiguous extents when they obtain secondary space. The system allocates secondary space in multiples of control area size. Previously, the system allocated secondary space as one contiguous extent.
l l	VSAM striped data sets support the REUSE parameter of the DEFINE CLUSTER and ALTER commands.
I	When change was introduced: z/OS V1R3.
   	<ul> <li>Reference information:</li> <li>z/OS DFSMS Migration</li> <li>z/OS DFSMS Access Method Services for Catalogs</li> <li>z/OS DFSMS: Using Data Sets</li> </ul>

DFSMSrmm special character support I I Description: You can now use special characters in the volume serial numbers you define to DFSMSrmm as well as the existing alphanumeric and national characters. You can now use all the characters supported by MVS JCL. I When change was introduced: z/OS V1R3. I **Reference information:** I For information about the characters supported, see z/OS MVS JCL Reference. For coexistence considerations, see z/OS DFSMS Migration. I DFSMSrmm report generator I Description: DFSMSrmm report generator provides a new ISPF function for I I creating reports: 1 You can now create reports using sequential data sets as input. You must provide mappings of the records in the input data set for the report generator to pick out information in the input data set. · You can create a DFSMSrmm extract data set using the EDGHSKP utility to create an input file for the report generator. Using the extract data set as input, DFSMSrmm provides mapping macros for the records in the extract data set. 1 · DFSMSrmm provides report types that associate the input file with the needed mapping macros. 1 · The default version of the report generator uses DFSORT ICETOOL as the reporting tool to create reports. You can modify the report generator to use other types of input data sets or other 1 reporting tools. T When change was introduced: OS/390 V2R10 by APAR OW47967, integrated in z/OS V1R3. **Reference information:**  z/OS DFSMS Migration L z/OS DFSMSrmm Reporting VSAM large real storage I Description: VSAM large real storage enables I/O processing with real addresses I I greater than 2 GB for all VSAM data sets, except for VSAM improved control interval processing (ICIP) and VSAM data sets used before the master scheduler is initialized. I When change was introduced: z/OS V1R3. I **Reference information:** T z/OS DFSMS Migration L z/OS DFSMS: Using Data Sets L IBM 3590 capacity utilization and performance enhancements L **Description:** 1 · Capacity utilization: I Allows DFSMShsm<sup>™</sup> and assembler programs to use the full 3590 media I capacity when 3490E emulation mode is used with the IBM 3590 TotalStorace<sup>™</sup> I L Enterprise Tape Controller Model A60 (3590 Model A60).

### DFSMS

1	Deferred conditional tape marks:
	CLOSE writes the last tape mark on an IBM TotalStorage Enterprise Tape Drive
1	3590 (3590) with a new command. The command tells the tape subsystem to
	conditionally write the tape mark unless another write is issued. The result is that
1	(reversals of direction). CLOSE does this automatically with no software change
1	<ul> <li>Buffered tape marks:</li> </ul>
	To maximize data integrity and prevent backhitches, tape subsystems without the
	new option automatically write all buffered data on the tape whenever a tape
	mark is written. This ensures that all user data and the tape labels are on the
1	error to be reflected accurately either to user data or to labels. On standard
	labeled tapes, there are three other tape marks for each file. If it is not important
I	to distinguish between an error in the data and in the labels, the application can
	use a new DCBE macro option that requests tape marks to be buffered.
	For the IBM 3590, the application program can request that the OPEN, EOV and
	CLOSE functions builer tape marks when writing.
1	<ul> <li>Fight speed positioning.</li> <li>OPEN issues and new command that talls have many tang marks to position.</li> </ul>
1	over. When you read or write a file other than the first one on the tape.
	high-speed positioning allows the tape subsystem to position quickly across all
	the appropriate tape marks to go directly to the right place. OPEN does this
	automatically with no software changes.
I	When change was introduced: z/OS V1R3.
I I	When change was introduced: z/OS V1R3. Reference information:
   	<ul> <li>When change was introduced: z/OS V1R3.</li> <li>Reference information:</li> <li>z/OS DFSMS Migration</li> </ul>
     	<ul> <li>When change was introduced: z/OS V1R3.</li> <li>Reference information:</li> <li>z/OS DFSMS Migration</li> <li>z/OS DFSMShsm Storage Administration Reference</li> </ul>
□ □ □ □ <b>Peer-to-Peer R</b> €	<ul> <li>When change was introduced: z/OS V1R3.</li> <li>Reference information: <ul> <li>z/OS DFSMS Migration</li> <li>z/OS DFSMShsm Storage Administration Reference</li> </ul> </li> <li>emote Copy extended distance feature</li> </ul>
Peer-to-Peer Re	<ul> <li>When change was introduced: z/OS V1R3.</li> <li>Reference information: <ul> <li>z/OS DFSMS Migration</li> <li>z/OS DFSMShsm Storage Administration Reference</li> </ul> </li> <li>Emote Copy extended distance feature</li> <li>Description: Peer-to-Peer Remote Copy (PPRC) has been enhanced to include</li> </ul>
Peer-to-Peer Re	<ul> <li>When change was introduced: z/OS V1R3.</li> <li>Reference information: <ul> <li>z/OS DFSMS Migration</li> <li>z/OS DFSMShsm Storage Administration Reference</li> </ul> </li> <li>emote Copy extended distance feature</li> <li>Description: Peer-to-Peer Remote Copy (PPRC) has been enhanced to include PPRC extended distance (XD). When you install and enable the PPRC extended distance (XD).</li> </ul>
Peer-to-Peer Re	<ul> <li>When change was introduced: z/OS V1R3.</li> <li>Reference information: <ul> <li>z/OS DFSMS Migration</li> <li>z/OS DFSMShsm Storage Administration Reference</li> </ul> </li> <li>Emote Copy extended distance feature</li> <li>Description: Peer-to-Peer Remote Copy (PPRC) has been enhanced to include PPRC extended distance (XD). When you install and enable the PPRC extended distance feature on the IBM TotalStorage Enterprise Storage Server (ESS), it provides an alternate method to synchronous PPBC. It also adds a new alternative</li> </ul>
Peer-to-Peer Re	<ul> <li>When change was introduced: z/OS V1R3.</li> <li>Reference information: <ul> <li>z/OS DFSMS Migration</li> <li>z/OS DFSMShsm Storage Administration Reference</li> </ul> </li> <li>Emote Copy extended distance feature</li> <li>Description: Peer-to-Peer Remote Copy (PPRC) has been enhanced to include PPRC extended distance (XD). When you install and enable the PPRC extended distance feature on the IBM TotalStorage Enterprise Storage Server (ESS), it provides an alternate method to synchronous PPRC. It also adds a new alternative method in the ESS-to-ESS data mirroring capabilities. When PPRC extended</li> </ul>
Peer-to-Peer Re	<ul> <li>When change was introduced: z/OS V1R3.</li> <li>Reference information: <ul> <li>z/OS DFSMS Migration</li> <li>z/OS DFSMShsm Storage Administration Reference</li> </ul> </li> <li>Emote Copy extended distance feature</li> <li>Description: Peer-to-Peer Remote Copy (PPRC) has been enhanced to include PPRC extended distance (XD). When you install and enable the PPRC extended distance feature on the IBM TotalStorage Enterprise Storage Server (ESS), it provides an alternate method to synchronous PPRC. It also adds a new alternative method in the ESS-to-ESS data mirroring capabilities. When PPRC extended distance is enabled, updates made to a PPRC primary volume are sent to a</li> </ul>
Peer-to-Peer Re	<ul> <li>When change was introduced: z/OS V1R3.</li> <li>Reference information: <ul> <li>z/OS DFSMS Migration</li> <li>z/OS DFSMShsm Storage Administration Reference</li> </ul> </li> <li>Emote Copy extended distance feature</li> <li>Description: Peer-to-Peer Remote Copy (PPRC) has been enhanced to include PPRC extended distance (XD). When you install and enable the PPRC extended distance feature on the IBM TotalStorage Enterprise Storage Server (ESS), it provides an alternate method to synchronous PPRC. It also adds a new alternative method in the ESS-to-ESS data mirroring capabilities. When PPRC extended distance is enabled, updates made to a PPRC primary volume are sent to a secondary volume asynchronously. This helps minimize the impact on application</li> </ul>
Peer-to-Peer Re	<ul> <li>When change was introduced: z/OS V1R3.</li> <li>Reference information: <ul> <li>z/OS DFSMS Migration</li> <li>z/OS DFSMShsm Storage Administration Reference</li> </ul> </li> <li>Emote Copy extended distance feature</li> <li>Description: Peer-to-Peer Remote Copy (PPRC) has been enhanced to include PPRC extended distance (XD). When you install and enable the PPRC extended distance feature on the IBM TotalStorage Enterprise Storage Server (ESS), it provides an alternate method to synchronous PPRC. It also adds a new alternative method in the ESS-to-ESS data mirroring capabilities. When PPRC extended distance is enabled, updates made to a PPRC primary volume are sent to a secondary volume asynchronously. This helps minimize the impact on application throughput.</li> </ul>
Peer-to-Peer Re	<ul> <li>When change was introduced: z/OS V1R3.</li> <li>Reference information: <ul> <li>z/OS DFSMS Migration</li> <li>z/OS DFSMShsm Storage Administration Reference</li> </ul> </li> <li>emote Copy extended distance feature</li> <li>Description: Peer-to-Peer Remote Copy (PPRC) has been enhanced to include PPRC extended distance (XD). When you install and enable the PPRC extended distance feature on the IBM TotalStorage Enterprise Storage Server (ESS), it provides an alternate method to synchronous PPRC. It also adds a new alternative method in the ESS-to-ESS data mirroring capabilities. When PPRC extended distance is enabled, updates made to a PPRC primary volume are sent to a secondary volume asynchronously. This helps minimize the impact on application throughput.</li> </ul>
Peer-to-Peer Re	<ul> <li>When change was introduced: z/OS V1R3.</li> <li>Reference information: <ul> <li>z/OS DFSMS Migration</li> <li>z/OS DFSMShsm Storage Administration Reference</li> </ul> </li> <li>Emote Copy extended distance feature</li> <li>Description: Peer-to-Peer Remote Copy (PPRC) has been enhanced to include PPRC extended distance (XD). When you install and enable the PPRC extended distance feature on the IBM TotalStorage Enterprise Storage Server (ESS), it provides an alternate method to synchronous PPRC. It also adds a new alternative method in the ESS-to-ESS data mirroring capabilities. When PPRC extended distance is enabled, updates made to a PPRC primary volume are sent to a secondary volume asynchronously. This helps minimize the impact on application throughput.</li> </ul>
Peer-to-Peer Re	<ul> <li>When change was introduced: z/OS V1R3.</li> <li>Reference information: <ul> <li>z/OS DFSMS Migration</li> <li>z/OS DFSMShsm Storage Administration Reference</li> </ul> </li> <li>Emote Copy extended distance feature</li> <li>Description: Peer-to-Peer Remote Copy (PPRC) has been enhanced to include PPRC extended distance (XD). When you install and enable the PPRC extended distance feature on the IBM TotalStorage Enterprise Storage Server (ESS), it provides an alternate method to synchronous PPRC. It also adds a new alternative method in the ESS-to-ESS data mirroring capabilities. When PPRC extended distance is enabled, updates made to a PPRC primary volume are sent to a secondary volume asynchronously. This helps minimize the impact on application throughput.</li> <li>When you enable the PPRC extended distance feature, the primary and recovery storage control sites can be separated by very long distances. You can use channel-extender technology to link the primary and recovery storage control sites. This technology allows these systems to be connected using less expensive.</li> </ul>
Peer-to-Peer Re	<ul> <li>When change was introduced: z/OS V1R3.</li> <li>Reference information: <ul> <li>z/OS DFSMS Migration</li> <li>z/OS DFSMShsm Storage Administration Reference</li> </ul> </li> <li>Emote Copy extended distance feature</li> <li>Description: Peer-to-Peer Remote Copy (PPRC) has been enhanced to include PPRC extended distance (XD). When you install and enable the PPRC extended distance feature on the IBM TotalStorage Enterprise Storage Server (ESS), it provides an alternate method to synchronous PPRC. It also adds a new alternative method in the ESS-to-ESS data mirroring capabilities. When PPRC extended distance is enabled, updates made to a PPRC primary volume are sent to a secondary volume asynchronously. This helps minimize the impact on application throughput.</li> <li>When you enable the PPRC extended distance feature, the primary and recovery storage control sites can be separated by very long distances. You can use channel-extender technology to link the primary and recovery storage control sites. This technology allows these systems to be connected using less expensive telecommunication lines, with little performance impact.</li> </ul>

When change was introduced: z/OS V1R3.

**Reference information:** *z/OS DFSMS Advanced Copy Services* 

#### XRC parameters in parmlib I

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I T Description: Default parameter values for Extended Remote Copy (XRC) have been calculated to ensure that they are suitable for most environments. In some

- cases, however, these values might not apply or you might need to change them to optimize the performance of your XRC environment.
  - Previously, changing these parameter values meant modifying the values of the XRC tuning table by using the TSO/E XSET command, by patching from the operator's console, or by issuing zaps to XRC modules. Now, you can tailor XRC operations by using the XSET command or by using parmlib parameters. The use of parmlib members allows you to set up your environment before starting XRC. This makes it easier to track changes and offers more control over your system. You can also concatenate—or link— up to 10 parameter libraries to the SYS1.PARMLIB data set.
  - After initially setting up your environment, you can dynamically override some parmlib parameters by issuing the XSET command. Be aware that you must carefully consider changing these parameter values so that there is no impact to other XRC functions.
  - When change was introduced: z/OS V1R3.
  - Reference information: z/OS DFSMS Advanced Copy Services

### Programs using DCOLLECT

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**Description:** An HFS data set must be mounted, or mountable, on the system in a sysplex where DCOLLECT is initiated. For OS/390 V2R9 through z/OS V1R2, if the file system is already mounted on the sysplex, you must run DCOLLECT on the system that owns the file system. This restriction has been removed in z/OS V1R3.

When change was introduced: z/OS V1R3.

Reference information: z/OS DFSMS Access Method Services for Catalogs.

## DFSORT new functions to consider

This section describes new DFSORT functions in z/OS.

### Improvements in Performance

**Description**: Memory object sorting is a new DFSORT capability that uses a memory object on 64-bit real architecture to improve the performance of sort applications. A memory object is a data area in virtual storage that is allocated above the bar and backed by central storage. With memory object sorting, a memory object can be used exclusively, or along with disk space, for temporary storage of records. Memory object sorting can reduce I/O processing, elapsed time, EXCPs, and channel usage. When a memory object is used, Hiperspace and data space are not needed.

When change was introduced: z/OS V1R5.

**Reference information**: z/OS DFSORT Application Programming Guide, z/OS DFSORT Installation and Customization.

# New and Changed Installation and Run-Time Options

### New MOSIZE option

**Description**: A new MOSIZE installation (ICEMAC) and run-time option allows you to specify the maximum size of a memory object to be used for memory object

 	sorting. The existing EXPMAX, EXPOLD and EXPRES installation (ICEMAC) options now apply to memory object sorting as well as Hipersorting.
I	When change was introduced: z/OS V1R5.
I	Reference information: z/OS DFSORT Installation and Customization.
       	<b>New NULLOUT option</b> <b>Description</b> : A new NULLOUT installation (ICEMAC) and run-time option allows you to specify what you want DFSORT to do when there are no records for the SORTOUT data set. This gives you control over the action (continue or terminate), type of message (informational or error) and return code (0, 4 or 16) for a SORTOUT data set with no records.
I	When change was introduced: z/OS V1R5.
I	Reference information: z/OS DFSORT Installation and Customization.
       	<b>New NULLOFL option</b> <b>Description</b> : A new NULLOFL installation (ICEMAC) option and OUTFIL run-time option allows you to specify what you want DFSORT to do when there are no data records for an OUTFIL data set. This gives you control over the action (continue or terminate), type of message (informational or error) and return code (0, 4 or 16) for an OUTFIL data set with no data records.
I	When change was introduced: z/OS V1R5.
I	Reference information: z/OS DFSORT Installation and Customization.
   	<b>COBEXIT option changed</b> <b>Description</b> : The IBM-supplied default for ICEMAC option COBEXIT has been changed from COB1 to COB2.
I	When change was introduced: z/OS V1R5.
I	Reference information: z/OS DFSORT Installation and Customization.
   	<b>DSA option changed</b> <b>Description</b> : The IBM-supplied default for ICEMAC option DSA has been changed from 32MB to 64MB.
I	When change was introduced: z/OS V1R5.
I	Reference information: z/OS DFSORT Installation and Customization.
   	<b>TMAXLIM option changed</b> <b>Description</b> : The IBM-supplied default for ICEMAC option TMAXLIM has been changed from 4MB to 6MB.
I	When change was introduced: z/OS V1R5.
I	Reference information: z/OS DFSORT Installation and Customization.
   	<b>ZDPRINT option changed</b> <b>Description</b> : The IBM-supplied default for ICEMAC option ZDPRINT has been changed from NO to YES.

I	When change was introduced: z/OS V1R5.
1	Reference information: z/OS DFSORT Installation and Customization.
Distributed Fi	le Service new functions to consider
I	This section describes new Distributed File Service functions in z/OS.
zFS multileve	<b>Security support</b> <b>Description:</b> The zSeries File System (zFS) supports security labels. In a multilevel-secure environment, you must use zFS for file systems in read-write mode.
I	When change was introduced: z/OS V1R5
1	Reference information: <ul> <li>z/OS Planning for Multilevel Security</li> </ul>
Enhanced AS	CII
1	<b>Description:</b> The SMB server now supports the ability to access ASCII data stored in a hierarchical file system (HFS) or in a zSeries File System (zFS).
I	When change was introduced: z/OS V1R2.
I	Reference information: z/OS Distributed File Service SMB Administration.
Carriage retur	<b>In/line feed in SMB server configuration files</b> <b>Description:</b> The SMB server now supports the ability to read SMB server configuration files that contain Windows end-of-line characters (carriage return/line feed).
I	When change was introduced: z/OS V1R2.
I	Reference information: z/OS Distributed File Service SMB Administration.
Export of non	-owned shared HFS file systems
•     	<b>Description:</b> The SMB server now supports the ability to export a file system that is not owned on the system running the SMB server by optionally moving ownership to the SMB server system.
I	When change was introduced: z/OS V1R2.
I	Reference information: z/OS Distributed File Service SMB Administration.
ACL support	
1	Description: The SMB server now honors access control list (ACL) authorizations.
I	When change was introduced: z/OS V1R3.
I	Reference information: z/OS UNIX System Services Planning.

   	Mapping all users in a domain Description: The SMB server now supports the ability to map all users in a Windows domain to a particular z/OS user ID.
I	When change was introduced: z/OS V1R4.
I	<b>Reference information:</b> z/OS Distributed File Service SMB Administration.
Ι	Dynamic zFS configuration changes
	<b>Description:</b> The <b>zfsadm config</b> command changes the configuration options (in main storage) that are specified in the IOEFSPRM file (or defaulted). The IOEFSPRM file is not changed. If you want the configuration specification to be permanent, you need to modify the IOEFSPRM file because the IOEFSPRM file is read to determine the configuration values the next time zFS is started. The values that can be specified for each option are the same as the values that can be specified for that option in the IOEFSPRM file.
I	The <b>zfsadm configquery</b> command displays the current configuration values.
I	When change was introduced: z/OS V1R4.
 	<b>Reference information:</b> <i>z/OS Distributed File Service zSeries File System Administration.</i>
	<ul> <li>zFS aggregate can be dynamically extended</li> <li>Description: Aggregates and file system quotas can be dynamically increased. Dynamic aggregate extension is enabled by one of the following: <ul> <li>The aggrgrow option in the IOEFSPRM file</li> <li>The AGGRGROW parm_string on the MOUNT PARM command</li> <li>The aggrgrow suboption of the define_aggr option in the IOEFSPRM file</li> <li>The -aggrgrow option of the zfsadm attach command.</li> </ul> </li> </ul>
   	<ul> <li>Dynamic file system quota increase is enabled by one of the following:</li> <li>The <b>fsgrow</b> option in the IOEFSPRM file</li> <li>The FSGROW parm_string in the PARM option of the MOUNT PARM command</li> </ul>
   	The option values of <b>fsgrow</b> are used for the quota size to grow and the number of times to grow. For compatibility mode aggregates, only the <b>aggrgrow</b> specification is used ( <b>fsgrow</b> is ignored).
I	When change was introduced: z/OS V1R4.
 	<b>Reference information:</b> <i>z/OS Distributed File Service zSeries File System</i> Administration.
I	Duplicate file system name for zFS
   	<b>Description:</b> A new configuration option allows duplicate file system names in different aggregates. The option is <b>allow_duplicate_filesystem=on</b> in file IOEFSPRM. Commands that specify zFS file systems can specify the aggregate name to qualify the option.

 	If the file system name is ambiguous, the command fails. The file system name can be ambiguous if it is a duplicate name and the aggregate name is not specified.
I	When change was introduced: z/OS V1R4.
 	<b>Reference information:</b> <i>z/OS Distributed File Service zSeries File System</i> <i>Administration.</i>
I	System symbols for data sets can be used in IOEFSPRM for zFS
   	<b>Description:</b> You can specify system symbols for data set names in the IOEFSPRM file. This makes it more likely that you can share your IOEFSPRM among systems in a sysplex.
Ι	When change was introduced: z/OS V1R4.
 	<b>Reference information:</b> <i>z/OS Distributed File Service zSeries File System</i> <i>Administration.</i>
Ι	Several new pfsctl APIs for zFS
   	<b>Description:</b> The <b>pfsctl</b> (BPX1PCT) application programming interface (API) is used to send physical file-system-specific requests to a physical file system. zFS is a physical file system and supports several (zFS-specific) <b>pfsctl</b> functions. Several new <b>pfsctl</b> APIs are provided for configuration operations.
Ι	When change was introduced: z/OS V1R4.
Ι	Reference information:
 	<ul> <li>For information about the specific new pfsctl APIs, see z/OS Distributed File Service zSeries File System Administration.</li> </ul>
   	<ul> <li>For information about the pfsctl (BPX1PCT) application programming interface, see z/OS UNIX System Services Programming: Assembler Callable Services Reference.</li> </ul>
	Several zfsadm commands and pfsctl APIs now accept the mount file system name
   	<b>Description:</b> Several <b>zfsadm</b> commands (and <b>pfsctI</b> APIs) now allow you to specify the z/OS UNIX file system name (the mount file system name) instead of the zFS file system name.
I	When change was introduced: z/OS V1R4.
 	<b>Reference information:</b> <i>z/OS Distributed File Service zSeries File System</i> Administration.
I	zFS file systems support z/OS UNIX ACLs
     	<b>Description:</b> In order to provide a better granularity of access control for z/OS UNIX files and directories, access control lists (ACLs) have been incorporated into z/OS V1R3. You can use ACLs to control access to files and directories by user ID (UID) and group ID (GID). This provides the means to allow specific users and groups dedicated and different types of access.
I	ACLs are supported in the zFS.

I	When change was introduced: z/OS V1R3.
I	Reference information: z/OS UNIX System Services Planning.
MOUNT comm	nands for zFS file systems in BPXPRMxx
 	<b>Description:</b> MOUNT commands for zFS file systems can now be placed in BPXPRM <i>xx</i> members. For example:
1	MOUNT FILESYSTEM('OMVS.PRV.COMPAT.AGGR001') TYPE(ZFS) MOUNTPOINT('/etc/mountpt')
     	Releases prior to z/OS V1R3 did not allow MOUNT commands for zFS file systems in BPXPRM <i>xx</i> members and recommended that you place <b>/usr/sbin/mount</b> commands in <b>/etc/rc</b> to cause zFS file systems to be mounted during IPL. For example:
I	/usr/sbin/mount -f OMVS.PRV.COMPAT.AGGR001 -t ZFS /etc/mountpt
     	If you have placed <b>/usr/sbin/mount</b> commands in /etc/rc, you can leave them there. Or, on systems that are running z/OS V1R3, you can move them to BPXPRM <i>xx</i> members. <b>mount</b> commands for zFS file systems cannot be placed in BPXPRM <i>xx</i> members that are shared with systems that are running a level of z/OS earlier than V1R3.
I	When change was introduced: z/OS V1R3.
 	<b>Reference information:</b> <i>z/OS Distributed File Service zSeries File System Administration</i> .
-size and -gro	w on the ioeagfmt utility for zFS
-                 	<b>Description:</b> The <b>ioeagfmt</b> utility creates an HFS compatibility mode aggregate or a multi-file system aggregate. As of z/OS V1R2, you can use the <b>-size</b> utility option to specify the number of 8 KB blocks that should be formatted to form the zFS aggregate. The default is the number of blocks that fit in the primary allocation of the VSAM Linear Data Set (LDS). If you specify a number less than the default, the value is rounded up to the default. If you specify a number greater than the default, a single extension of the VSAM LDS is attempted after the primary allocation is formatted unless the <b>-grow</b> option is specified. In that case, multiple extensions of the amount specified in the <b>-grow</b> option are attempted until the <b>-size</b> is satisfied. The size may be rounded up to a control area (CA) boundary by DFSMS. It is not necessary to specify a secondary allocation size on the DEFINE of the VSAM LDS for this extension to occur. Space must be available on the volume (or volumes).
 	When change was introduced: -size was introduced in z/OS V1R2grow was introduced in z/OS V1R4.
 	<b>Reference information:</b> <i>z</i> /OS Distributed File Service zSeries File System Administration.
SUPERUSER.	FILESYS.PFSCTL support for zFS commands
   	<b>Description:</b> zFS commands that required a UID of 0 can now be issued without a UID of 0 if the user has read authority to the SUPERUSER.FILESYS.PFSCTL profile in the UNIXPRIV class.
I	When change was introduced: z/OS V1R2.

**Reference information:** *z*/OS Distributed File Service zSeries File System Administration.

### zFS messages can be sent to a message data set

**Description:** zFS messages can be sent to a message data set by specifying the **msg\_output\_dsn** configuration option. This can be helpful during a service call because this data set can be sent to IBM if necessary.

When change was introduced: z/OS V1R3.

**Reference information:** *z/OS Distributed File Service zSeries File System Administration.* 

## zFS can be run outside of JES control

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**Description:** You can run zFS so that it is not under control of JES2 or JES3 by adding SUB=MSTR to the ASNAME parameter of the zFS FILESYSTYPE statement in the BPXPRM*xx* parmlib member. You might want to do this so that zFS does not interfere with shutting down JES. If you are sharing the zFS procedure among members of a sysplex and you are running one or more members at a release prior to z/OS V1R3, you must include several additional DD statements in the zFS procedure. Otherwise, Language Environment will attempt to dynamically allocate these to JES spool. The DD statements to include are:

SYSINDDDUMMYSYSPRINTDDDUMMYSYSOUTDDDUMMYCEEDUMPDDDUMMY

These DD statements can be included in systems running z/OS V1R3 and later.

When change was introduced: z/OS V1R3.

**Reference information:** *z*/OS Distributed File Service zSeries File System Administration.

## Several zFS caches are in data spaces

**Description:** The user data cache is contained in data spaces and can be up to 64 GB in size. A new cache called the metadata backing cache is contained in a data space and can be up to 2 GB in size.

When change was introduced: User data cache data spaces were introduced in z/OS V1R3. Metadata backing cache was introduced in z/OS V1R4.

**Reference information:** *z*/OS Distributed File Service zSeries File System Administration.

## HCD and HCM new functions to consider

This section describes new HCD and HCM functions in z/OS.

# Multiple logical channel subsystems (LCSS) support

**Description:** More than 256 channel paths are supported on an XMP server, a server that supports multiple logical channel subsystems (LCSS). The HCD dialog is enhanced in a way that for XMP processors the definition of multiple logical channel subsystems is supported. A new object called channel subsystem is

introduced into the object hierarchy below the processor object. For such processors, partitions and channel paths now pertain to a channel subsystem. For previous server generations (SMP servers that support only one channel subsystem), the object hierarchy remains unchanged. With XMP servers, supporting multiple logical channel subsystems, some types of channel paths can be shared across partitions belonging to different channel subsystems. Such a channel path is called a spanned channel path.
When change was introduced: z/OS V1R4.
Reference information:         • z/OS HCD User's Guide         • z/OS HCD Planning
vsical channel identifiers
<b>Description:</b> Real I/O hardware is attached to a server via physical channels. For XMP servers (servers that support multiple channel subsystems), the physical channels need a physical channel identifier (PCHID) which determines the physical location of a channel in the server. For these servers, you have to specify the physical channel identifier (PCHID) related to the channel path identifier (CHPID). The task of adding the physical channel path information to an IODF is eased in a way that HCD can cooperate with the CHPID Mapping Tool (CMT). Input to the CMT is the hardware configuration file of your server and a valid IOCP input file. Output from the CMT is again an IOCP input file that has the PCHID values filled in. This IOCP input file can be reimported into the IODF.
When change was introduced: z/OS V1R4.
Reference information: • z/OS HCD User's Guide • z/OS HCD Planning
F prompt
<ul> <li>Description: Besides IODF name and the volume serial number, the IODF prompt now shows the following attributes:</li> <li>VSAM allocated blocks for the data object</li> <li>Creation date of the VSAM cluster</li> </ul>
When change was introduced: z/OS V1R4.
Reference information:• z/OS HCD User's Guide
<ul> <li>Description: The default of the following keywords in the HCD profile have changed from NO to YES:</li> <li>IODF_DATA_SPACE</li> <li>SHOW_IO_CHANGES</li> <li>BATCH_IODF_NAME_CHECK</li> </ul>

1	Reference information:         • z/OS HCD User's Guide
Redesigned S	witch Configuration Detail Report Description: The Switch Configuration Detail Report was previously too extensive and not clearly arranged. Its format is now redesigned such that via grouping the information contained in that report will be highly condensed.
I	When change was introduced: z/OS V1R4.
1	Reference information:• z/OS HCD User's Guide
Limitation of C	Channel Subsystem Report
   	<b>Description:</b> When limiting a Channel Subsystem Report to a single partition, the report will show channel paths, control units and devices attached by the access list as well as those attached by the candidate list.
I	When change was introduced: z/OS V1R4.
I	Reference information:
I	• z/OS HCD User's Guide
Default SIZE p	parameter of INITIODF utility
     	<b>Description:</b> For the SIZE parameter of the Initialize IODF (INITIODF) utility, you can now specify zero (0) to get the default. HCD then tries to get the number of allocated blocks of the VSAM data set from the catalog and uses that value as the default. If you specify a size value greater than zero, HCD checks whether this value does not exceed the allocated size of the VSAM data set.
I	When change was introduced: z/OS V1R4.
I	Reference information:
I	• z/OS HCD User's Guide
Enhanced che	ecking
I	Description: The following new checks are introduced:
       	• When copying/merging channel paths, HCD checks whether an existing target channel path is connected to a different switch port than the source channel path. HCD also checks whether an existing dedicated channel path in the target is reconnected to a different partition during copying/merging, because the CHPID already existed in the target. Appropriate warning messages are issued if necessary.
I	<ul> <li>For esoteric groups, HCD issues a warning message if:</li> </ul>
	<ul> <li>You do not specify a token for esoterics in an EDT</li> </ul>
	<ul> <li>You mix DASDs and TAPEs into a single esoteric group</li> </ul>
     	<ul> <li>A warning message is issued while building the production IODF in case more than one channel path is connected to the same switch port. Also a port that is already connected to a channel path will no longer be presented in the prompt when connecting a channel path with the same ID to the switch.</li> </ul>
I	When change was introduced: z/OS V1R4.

	Reference information:
I	• z/OS HCD User's Guide
Hardware sup	port
	<b>Description:</b> HCD supports zSeries 990 (Type 2084) servers. These servers
	<ul> <li>More than one channel subsystem within the processor complex</li> </ul>
	<ul> <li>More than 15 partitions throughout all defined channel subsystems</li> </ul>
	<ul> <li>More than 256 channel paths throughout all defined channel subsystems</li> </ul>
I	Spanning for specific channel types
l	Each single channel subsystem has the following limitations:
l	256 channel paths
l	<ul> <li>15 logical partitions</li> </ul>
l	64K devices
I	When change was introduced: z/OS V1R4.
l	Reference information:
I	• z/OS HCD User's Guide
Informint Sorv	ar now functions to consider
	This section describes new Infoprint Server functions in z/OS.
Common mes	sage log
	<b>Description:</b> In previous releases, Infoprint Server components such as Print Interface, IP PrintWay, and NetSpool wrote messages to different locations. In z/OS 1.5, Infoprint Server components write messages to a common message log. This makes it easier to find messages that might be related to each other. Only IP PrintWay basic mode and Infoprint Server Transforms do not write messages to the common message log.
	For compatibility with previous releases, Infoprint Server components also continue to write messages to the same locations as in previous releases. For example, NetSpool also writes messages to the console and to the NetSpool message data set, and Print Interface also writes messages to the console. The new IP PrintWay extended mode component, however, writes messages only to the common message log.
	You can use either Infoprint Central or the new z/OS UNIX command <b>aoplogu</b> to see messages in the common message log. Infoprint Central displays messages in the common message log for selected print jobs and printers. The <b>aoplogu</b> command lets administrators select messages in the common message log in a particular time range and copy them to a file or view them on the terminal.
   	You can customize the common message log to specify how many days worth of messages to keep. Unless you use Infoprint Central or specify the number of days of messages to keep, the common message log is not used.
I	When change was introduced: z/OS V1R5
I	Reference information:

1	<ul> <li>z/OS Infoprint Server Customization describes how to customize the common message log.</li> </ul>
   	<ul> <li>z/OS Infoprint Server Operation and Administration describes how to use the aoplogu command.</li> </ul>
IP PrintWay e	-mail support in z/OS V1R5
     	<b>Description:</b> Infoprint Server lets you send output directly to one or more e-mail addresses instead of printing the output. In previous releases, you specified the e-mail addresses in a printer definition. In this release, you can now also specify the e-mail addresses in a new JCL parameter. In addition, you can specify these e-mail items in the printer definition or in JCL parameters.
	<ul> <li>E-mail addresses of the recipients of the e-mail</li> </ul>
1	File name of the attachment to the e-mail
1	Descriptive name or other identifier of the sender of the e-mail
1	<ul> <li>Blind copy (bcc) recipients of the e-mail</li> </ul>
I	Copy (cc) recipients of the e-mail
I	E-mail address that recipients of the e-mail can reply to
I	To use the new e-mail items, you can use one or more of these:
   	<ul> <li>Attributes of the Printer Inventory Definition Utility (PIDU) program: mail-bcc-addresses, mail-cc-addresses, mail-from-name, mail-reply-address, mail-to-addresses</li> </ul>
1	Fields on the ISPF panels
 	<ul> <li>JCL parameters on the OUTPUT JCL statement: MAILBCC, MAILCC, MAILFILE, MAILFROM, MAILTO, REPLYTO</li> </ul>
 	<ul> <li>Job attributes: mail-bcc-addresses, mail-cc-addresses, mail-file-name, mail-from-name, mail-reply-address, mail-to-addresses</li> </ul>
I	When change was introduced: z/OS V1R5
I	Reference information:
 	<ul> <li>z/OS Infoprint Server Operation and Administration describes the new attributes of the PIDU program and the new fields on the ISPF panels.</li> </ul>
	<ul> <li>z/OS Infoprint Server User's Guide describes the new JCL parameters and job attributes.</li> </ul>
IP PrintWav ex	xtended mode
	<b>Description:</b> IP PrintWay can operate in a new mode called <i>IP PrintWay extended</i> <i>mode</i> . IP PrintWay extended mode uses the z/OS Sysout Application Programming Interface (SAPI) to obtain output data sets from the JES spool. This implementation

*mode.* IP PrintWay extended mode uses the z/OS Sysout Application Programming Interface (SAPI) to obtain output data sets from the JES spool. This implementation results in better performance and improved usability. In addition, IP PrintWay extended mode provides new functions that help you manage printers and print jobs.

*IP PrintWay basic mode* is the name used for the original IP PrintWay mode of operation, to distinguish the original mode from the new IP PrintWay extended mode. You can continue to run IP PrintWay basic mode in z/OS 1.5. However, no enhancements have been made to IP PrintWay basic mode. IBM will make enhancements in future releases only to IP PrintWay extended mode.

IP PrintWay extended mode and IP PrintWay basic mode use the same printer definitions in the Printer Inventory.

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1	IP PrintWay extended mode provides these enhancements as compared to IP PrintWay basic mode:
	Better performance:
	<ul> <li>Most jobs start printing sooner.</li> </ul>
1	<ul> <li>A printer problem or large job on one printer does not delay printing to another printer.</li> </ul>
   	<ul> <li>IP PrintWay extended mode calls data stream transforms and other filters directly without resubmitting them to Print Interface for filtering. Calling transforms directly is more efficient because data is not written to the JES spool a second time.</li> </ul>
	Improved usability:
   	<ul> <li>Operators can use Infoprint Central, a Web-based application, to work with IP PrintWay extended mode printers and print jobs. For more information, see "New functions".</li> </ul>
     	<ul> <li>Operators can use JES commands to work with print jobs that IP PrintWay extended mode has selected to process, is waiting to retry, or has retained on the JES spool. However, to work with print jobs that IP PrintWay is currently processing, operators must use Infoprint Central.</li> </ul>
I	New functions:
   	<ul> <li>IP PrintWay extended mode can process and retain more data sets on the JES spool without running out of address space. This reduces the possibility of ending abnormally with an F02 abend code.</li> </ul>
1	<ul> <li>IP PrintWay extended mode prints output data sets in priority order.</li> </ul>
1	<ul> <li>IP PrintWay extended mode can print data sets larger than 2 gigabytes provided space is available in the file system.</li> </ul>
   	<ul> <li>IP PrintWay extended mode can print to printers that have IPv6 addresses.</li> <li>However, you must use the host name (instead of the colon-hexadecimal address) in the DEST=IP JCL parameter, job attributes, and printer definitions.</li> </ul>
1	<ul> <li>IP PrintWay extended mode writes the printer address for all protocol types in the SMF type 6 record.</li> </ul>
1	<ul> <li>Authorized users can use Infoprint Central to do these additional printer functions:</li> </ul>
I	- Stop printing to selected printers. Restart printing to stopped printers.
I	- Ping printers.
1	<ul> <li>View printers' Web pages to see extended printer status, such as whether a printer is out of paper or toner.</li> </ul>
       	<ul> <li>Redirect all print jobs on a printer's queue (except for the print job that is currently processing), as well as all future print jobs, to an alternate printer. The alternate printer must also be an IP PrintWay printer. Redirections remain in effect until the operator restores the original printers or until IP PrintWay is restarted.</li> </ul>
	- Restore redirected printers.
I	- View messages for selected printers.
1	<ul> <li>Authorized users can use Infoprint Central to do these additional print job functions:</li> </ul>
1	- Delete print jobs that IP PrintWay extended mode is currently processing.
1	<ul> <li>Hold print jobs that IP PrintWay extended mode is currently processing.</li> </ul>
1	<ul> <li>Change the priority of print jobs before or after IP PrintWay extended mode has selected them for processing.</li> </ul>

- Move print jobs to alternate printers, including print jobs that are currently being processed. The alternate printer must also be an IP PrintWay printer.
- View messages for selected print jobs.

### Limitations:

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- IP PrintWay extended mode cannot print to VTAM-controlled printers in the SNA network.
- IP PrintWay extended mode always uses the z/OS iconv utility to convert between EBCDIC and ASCII code pages. It does not use standard or customized TCP/IP translate tables as IP PrintWay basic mode can.
- IP PrintWay extended mode does not call the Message exit and the Response Notification exit. Also, IP PrintWay extended mode does not pass some fields in the ANFUEXTP control block to IP PrintWay exits, and it ignores requests from the exits to hold or delete data sets and write messages to the console.
- IP PrintWay extended mode cannot share printing information across multiple systems in a sysplex as IP PrintWay basic mode can. (IP PrintWay basic mode lets you share the transmission-queue data set across multiple systems.) Therefore, if you configure IP PrintWay extended mode to print to the same printers from different systems, you might see more timeout situations. A timeout situation occurs if a printer is busy when IP PrintWay sends data to it. However, while IP PrintWay extended mode waits for a printer to become available, printing to other printers is unaffected.

Also, from Infoprint Central, you can see printer jobs and print queues for only one system. To see print jobs and printer queues for multiple systems, you must log on to multiple instances of Infoprint Central.

- IP PrintWay extended mode ignores the NOTIFY parameter on the OUTPUT JCL statement and the **Notify** field in the printer definition.
- IP PrintWay extended mode prints all data sets in an output group on the printer selected for the first data set in the output group. In addition, retry values and retention periods for the first data set apply to all data sets in the output group.

#### **Recommendations:**

- Run IP PrintWay extended mode instead of IP PrintWay basic mode to obtain improved performance and reliability, and to obtain future enhancements.
- Do not run IP PrintWay extended mode and IP PrintWay basic mode together on the same z/OS system, because IP PrintWay extended mode and IP PrintWay basic mode might select the same print job from the JES spool. To test IP PrintWay extended mode, run it at a different time of day from IP PrintWay basic mode.

However, if you need to run both IP PrintWay modes at the same time, customize IP PrintWay extended mode to select different print jobs from the JES spool than IP PrintWay basic mode. For example, if IP PrintWay basic mode selects print jobs in class P, create an IP PrintWay extended mode job selection rule to select print jobs in class Q.

• Use Infoprint Central to manage IP PrintWay extended mode printers and print jobs.

#### When change was introduced: z/OS V1R5

#### **Reference information:**

• *z/OS Infoprint Server Customization* describes how to customize IP PrintWay extended mode and Infoprint Central.

	<ul> <li><i>z/OS Infoprint Server Operation and Administration</i> describes how to start IP PrintWay extended mode and how to set up printer definitions.</li> <li><i>z/OS Infoprint Server User's Guide</i> describes considerations for JCL parameters.</li> <li>Infoprint Server ISPF online help describes which fields apply to IP PrintWay extended mode.</li> <li>Infoprint Central help describes how to manage IP PrintWay extended mode printers and print jobs.</li> </ul>
Java 1.4 supp	
   	<b>Description:</b> The Infoprint Server Internet Printing Protocol (IPP) server now requires Java 1.4. The IPP server requires that the Java 1.4 run-time libraries be APF-authorized.
I	When change was introduced: z/OS V1R5
I	Reference information:
	<ul> <li>z/OS Infoprint Server Customization describes how to APF authorize Java 1.4 run-time libraries.</li> </ul>
NetSpool enha	ancements
	Description: NetSpool now lets you:
1	Specify the owner of a NetSpool print job. You can either:
1	<ul> <li>Embed the new job attribute, owner, in print data.</li> </ul>
1	<ul> <li>Use the new Delaut owner held in the printer delimition.</li> <li>Fither method can help you identify the owner of printed output or the user to</li> </ul>
   	charge in an accounting system for printing jobs, such as SMF accounting records.
 	<ul> <li>Embed other job attributes in print data, such as forms, page-definition, or form-definition.</li> </ul>
     	<ul> <li>See additional information about the current VTAM session when you use Infoprint Central or the NetSpool operator command DISPLAY LUNAME. The information can help you diagnose problems with NetSpool LUs (logical units), VTAM definitions, and VTAM application programs.</li> </ul>
I	NetSpool works with both IP PrintWay basic mode and extended mode.
I	When change was introduced: z/OS V1R5
I	Reference information:
 	<ul> <li>z/OS Infoprint Server Operation and Administration describes the DISPLAY command and the new field on the ISPF panels.</li> </ul>
I	• <i>z/OS Infoprint Server User's Guide</i> describes how to embed job attributes.
Security enha	ncements
1	<b>Description:</b> Infoprint Server has enhanced its security functions. In z/OS 1.5, the security administrator can permit z/OS users to:
     	<ul> <li>Read the Printer Inventory using Infoprint Server ISPF panels, the Printer Inventory Definition Utility (PIDU) program, and Infoprint Central. Users with read-only access can display objects in the Printer Inventory but not update them. The new AOP.ADMINISTRATOR profile in the RACF PRINTSRV class lets you give either read-only or update access to the Printer Inventory.</li> </ul>

Profile AOP.ADMINISTRATOR replaces profile AOPADMIN in the RACF Т FACILITY class. Infoprint Server continues to check profile AOPADMIN if L AOP.ADMINISTRATOR is not defined. T I Display or update printers, groups of printers, NetSpool logical units, and IP PrintWay job selection rules using Infoprint Central. To control access, you can T define new profiles in the RACF PRINTSRV class. In some cases, you must also I specify these profile names in the Printer Inventory. I When change was introduced: z/OS V1R5 I **Reference information:** I z/OS Infoprint Server Customization describes how to define profiles to RACF. I z/OS Infoprint Server Operation and Administration describes how to specify L profile names in the Printer Inventory. L SMF type 6 record restructure L Description: IP PrintWay extended mode writes additional information in the SMF L type 6 record. The SMF type 6 record has been restructured to add new fields for L IP PrintWay extended mode, mapped by a new AOPSMF6 macro. IP PrintWay L L basic mode continues to write the same SMF type 6 record. IP PrintWay extended mode writes these new SMF type 6 fields: I I SMF6BYTD: The total number of bytes transmitted to the printer. Field SMF6BYTE also contains the number of bytes transmitted to the printer. T However, field SMF6BYTE contains a maximum value of 2 gigabytes. Therefore, 1 if your installation prints documents that contain more than 2 gigabytes, your SMF accounting programs should use field SMF6BYTD instead of field L SMF6BYTE. T • **SMF6URI:** The address of the printer or the e-mail destination. This field contains the printer address for all protocols that IP PrintWay extended mode supports -I including the LPR, direct sockets, Internet Printing Protocol (IPP), and e-mail protocols. I SMF6URIL: The length of the value in field SMF6URI. I • **SMF6FTL**: An indicator of whether IP PrintWay extended mode or IP PrintWay basic mode wrote the SMF type 6 record. I IP PrintWay extended mode does not write these existing SMF type 6 fields: I • SMF6IP1, SMF6IP2, SMF6IP3, and SMF6IP4: These fields contain zeroes I I instead of the printer's IP address. IP PrintWay extended mode writes the printer's IP address in a new format in field SMF6URI. I **Recommendations:** · If you run IP PrintWay extended mode, you might need to change your SMF I accounting programs and IP PrintWay SMF exit (ANFUXSMF) to use the new 1 fields. To use the new fields, you must compile the programs with the new T IFASMFR and AOPSMF6 mapping macros. However, no change is required to I the macro invocation because macro IFASMFR calls AOPSMF6. L If you do not run IP PrintWay extended mode, no changes are required to SMF I accounting programs or the ANFUXSMF exit because IP PrintWay basic mode T writes the same information in the SMF type 6 record as in previous releases. L If you run both IP PrintWay extended mode and IP PrintWay basic mode, SMF L accounting programs and the ANFUXSMF exit can query the SMF6FTL field to L L determine whether IP PrintWay extended mode or IP PrintWay basic mode wrote

1	the SMF record. By checking field SMF6FTL, the same accounting program and ANFUXSMF exit can process both versions of the SMF type 6 record.
I	When change was introduced: z/OS V1R5
I	Reference information:
	<ul> <li>z/OS MVS System Management Facilities (SMF) describes the new format of the SMF type 6 record that IP PrintWay writes.</li> </ul>
 	<ul> <li>z/OS Infoprint Server Customization describes the IP PrintWay SMF exit, ANFUXSMF.</li> </ul>
Infoprint Cent	ral
   	<b>Description:</b> Infoprint Central is a Web-based print management system primarily for help desk operators. However, other authorized users or job submitters can also use it. Infoprint Central works with IP PrintWay extended mode.
   	These Web browsers are supported: Microsoft Internet Explorer 5.5 (and higher), Netscape Navigator 7.0 (and higher), and IBM Home Page Reader 4.0 (and higher). No code other than a Web browser needs to be installed on users' workstations. The z/OS HTTP Server is required.
I	With Infoprint Central you can:
     	• Work with print jobs: You can find and work with any print jobs that are on the JES spool. Plus, you can see more information about print jobs that Infoprint Server processes. For example, you can see whether an Infoprint Server print job completed successfully and where it printed – even if the print job is no longer on the JES spool.
   	You can use several different search criteria to find print jobs. After you find a print job, you can delete, hold, release, move, or change the priority of the print job. And, you can see all messages from Infoprint Server for that one print job.
     	• Work with printers: You can find and work with printers that are defined in the Printer Inventory – including IBM AFP printers controlled by PSF (called <i>PSF printers</i> ), and TCP/IP-attached printers to which IP PrintWay extended mode sends print jobs (called <i>IP PrintWay printers</i> ) You can find and work with IP PrintWay printers only when you run IP PrintWay extended mode.
	You can use a variety of search critieria to find printers. After you find a printer, you can:
1	<ul> <li>Stop, start, redirect, and ping IP PrintWay printers. You can also see messages in the common message log for printers.</li> </ul>
I	- Start, stop, space, interrupt, pause (JES2 only), and ping PSF printers.
   	• Work with NetSpool logical units: You can work with any NetSpool logical units (LUs) that are defined to NetSpool in the Printer Inventory and also defined to VTAM.
     	You can find LUs by name. After you find a NetSpool LU, you can start and stop it. When you start an LU, that LU is started in both Infoprint Server and VTAM. Likewise, when you stop an LU, that LU is stopped in both Infoprint Server and VTAM. You can also display information about the current VTAM session established with a NetSpool LU.
     	• <b>Display printer status:</b> You can display the properties of any printer definition in the Printer Inventory. You can use a variety of search criteria to find printer definitions, including the printer definition name and the printer's location. This can help you find the name of a printer in your area.

•	Check system status: You can see the status of all Infoprint Server daemons
	and tasks. This can help you determine the cause of a printing problem. You can
	also start and stop IP PrintWay job selection rules to change which print jobs IP
	PrintWay processes.

### **Recommendations:**

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- If you run IP PrintWay extended mode, use Infoprint Central to manage IP PrintWay printers and print jobs on the JES spool.
- If you use the Infoprint Server common message log, use Infoprint Central to display messages for selected printers and print jobs.

#### When change was introduced: z/OS V1R5

#### **Reference information:**

- *z/OS Infoprint Server Customization* describes how to customize Infoprint Central and restrict who can do actions on printers and print jobs.
- Infoprint Central help system describes how to use Infoprint Central.

## Support for IBM Infoprint XT Extender for z/OS

**Description:** If you install IBM Infoprint XT Extender for z/OS (5655-J65), you can now transform Xerox files to AFP format for printing or e-mailing. XT is the IBM Xerox transform technology.

Infoprint Server is enhanced to support the XT transform (**x2afp**) that is provided with XT Extender.

The Xerox files can be line-conditioned data streams (LCDS) or metacode data streams. Infoprint XT Extender also converts the resources that the jobs need, such as fonts and forms, into AFP format.

When change was introduced: z/OS V1R5.

#### **Reference information:**

• Infoprint XT Extender for z/OS: Customization and Usage

# IP PrintWay copy support for LAN printers

**Description:** The IP PrintWay component of Infoprint Server can now print more than one copy of a document on any remote printer or print server that either contains a line printer daemon (LPD) or supports the direct sockets printing protocol. IP PrintWay now transmits a data set multiple times to the printer, while ensuring that all copies of the data set print together. In the previous release, IP PrintWay provided copies support only for a small subset of printers whose LPDs support printing the same data set multiple times. Also, the administrator can now limit the number of copies that are allowed to print on each printer.

When change was introduced: z/OS V1R2.

#### **Reference information:**

• z/OS Infoprint Server Operation and Administration.

# IP PrintWay e-mail support in z/OS V1R2

**Description:** The IP PrintWay component of Infoprint Server now lets you send output from the JES spool to one or more e-mail addresses. Previously, IP PrintWay

could transmit output only to printers and print servers. This support lets you easily Т distribute documents over the Internet and lets e-mail recipients view the output and T print it only when necessary. When change was introduced: z/OS V1R2 but rolled back to OS/390 V2R8. You must apply Infoprint Server PTFs UW85327 and UW85325 to obtain this enhancement in z/OS V1R2 and later releases. Corresponding PTFs for OS/390 V2R8 - z/OS V1R1 are UW85756 and UW85769. **Reference information:** • z/OS Infoprint Server Operation and Administration. IP PrintWay enhancements for printing to VTAM printers L Description: The IP PrintWay component of Infoprint Server now provides enhanced support for printing to VTAM-controlled printers: The administrator can request that IP PrintWay transmit output data sets from the JES spool to VTAM-controlled printers without converting the data to SNA Character String (SCS) or Data Stream Compatible/Data Stream Extended (DSC/DSE) format. This support means that you can now print data that is already in the format required by your VTAM-controlled printers. For example, you can print PCL data to VTAM-controlled printers that accept PCL data. Optionally, IP PrintWay can transmit the unchanged data to the VTAM-controlled printer as transparent data. This support lets you transmit data through an SNA gateway that requires that data be preceded by transparent data controls. Usually, the SNA gateway removes the transparent data controls before transmitting the data to the printer. For each printer, the administrator can specify the transparent data character that the SNA gateway expects in the transparent data controls. The administrator can change the end-of-line controls that IP PrintWay adds to the end of each line. This support is available only when IP PrintWay converts line data to SCS or DSC/DSE format. The administrator can request that IP PrintWay delete form-feed controls that result in blank pages at the beginning and end of documents. This support is available when IP PrintWay converts line data to SCS or DSC/DSE format. When change was introduced: z/OS V1R2. In order to use this enhancement, you must apply the following PTFs: • To print data unchanged to VTAM-controlled printers: - Infoprint Server PTFs UW82899 and UW82940 for releases z/OS V1R2 through z/OS V1R4 Infoprint Server Transforms PTF UW82927 • To change the end-of-line control: Infoprint Server PTFs UW82899 and UW82940 for releases z/OS V1R2 through z/OS V1R4 To delete form-feed controls: - Infoprint Server PTF UW85178 for releases z/OS V1R2 through z/OS V1R4 Т Infoprint Server Transforms PTF UW85179 **Reference information:** 1 1 z/OS Infoprint Server Operation and Administration.
### IP PrintWay query printer status

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	<b>Description:</b> The IP PrintWay component of Infoprint Server now lets the operator query the status of the printer from the Infoprint Server ISPF panels. The operator will find this function useful when transmission of a data set to the printer is unsuccessful. This function is available only when IP PrintWay uses the LPR to LPD transmission protocol to transmit a data set to the printer.	
	<b>Note:</b> In z/OS V1R5, the Infoprint Server ISPF panels are used to query the status of the printer only for IP PrintWay basic mode. For IP PrintWay extended mode, the operator can query the status of the printer using Infoprint Central.	
	When change was introduced: z/OS V1R2.	
	Reference information:	
	• z/OS Infoprint Server Operation and Administration.	
IP PrintWay resubmit for filtering enhancements		
-	<b>Description:</b> When you use the IP PrintWay resubmit for filtering function to transform data, Print Interface allocates a second sysout data set on the JES spool	

transform data, Print Interface allocates a second sysout data set on the JES spool for each original sysout data set; the second sysout data set contains the transformed data. Resubmit for filtering has been enhanced to make it easier to find the second sysout data set on the JES spool. The job ID and job name of the second sysout data set on the JES spool are now the same as the job ID and job name of the original sysout data set. Additionally, the ID of the job submitter prints on separator pages, is recorded as the owner in the SMF type 6 records for both the first and second sysout data sets, and is passed as input to IP PrintWay exit routines.

When change was introduced: z/OS V1R2, but rolled back to OS/390 V2R8. You must apply Infoprint Server PTF UW87646 to obtain this enhancement in z/OS V1R2 through z/OS V1R4. The corresponding PTF for OS/390 V2R8 through z/OS V1R1 is UW87645.

### **Reference information:**

- z/OS Infoprint Server Customization.
- z/OS Infoprint Server Operation and Administration.

### IP PrintWay TCP/IP connection timeout enhancement

**Description:** IP PrintWay now waits a maximum of 30 seconds for TCP/IP to connect to a printer. Prior to this enhancement, IP PrintWay waited up to 3 minutes. Because the IP PrintWay FSA cannot process or print any other data sets while it waits for TCP/IP to connect to the printer, this enhancement can significantly improve performance.

This enhancement applies only when IP PrintWay uses the TCP/IP LPR or direct sockets printing protocol to communicate with the printer. It does not apply to VTAM-controlled or IPP-enabled printers. And, it does not apply when IP PrintWay sends data to an e-mail destination instead of to a printer.

When change was introduced: z/OS V1R2 but rolled back to OS/390 V2R8. You must apply Infoprint Server PTFs UW88108 and UW88135 to obtain this enhancement in z/OS V1R2 through z/OS V1R4. Corresponding PTFs for OS/390 V2R8 through z/OS V1R1 are UW88107 and UW88132.

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**Reference information:** *z/OS Infoprint Server Operation and Administration.* 

### NetSpool exit enhancements

**Description:** The NetSpool component of Infoprint Server now provides two new exits:

- The Graphic Escape exit (APIUGEX) for SCS and 3270 data streams. You can use this exit to map graphic escape sequences to appropriate printable characters in an alternate font. For example, a Graphic Escape "T" can be mapped to a telephone symbol in the Wingdings font. A sample Graphic Escape exit routine (APIJUGEX) provided in SYS1.SAMPLIB shows how to code the new exit.
- The Beginning of File exit (APIUBF3) for 3270 data streams. You can use this exit to add PCL commands to the beginning of PCL data streams. For example, you can add PCL commands to select a font. A sample Beginning of File exit routine (APIJUBF3) provided in SYS1.SAMPLIB shows how to code the new exit.

Also, NetSpool has enhanced two existing exits and sample exits for SCS data streams:

- NetSpool now passes to the Transparent Data Control exit (APIPPTD2) and Beginning of File exit (APIPPTD1) the type of LU session and the type of output data stream (line or PCL data stream). Therefore, your exit routines can now perform different functions for different types of sessions and output data streams.
- The sample Transparent Data Control exit (APIJPTD2) and Beginning of File exit (APIJPTD1) now provide additional examples, for example, how to delete and modify transparent data depending on whether the output data stream is a line or PCL data stream.
- When change was introduced: z/OS V1R2.
- Reference information: z/OS Infoprint Server Customization.

### **NetSpool PCL conversion**

**Description:** The NetSpool component of Infoprint Server has enhanced its support for printing data from VTAM applications, such as CICS and IMS. NetSpool can now convert VTAM application print data directly to PCL format. This new support provides greater print fidelity on printers that accept the PCL data format, which include most IBM, HP, Lexmark, and other manufacturers' network printers.

When change was introduced: z/OS V1R2.

### Reference information:

- z/OS Infoprint Server Customization.
- z/OS Infoprint Server Operation and Administration.
- z/OS Infoprint Server User's Guide.

### Print Interface support for more than 255 copies

**Description:** The Print Interface component of Infoprint Server now lets the job submitter request up to 32 640 copies of the same document in the copies job attribute. This function can be used by any job submitter who can specify Infoprint Server job attributes. In previous releases, the maximum number of copies that could be specified was 255.

Also, the administrator now can specify 32 640 copies in the copies field of the T printer definition for print requests submitted through Print Interface. If the printer L definition is shared with NetSpool, and a value larger than 255 is specified, L NetSpool uses 255. The administrator can also specify up to 32 640 copies in the Maximum copies field of the printer definition to limit the number of copies printed. L When change was introduced: z/OS V1R2. I **Reference information:** I z/OS Infoprint Server Operation and Administration I Print Interface remote transform support for IBM Infoprint Color 130 L **Plus Printer** I Description: The Print Interface component of Infoprint Server now lets you use the PostScript and PDF-to-AFP color transform provided by Infoprint Manager for AIX (5785-E42) or later. This AIX<sup>®</sup> transform is required to print color PostScript and I color PDF files on the IBM Infoprint Color 130 Plus printer. You can now specify many new options and values on the existing Print Interface remote transform filter, aoprform.dll. When change was introduced: z/OS V1R2. You must apply Infoprint Server PTF UW85327 to obtain this enhancement in z/OS V1R2 through z/OS V1R4. I **Reference information:** I I z/OS Infoprint Server Operation and Administration Print Interface subsystem for batch applications L Description: The Print Interface subsystem provides enhanced support for batch I applications. Batch applications can now use the automatic transform function I I provided by Print Interface. The Print Interface subsystem can automatically detect the data format of most data sets and, using transforms provided by Infoprint Server T Transforms, transform the data to the format required by the printer or e-mail Т destination before writing the data to the JES spool. I A batch application might want to use the Print Interface subsystem in the following 1 situations: T To transform batch application output that contains PCL, PostScript, or PDF data to AFP format and print it on IBM AFP printers controlled by PSF for OS/390 T To transform batch application output that contains line data or AFP data to PCL or PostScript format and print it on PCL or PostScript printers controlled by IP **PrintWay** To transform batch application output that contains line data or AFP data to PDF format and send it to e-mail destinations To specify Infoprint Server job attributes You can use the Print Interface subsystem in situations where you now might use I the IP PrintWay resubmit for filtering function. The subsystem provides these advantages over the resubmit for filtering function: I The subsystem is more efficient because it transforms data before writing it to the JES spool; therefore, data is written to the JES spool only one time. T The job submitter can code the DEST=IP, PRTQUEUE, and PORTNO L parameters on the OUTPUT JCL statement to override the printer's IP address in I the printer definition. If your installation wants to minimize the administration of L

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printer definitions, this means that the administrator can define one IP PrintWay printer definition for all printers that have the same printing requirements. The application programmer can specify Infoprint Server job attributes on the DD statement. To use the Print Interface subsystem, the application programmer specifies the SUBSYS parameter on the DD JCL statement for the data set. SUBSYS subparameters include the name of the Print Interface subsystem, the name of a printer definition defined in the Infoprint Server Printer Inventory, and optional Infoprint Server job attributes. The Print Interface subsystem also supports most parameters of the DD and OUTPUT JCL statements that are supported for JES sysout data sets. Because the administrator can specify default values for the supported JCL parameters in the printer definition, the application programmer does not need to code JCL parameters that have suitable default values. When change was introduced: z/OS V1R2. You must apply Infoprint Server PTF UW88209 to obtain this enhancement in z/OS V1R2 through z/OS V1R4. **Reference information:**  z/OS Infoprint Server Customization. • z/OS Infoprint Server Operation and Administration. z/OS Infoprint Server User's Guide. PSF FSA definition enhancements **Description:** Infoprint Server now lets the PSF system programmer specify additional configuration information in the Printer Inventory. PSF for OS/390 and z/OS V3 (5655-B17) can use this information when it starts a PSF-controlled printer. The following new fields can be specified in the functional subsystem application (FSA) definition: • Retained Resource Counts fields. These fields let you specify the number of form definitions, page definitions, page segments, fonts, and object containers that you want PSF to retain in printer storage or virtual storage between print jobs. These values override the reasonable resource loading values (RRLV) that you can specify in the PSF exit 7 initialization call. Save printer characteristics field. This field lets you request that PSF save information about the printer, including the printer's model and supported features, to assist IBM in diagnosing problems. Input Tray Substitution fields. These fields let you substitute different printer paper trays for the paper trays specified by the job submitter. You might want to specify substitute trays when the same side-sensitive or edge-sensitive paper is loaded in different trays in two different directions; that is, in one direction for printing on a single side of the paper and in another direction for printing on both sides of the paper. When change was introduced: z/OS V1R2 but rolled back to OS/390 V2R8. For the retained resource counts and save printer characteristics enhancements, you must apply PTF UW83615 for zOS V1R2 through z/OS V1R4; the corresponding PTF for OS/390 V2R8 is UW82178. For the input tray substitution enhancement, you must apply PTF UW92331 for zOS V1R2 through z/OS V1R4; the corresponding PTF for OS/390 V2R8 is UW92330.

PSF V3R3 or higher is required to use the Retained Resource Counts fields and the Save printer characteristics field in the printer inventory. PSF V3R2 or later is required to use the Input Tray Substitution fields in the printer inventory.

   	<ul> <li>Reference information:</li> <li>z/OS Infoprint Server Operation and Administration</li> <li>PSF for z/OS: Customization</li> </ul>
New sample c	ustomization files
   	<b>Description:</b> Infoprint Server now provides the following new sample files in SYS1.SAMPLIB. These files can help you customize Infoprint Server for the first time:
 	<ul> <li>AOPCPETC: This file copies all of the Infoprint Server sample configuration files to a directory where you can edit them.</li> </ul>
 	<ul> <li>AOPRACF: This file contains all the RACF commands you need in order to customize the security function in Infoprint Server.</li> </ul>
I	When change was introduced: z/OS V1R2.
I	Reference information: z/OS Infoprint Server Customization.
AFP <sup>™</sup> Printer I	Driver and AFP Viewer now on Internet only
     	<b>Description:</b> With OS/390 V2R10, the AFP Printer Driver for Windows and the AFP Viewer plug-in for Windows are downloadable to a workstation from OS/390 or from the Internet. With z/OS, they are downloadable only from the Internet (not from z/OS). Therefore, if you want to install these tools on any new workstations, get them from http://www.ibm.com/printers/download.html. There is no charge.
I	When change was introduced: z/OS V1R2.
I	Reference information: z/OS Infoprint Server User's Guide.
Support for IB	M Infoprint XML Extender
	<b>Description:</b> IBM Infoprint XML Extender for z/OS (5655-J66) is a licensed program that transforms Extensible Markup Language (XML) files to AFP or PDF format for printing or e-mailing. Infoprint Server is enhanced to support the XML to AFP transform ( <b>xml2afp</b> ) and the XML to PDF transform ( <b>xml2pdf</b> ) that are provided with XML Extender:
     	<ul> <li>Infoprint Server can now manage the XML to AFP and the XML to PDF transforms. Although you can also run the transforms as stand-alone, IBM recommends that Infoprint Server manage them to improve system performance. For example, if you use Infoprint Server to run a transform multiple times, your system doesn't have to reload the transform program each time you run it.</li> </ul>
   	<ul> <li>Infoprint Server can now automatically detect the XML data format and call the XML to AFP transform. This means that users who submit print jobs through the Print Interface component of Infoprint Server can print XML files on IBM AFP printers without first transforming XML data to AFP format in a separate step.</li> </ul>
   	<ul><li>Using XML Extender with Infoprint Server, users can also transform XML files to non-AFP data streams using this process:</li><li>1. Transform XML to AFP.</li><li>2. Transform AFP to another data stream, such as PCL, PostScript, or PDF.</li></ul>
1	When change was introduced: z/OS V1R2 but rolled back to OS/390 V2R8. You must apply Infoprint Server PTF UW94796 for z/OS V1R2 through z/OS V1R4; the

     	<ul> <li>Reference information:</li> <li>z/OS Infoprint Server Customization</li> <li>z/OS Infoprint Server Operation and Administration</li> <li>z/OS Infoprint Server User's Guide</li> </ul>
Integrated Sec	curity Services new functions to consider
I	This section describes new Integrated Security Services functions in z/OS.
   	Integrated Security Services includes DCE Security Server, Open Cryptographic Enhanced Plug-ins (OCEP), Firewall Technologies, LDAP Server, Network Authentication Service, and Enterprise Identity Mapping (EIM).
Enterprise Ide	ntity Mapping: EIM enhancements Description:
	EIM enhancements provide ease in managing workloads in a heterogeneous server environment, as follows:
   	<ul> <li>Provide programming interfaces for managing EIM domains, which includes everything from creation to deletion of domains, registries, enterprise identifiers, and associations between registry user IDs and enterprise identifiers</li> </ul>
I	<ul> <li>Provide programming interfaces to retrieve mappings from EIM domains</li> </ul>
 	<ul> <li>Inter operate with domains that reside in a local or remote LDAP server, on z/OS or another platform</li> </ul>
   	<ul> <li>Provide a tool capable of administering EIM domains and populating them with identifiers and user IDs from SAF/RACF DBUNLOAD output or any other tabular input</li> </ul>
	<ul> <li>Exploit SAF APIs for storing and retrieving EIM configuration information on the local system</li> </ul>
I	<ul> <li>Control which application may use of the EIM APIs.</li> </ul>
I	When change was introduced: z/OS V1R5.
 	<b>Reference information:</b> <ul> <li>z/OS Integrated Security Services EIM Guide and Reference</li> </ul>
Firewall Techr	<b>Description:</b> The ISAKMP server is enhanced to detect when a dynamic virtual IP address (DVIPA) in a sysplex configuration is moved to and from a Firewall stack. A DVIPA is a virtual IP address that can be moved from one system to another in a sysplex through a takeover/giveback scenario or through the VARY TCPIP,,OBEYFILE operator commands. When a DVIPA is moved from one Firewall stack in a sysplex to another, an attempt is made to automatically reestablish the security associations associated with that DVIPA on the target stack. The ISAKMP server on the system assuming control of the DVIPA will attempt to renegotiate the new security associations to replace the ones that were on the previously owning system in the sysplex.
1	connections). When change was introduced: z/OS V1R4.

   	<ul> <li>Reference information:</li> <li>z/OS Integrated Security Services Firewall Technologies</li> <li>z/OS Communications Server: IP Configuration Guide</li> <li>z/OS Communications Server: IP Configuration Reference</li> </ul>
Firewall Techn	ologies: Changed ISAKMP server
I	Description: The ISAKMP server was updated with the following support:
	<ul> <li>Internet Key Exchange (IKE) commit bit processing</li> </ul>
	Detection if movement of a dynamic VIPA is to or from a Firewall stack
	• Removal of the requirement to have the Security Server enabled in order to use the ISAKMP server
I	When change was introduced: z/OS V1R2.
	Reference information:
	<ul> <li>z/OS Integrated Security Services Firewall Technologies</li> <li>z/OS Communications Server: IP Configuration Guide</li> </ul>
Ì	• z/OS Communications Server: IP Configuration Reference
Firewall Techn	ologies: Enhanced configuration client GUI
 	<b>Description:</b> The configuration client graphical user interface (GUI) is enhanced as follows:
   	<ul> <li>The presentation layer of the configuration client GUI is re-engineered. It has a slightly different look and feel such as new hot key actions, a <b>new/add</b> button on list panels, and field sensitive help.</li> </ul>
I	<ul> <li>The browser-based help system is replaced with a Java-based help window.</li> </ul>
       	<ul> <li>Configuration assistants have been added for IP filtering, manual VPN definition, and dynamic VPN definition. Configuration assistants are a combination of a wizard, help screens, and normal GUI panels. They are intended to help a novice user learn how to perform complex, multistep configuration tasks. They also provide an experienced user with an alternative navigational path through the GUI.</li> </ul>
	Newly-supported client platforms include Windows 2000 and Windows Millennium Edition.
I	<ul> <li>Underlying Java and SSL support was upgraded to maintain serviceability.</li> </ul>
I	When change was introduced: z/OS V1R2.
I	<b>Reference information:</b> z/OS Integrated Security Services Firewall Technologies.
Firewall Techn	ologies: Changed configuration server
I	Description: The configuration server is updated with the following support:
	<ul> <li>The ability to store the configuration server's SSL certificate on a key ring managed by an external security manager (ESM)</li> </ul>
 	<ul> <li>The removal of the requirement to have the Security Server enabled to use the configuration GUI</li> </ul>
Ι	When change was introduced: z/OS V1R2.
   	<ul> <li>Reference information:</li> <li>z/OS Integrated Security Services Firewall Technologies</li> <li>z/OS Security Server RACF Command Language Reference</li> </ul>

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LDAP Se	erver: Modify	DN enha	ancements
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Description: The Modify DN operation is enhanced as follows:

- A Modify DN operation can now be accompanied by the new superior parameter. This parameter specifies the DN that will become the immediate superior of the renamed entry.
- A non-leaf node can now be the target of a Modify DN operation.
- A subtree move can be accomplished by specifying a New Superior parameter when the target of the Modify DN operations is a non-leaf node.
- The new **IBMModifyDNRealignDNAttributesControl** control can accompany a Modify DN operation. This control causes the server to search for all attributes of DN syntax whose values match the old DN value. These values are then updated to reflect the new DN that was created in the Modify DN operation.

When change was introduced: z/OS V1R4.

**Reference information:** *z/OS Integrated Security Services LDAP Server Administration and Use.* 

## LDAP Server: CRAM-MD5 and DIGEST-MD5 authentication

**Description:** The LDAP Server is enhanced to allow CRAM-MD5 (Challenge Response Authentication Mechanism - RFC 2104) and DIGEST-MD5 (RFC 2831) authentication.

When change was introduced: z/OS V1R4.

**Reference information:** *z/OS Integrated Security Services LDAP Server Administration and Use.* 

## LDAP Server: Transport Layer Security (TLS) support

**Description:** The LDAP Server APIs provide support through System SSL for Transport Layer Security (TLS) protocol protection of client/server communication. Transport Layer Security is based on Secure Sockets Layer (SSL) Security Version 3. The differences between TLS V1.0 and SSL V3.0 protocol are not dramatic, but they are significant enough that TLS V1.0 and SSL V3.0 do not interoperate. The z/OS LDAP Server continues to support SSL V3.0 protocol protection through System SSL. System SSL determines the protocol to use during the secure protocol handshake performed by the peers.

The z/OS LDAP Server supports the Start TLS extended operation as described in RFC 2830. This extended operation allows a client communicating over a nonsecure connection to change communication to secure communication protected by SSL/TLS. The client can later terminate secure communication while maintaining the connection to the server, resulting in non-secure communication between the server and the client.

When change was introduced: z/OS V1R4.

**Reference information:** *z/OS Integrated Security Services LDAP Server Administration and Use.* 

## LDAP Server: ACL enhancements

**Description:** Additional capabilities have been added to the TDBM backend database to support grant/deny as well as attribute-level access control

permissions. Access control lists (ACLs) can now contain permission clauses that explicitly deny access to information. In prior releases, access could only be granted, with access to all other information being denied implicitly. ACLs can now be set up to grant or deny access to individual attribute types. In prior releases, access could only be granted to attribute access classes (groups of attributes).

TDBM database instances must be at database version 2.0 in order to use the enhanced access control support. For database instances created using z/OS V1R4, the database version is set to 2.0 during startup of either the LDAP Server or ldif2tdbm program. For database instances created using an earlier release, the TDBM database version must be updated in order to use the new access control features.

Additionally, if you are running the LDAP Server in a sysplex environment with mixed levels of systems, you cannot use the enhanced access control support until all LDAP Servers accessing the same TDBM database instance are running at the *z*/OS V1R4 level.

When change was introduced: z/OS V1R4.

**Reference information:** *z/OS Integrated Security Services LDAP Server Administration and Use.* 

### LDAP Server: SDBM enhancements

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**Description:** SDBM is enhanced as follows in z/OS V1R2:

- RACF manages group membership and maintains a set of connection information about each member of a group. SDBM can now be used to administer this connection information.
- Support is added for the LNOTES, NDS, KERB, and PROXY segments in the RACF user profile. Values for these segments can be set and displayed in an SDBM user profile entry. SDBM can also be used to administer RACF universal groups.
- New application identification search filters are added to SDBM. These filters allow an application to retrieve the entire entry of the RACF user corresponding to a given LNOTES short name, NDS user name, KERB principal name, or OMVS UID. The entire entry of the RACF group corresponding to a given OMVS GID can also be retrieved.

SDBM is enhanced to support the following in z/OS V1R4:

- Setting and displaying the values of the new EIM segment in the RACF user profile
- Specifying SHARED and AUTOUID or AUTOGID when setting the UID or GID value in the OMVS segment in the RACF user or group profile
- Searching for all the RACF users or groups with a specified OMVS UID or GID value
- Using an internal schema instead of defining the attributes and object classes in external files

In addition for z/OS V1R4, there is a change in the reason code that SDBM returns when a client attempts to bind using a user who doesn't exist, a user who is not fully defined, or an incorrect password. All these cases now return reason code R000104. To cover all these cases, the text for reason code R000104 is changed to:

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 ${\tt R000104}$  The password is not correct or the user id is not completely defined (missing password or uid).

When change was introduced: z/OS V1R2 and rolled back to OS/390 V2R10 by PTF UW99369; z/OS V1R4.

**Reference information:** *z/OS* Integrated Security Services LDAP Server Administration and Use.

## LDAP Server: ibm-entryuuid support

**Description:** The LDAP Server now supports the **ibm-entryuuid** attribute. Each new LDAP entry is assigned a universally unique **ibm-entryuuid** value. Existing entries can be assigned values using the new **Idapadduuids** utility.

When change was introduced: z/OS V1R4 and rolled back to OS/390 V2R10 by PTF UW89493.

**Reference information:** *z/OS Integrated Security Services LDAP Server Administration and Use.* 

### LDAP Server: Activity logging

**Description:** The LDAP Server provides a means of collecting server activity information in a log file. The log file can be an HFS file or an MVS data set.

When change was introduced: z/OS V1R4.

**Reference information:** *z/OS* Integrated Security Services LDAP Server Administration and Use.

### LDAP Server: Monitor support

**Description:** The LDAP Server provides the capability to retrieve certain statistics about its operations through an LDAP Server using a base of cn=monitor.

When change was introduced: z/OS V1R4.

**Reference information:** *z/OS Integrated Security Services LDAP Server Administration and Use.* 

### LDAP Server: TDBM schema

**Description:** Additional attribute types and object classes are added to the TDBM schema by applying the updates from the schema-update.ldif file shipped with this release. Enhanced schema migration instructions are now available.

When change was introduced: z/OS V1R4.

**Reference information:** *z/OS Integrated Security Services LDAP Server Administration and Use.* 

### LDAP Server: Kerberos authentication

**Description:** Kerberos is a trusted third party, private-key, network authentication system. The LDAP Server is enhanced to allow Kerberos authentication.

When change was introduced: z/OS V1R2 and rolled back to OS/390 V2R10 by PTF UW99369.

**Reference information:** *z/OS Integrated Security Services LDAP Server Administration and Use.* 

### LDAP Server: Native authentication

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**Description:** The LDAP Server is enhanced to allow authentication to the Security Server through the TDBM backend.

When change was introduced: z/OS V1R2 and rolled back to OS/390 V2R10 by PTF UW99369.

**Reference information:** *z/OS Integrated Security Services LDAP Server Administration and Use.* 

### LDAP Server: Extended operations for accessing Policy Director data

**Description:** The LDAP Server, when using the extended operation (EXOP) backend, supports two LDAP extended operations, **GetDnForUserid** and **GetPrivileges**, which retrieve Policy Director data from any LDAP Server.

When change was introduced: z/OS V1R2 and rolled back to OS/390 V2R10 by PTF UW99369.

**Reference information:** *z/OS Integrated Security Services LDAP Server Administration and Use.* 

### LDAP Server: Abandon support

**Description:** The Abandon operation was supported in previous releases of the LDAP Server. However, all operations on a single connection were processed synchronously. Therefore, the Abandon operation had no effect on the processing of previous operations by the LDAP Server. In z/OS V1R4, the LDAP Server reads additional operations as they arrive as long as the connection is not a secure connection and the previous operation is not bind, unbind, or extended operations.

When change was introduced: z/OS V1R4.

**Reference information:** *z/OS Integrated Security Services LDAP Server Administration and Use.* 

### Network Authentication Service: Support for IPv6

**Description:** Network Authentication Service now supports IPv6, a new addressing format for the Internet.

When change was introduced: z/OS V1R4.

**Reference information:** *z/OS Integrated Security Services Network Authentication Service Programming.* 

## Network Authentication Service: MIT Kerberos's New Database Manager (NDBM)

Description: Network Authentication Service now supports MIT Kerberos's New Database Manager (NDBM) for use with the hierarchical file system (HFS), as follows:
The kadmin command is modified for use with NDBM.

Chapter 1. What's new in z/OS (z/OS V1R2 through z/OS V1R5) 135

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	<ul> <li>NDBM allows other platform Key Distribution Centers (KDCs) to act as part of the z/OS realm. Database propagation to these other platforms is supported for MIT Kerberos V5R1.2.2 and later, and a compatibility mode is provided for MIT Kerberos V5R1.2.1 and earlier.</li> <li>There are new messages and codes to support the NDBM implementation.</li> </ul>	
1	When change was introduced: z/OS V1R4.	
	<b>Reference information:</b> <i>z</i> /OS Integrated Security Services Network Authentication Service Administration.	
Network Authe	entication Service: Command enhancements	
	Description: Three commands are new:	
	<ul> <li>The kadmin command allows you to manage the MIT Kerberos database on platforms other than z/OS as well as the Kerberos NDBM database on z/OS.</li> </ul>	
	<ul> <li>The kpasswd command allows you to change the password for a Kerberos principal.</li> </ul>	
	• The <b>kvno</b> command displays the current key version number for a principal.	
1	When change was introduced: z/OS V1R2.	
	<b>Reference information:</b> <i>z</i> /OS Integrated Security Services Network Authentication Service Administration.	
Network Authentication Service: Support for message logging using sysload daemon		
-,	<b>Description:</b> The _EUV_SVC_MSG_LOGGING environment variable now supports the specification that all messages be written to the system logging facility, using	

When change was introduced: z/OS V1R2.

the syslogd daemon.

**Reference information:** *z/OS* Integrated Security Services Network Authentication Service Administration.

## Network Authentication Service: Cryptographic support for DES and DES3

**Description:** Network Authentication Service always supports 56-bit Data Encryption Standard (DES) encryption (for both authentication and user data encryption). With the z/OS Security Server Network Authentication Service Level 3 optional feature installed, 168-bit Triple DES (DES3) encryption is available for authentication purposes. However, due to US government export regulations, it might not be available for user data encryption. This means that tickets can be obtained using 168-bit DES3 encryption but the session keys in service tickets may need to be restricted to 56-bit DES encryption (the session key is often used for user data encryption).

### When change was introduced: z/OS V1R2.

### **Reference information:**

- z/OS Integrated Security Services Network Authentication Service Administration
- z/OS Integrated Security Services Network Authentication Service Programming

1	Network Authentication Service:	API enhancements
	new. Other APIs are updat	ed.
I	When change was introd	uced: z/OS V1R2.
	Reference information: z       Service Programming.	OS Integrated Security Services Network Authentication
	ISPF new functions to consider	
I	This section describes new	ISPF functions in z/OS.
I	Scrollable and multiline panel fie	lds
 	Description:         ISPF panel la           I         enhanced to give dialog de	anguage and Dialog Tag Language (DTL) have been velopers new options when defining panel fields:
I	panel fields can be defin	ed as scrollable
	multiline input fields can	be defined within a scrollable area
	Input and output fields c     a field can be displayed	an be defined as expandable, so that the full contents of in a popup window
I	When change was introd	uced: z/OS V1R5.
I	Reference information:	
I	• z/OS ISPF Dialog Devel	oper's Guide and Reference
I	• z/OS ISPF Dialog Tag L	anguage Guide and Reference
I	New built-in functions for panel p	processing
 	Description:         The LENGTH           obtain the length of data w	I built-in function enables a panel processing section to ithin a variable.
 	The UPPER built-in function assignment statement.	n returns the uppercase value of a variable in an
I	When change was introd	uced: z/OS V1R5.
I	Reference information:	
I	z/OS ISPF Dialog Devel	oper's Guide and Reference
I	Member list enhancements	
 	Description: The SORT PF           in a sequence determined	ROMPT command enables a member list to be displayed by the data displayed in the PROMPT field.
 	The SRCHFOR primary co search of the members in t	mmand can now be used from a member list, allowing a he list using the SuperC Utility.
 	The Move/Copy Utility has or copied when associated	been modified so that aliases are automatically moved members are selected using the member list.
 	A new Settings option and member lists from scrolling	configuration table keyword allows users to disable to the first member selected for processing.

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I	When change was introduced: z/OS V1R5.
   	<ul> <li>Reference information:</li> <li>z/OS ISPF User's Guide</li> <li>z/OS ISPF User's Guide Volume II</li> <li>z/OS ISPF Planning and Customizing</li> </ul>
   	Data set list enhancements Description: The Data Set List Utility has been enhanced to differentiate duplicate data set names obtained by searching multiple user catalogs.
 	The Data Set List Utility has been enhanced to allow HFS commands to be issued against data sets displayed in the list.
I	When change was introduced: z/OS V1R5.
 	Reference information: • z/OS ISPF User's Guide Volume II
	<ul> <li>PDS member delete by pattern</li> <li>Description: ISPF now supports deletion of multiple members of a PDS or PDSE with a single command, optionally bypassing the member list display. This facility is available through the member delete options in the following interfaces:</li> <li>ISPF Option 3.1 (Library Utility)</li> <li>ISPF Option 3.4 (Data Set Utility)</li> <li>ISPF Option 11 (Workplace)</li> <li>The LMMDEL service</li> </ul>
	When change was introduced: z/OS V1R5.
   	<ul> <li>Reference information:</li> <li>z/OS ISPF User's Guide Volume II</li> <li>z/OS ISPF Services Guide</li> </ul>
	ISPF Edit
 	<b>Description:</b> SuperC has been added to the list of languages that can automatically be identified by the EDIT HILITE function.
   	A new option on the EDITSET command, Force ISRE776 if RFIND/RCHANGE passed arguments, controls whether RFIND and RCHANGE process input on the command line.
I	When change was introduced: z/OS V1R5.
   	<ul> <li>Reference information:</li> <li>z/OS ISPF Edit and Edit Macros</li> <li>z/OS ISPF Planning and Customizing</li> </ul>
I	Exit 11 (Logical Screen End)
L	Description: ISPF installation-wide exit 11 (Logical Screen End) has been modified

**Description:** ISPF installation-wide exit 11 (Logical Screen End) has been modified to supply the next logical screen to be displayed.

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I	When change was introduced: z/OS V1R5.
I	Reference information:
Ι	• z/OS ISPF Planning and Customizing
	Configuration utility enhancements
 	<b>Description:</b> The ISPF Configuration Utility now stores details of the keyword source data set that was used to build the current configuration module.
   	The field ISPF_TEMPORARY_DATA_SET_QUALIFIER in the ISPF Configuration Table now supports the use of any of the system symbolic variables, such as &SYSNAME, for the temporary data sets that are allocated by ISPF, including LOG, Work and CNTL files.
I	When change was introduced: z/OS V1R5.
	Reference information:
I	z/OS ISPF Planning and Customizing
	Configurable minimum and maximum scroll amounts
   	<b>Description:</b> New configuration table options allow you to configure minimum and maximum values for the number of lines to scroll on scrollable panels. Another option defines the behavior when a scroll amount of zero is entered on a scrollable panel.
I	When change was introduced: z/OS V1R5.
 	Reference information: <ul> <li>z/OS ISPF Planning and Customizing</li> </ul>
Ι	Multiple User and Site command tables
   	<b>Description:</b> The ISPF configuration utility now enables users to specify additional SITE and USER command tables to be used with the standard ISPF command tables.
I	When change was introduced: z/OS V1R5.
	Reference information:
I	z/OS ISPF Planning and Customizing
I	• z/OS ISPF User's Guide
I	Terminal types and translation tables
	<b>Description:</b> Changes to translation tables for terminal types include:
	<ul> <li>New Greek translation table and associated terminal type 3278GR</li> <li>New TEXT translation table and associated terminal type DEU78T with support</li> </ul>
   	<ul> <li>English/Swiss translation table changed to allow for uppercase translations of German umlaut</li> </ul>
I	When change was introduced: z/OS V1R5.
I	Reference information:
	Chapter 1. What's new in z/OS (z/OS V1R2 through z/OS V1R5) <b>139</b>

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• z/OS ISPF Planning and Customizing

## Enhancements to SCLM utilities

   	<b>Description:</b> The Package Backout utility enables you to back up and recover non-editable types using a backup group controlled within SCLM. Package backout is controlled by several new parameters on the FLMTYPE and FLMGROUP macros.
 	The SCLM Version Selection panel has these new options: External Compare, Version Viewer, and Version History Browser.
 	A new member description field can be specified in the SCLM Edit Profile panel and is displayed in the SCLM Library Utility.
I	The Audit and Version Utility now allows a wildcard to be entered in the Type field.
   	During SCLM edit sessions, if a member is being used by another process, additional panels are presented showing which other users have ENQ's on the member in question. This enhancement makes SCLM Edit consistent with the normal ISPF edit process.
I	When change was introduced: z/OS V1R5.
I	Reference information:
 	<ul> <li>z/OS ISPF Software Configuration and Library Manager Project Manager's and Developer's Guide</li> </ul>
Ι	• z/OS ISPF Software Configuration and Library Manager Reference
I	New SCLM services and variables
 	<b>Description:</b> A new service, GETBLDMP, returns Build Map information associated with an SCLM-controlled member.
Ι	A new service, SCLMINFO, returns project definition information.
 	A new variable, @ @FLMCAA, contains the current change code during the Parse phase of SCLM translators.
I	When change was introduced: z/OS V1R5.
Ι	Reference information:
 	<ul> <li>z/OS ISPF Software Configuration and Library Manager Project Manager's and Developer's Guide</li> </ul>
Ι	• z/OS ISPF Software Configuration and Library Manager Reference
I	ISPF product and library changes
   	<b>Description:</b> The system variables ZENVIR, ZISPFOS, and ZOS390RL can be used in dialogs and EXECs to test the current release levels of ISPF and z/OS. In z/OS V1R4, these variables contain the following values:
1	• ZENVIR contains "ISPF 5.2" in characters 1 to 8.
	<ul> <li>ZISPEOS contains "ISPE for Z/OS 01.02.00".</li> <li>ZOS390RL contains "Z/OS 01.04.00".</li> </ul>
I	New system variable ZDAYOFWK indicates the day of the week.

The ISRDDN diagnostic utility is now documented in *z/OS ISPF User's Guide Volume I.* 

When change was introduced: z/OS V1R2.

### **Reference information:**

- z/OS ISPF User's Guide Volume I
- z/OS ISPF Planning and Customizing

### ISPF DM component changes

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Description: The Dialog Manager (DM) component of ISPF is enhanced as follows:

- Support for "VER(&variable,IPADDR4)" is added.
- The NOSETMSG parameter is added to the CONTROL service.
- The LFORMAT parameter is added to the VDEFINE service to allow defining like format variables in a list.
- Tutorial processing changed to eliminate the "end of data" message on scrollable area panels that display the entire scrollable area on the screen (+/ is no longer displayed). This change eliminates the extra Enter the user had to execute before continuing to the next panel.
- A TSO/E line message is now issued when a help panel is not found, and the dialog continues. Previously, ISPF issued a severe error message when a help panel could not be found.
- A message is displayed that indicates a message is not found when running in Dialog Test and, and the dialog is allowed to continue.
- Support for the following single byte character set (SBCS) and double byte character set (DBCS) Coded Character Set Identifiers (CCSIDs) is added:
  - 1159 Traditional Chinese
  - 1364 Korean
  - 1371 Traditional Chinese
  - 1388 Simplified Chinese
  - 1390 Japanese
  - 1399 Japanese
- Z variables are added to support 5-character code pages and character sets, ZTERMCP5 and ZTERMCS5, respectively.
- The Reflist function of TEST option 7.6 is enhanced to allow better list management.
- Locate and Find for Dialog Test Variables (option 7.3) are enhanced.
- A command called ISPCMDTB is added to convert ISPF command tables to DTL.
- A configuration table variable is added to allow scroll defaults.
- A configuration table variable is added to allow status area defaults.

Enhancements to Dialog Tag Language include the following:

- National language text strings are now accessible as entities.
- New tags have been added to support dividers within the DL and PARML tags.
- ISPDTLC (the Dialog Tag Language conversion utility) has been enhanced to support the new tags and tag attributes.
- When change was introduced: z/OS V1R2.
- **Reference information:** *z/OS ISPF Planning and Customizing.*

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## **ISPF PDF component changes**

1	<b>Description:</b> The ISPF Program Development Facility (PDF) component is enhanced as follows:
 	<ul> <li>A MEMBER command is added to the data set list (option 3.4) to allow the data set list to be searched for a specific member</li> </ul>
 	<ul> <li>When the EDIT service is specified with an initial macro, parameters can now be specified for the initial macro.</li> </ul>
 	<ul> <li>A FIND command is added to the member list to allow a string to be searched for in any of the displayed statistics.</li> </ul>
 	<ul> <li>A SRCHFOR command is added to the data set list to allow SuperC to be invoked to search the data set list for strings.</li> </ul>
 	<ul> <li>Move/Copy now dynamically calculates the sizes for the IEBCOPY SYSUT3 and SYSUT4 data sets.</li> </ul>
 	<ul> <li>A QUERYENQ service is added to retrieve ENQ information about a data set in use.</li> </ul>
1	• A new SuperC option FINDALL is added to specify that all strings must be found to issue a "strings found" return code.
1	<ul> <li>LMPRINT now allows the INDEX parameter to be specified for a record format U data set.</li> </ul>
1	<ul> <li>Foreground and batch now support the z/OS C/C++ compiler.</li> </ul>
   	<ul> <li>A new AUTOTYPE command can be set to a PF key to retrieve a data set name or pattern entered on a panel based on data sets that start with that partial name.</li> </ul>
	<ul> <li>Data sets with an LRECL less than 10 bytes can be edited or viewed.</li> </ul>
1	• The Edit CUT and PASTE command defaults are added to the ISPF configuration table.
1	• The Edit CUT and PASTE default behaviors are modified to use CUT REPLACE and PASTE KEEP.
	<ul> <li>The BARRIER keyword is added to the SELECT for Edit macros.</li> </ul>
1	• A new program called ISREMSPY can be invoked from an Edit macro to display the current Edit data.
 	<ul> <li>The Edit macro commands CURSOR, LINENUM, and DISPLAY_LINES can retrieve line numbers greater than 999999.</li> </ul>
I	When change was introduced: z/OS V1R2.
I	Reference information: z/OS ISPF Planning and Customizing.
ISPF SCLM cor	nponent changes
l I	<b>Description:</b> The ISPF Software Configuration and Library Manager (SCLM) component is enhanced as follows:
	The Library utility is enhanced as follows:
I	<ul> <li>A member action is added to initiate promotion on a member.</li> </ul>
I	<ul> <li>The REFRESH command is added to update the member list contents.</li> </ul>
l I	<ul> <li>The HIER command is added to switch between full hierarchy view and single group view.</li> </ul>
I I	<ul> <li>The edit action can create a new member when entered on the command line.</li> </ul>

- The ability to select deletion of accounting data or build map only is added.

	<ul> <li>The FLMLRBLD macro is new. It selects automated rebuild for members with a specified language on promotion to listed groups.</li> </ul>
I	<ul> <li>Edit models for SCLM services are improved.</li> </ul>
 	<ul> <li>The VOL keyword is added to the FLMCPYLB and FLMSYSLB macros to allow reference to uncataloged data sets.</li> </ul>
I	The VIO keyword is added to the FLMALLOC macro to override the
1	SCLM-calculated default unit of DASD or VIO for temporary data sets.
I	• Supplied parsers and translators are all loaded RMODE(31).
I	When change was introduced: z/OS V1R2.
I	<b>Reference information:</b> <i>z/OS ISPF Planning and Customizing.</i>
I	SCLM Package Backout and Version Viewer
	<b>Description:</b> The Package Backout process is new. It enables you to back up and recover noneditable types, using a backup group controlled within SCLM. The backout process restores an executable environment by promoting the previously backed up modules from the backup group. Source members are recoverable through versioning, using SCLM services and administration procedures external to the Package Backout processes. The term "package" refers to an SCLM architecture member that is used during the build and promote processes within SCLM. This architecture member defines the modules/archdef members that are promoted using include or change code parameters.
I	The Audit and Version utility is enhanced as follows:
 	<ul> <li>The new Version Viewer option extracts and shows the selected version of the source, using the SCLM VERRECOV service.</li> </ul>
   	<ul> <li>The new Version History Browser option shows changes in the source code between the selected version and the current version. The Key column indicates whether each line has changed and if so, in which version.</li> </ul>
 	When change was introduced: Rolled back to OS/390 V2R10 by PTF UW92689 and z/OS V1R2 by PTF UW89007.
 	<b>Reference information:</b> See the documentation supplied in PDF format with the PTF.
	JES2 new functions to consider
Ι	This section describes new JES2 functions in z/OS.
	Examine checkpoint scheduling settings to accommodate JES2 ENF58 record generation
   	<b>Description:</b> JES2 generates an ENF58 record whenever a checkpoint is taken by a device processing a SYSOUT data set. Periodic checkpointing monitors the processing and progress of printing to ease print restart in the even to of a printing failure.
I	When change was introduced: z/OS V1R5.
I	Beference information:
' I	<ul> <li>z/OS JES2 Macros for coding examples of those JES2 macros that access the</li> </ul>

checkpoint outside the JES2 main task.

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	<ul> <li>z/OS JES2 Macros for more details about affecting and tuning JES2 checkpoint record writing frequency.</li> </ul>
	<ul> <li>z/OS MVS Using the Functional Subsystem Interface for more details about ENF58 records and client tokens.</li> </ul>
I	z/OS JES2 Migration
	Update JES2 Exit 14, 36, and 37 processing to support multilevel security
	<b>Description:</b> In support of multilevel security through RACF, JES2 can now limit job selection based on "security label by system". Although the RACF data base is shared by all JES2 multi-access spool (MAS) members and most profiles apply to all systems, you can specify a subset of members to which SECLABELs apply. JES2 maps the systems for which a SECLABEL is active against an affinity mask associated with each batch job. This affinity can increase security within your system, but it can also prevent job selection.
   	If you have implemented JES2 exits, if appropriate, review and update Exit 14 (Job queue work select - \$QGET,), Exit 36 (Pre-security authorization call) or an Exit 37 (Post-security authorization call) routine. See <i>z/OS JES2 Migration</i> for additional detail.
I	When change was introduced: z/OS V1R5.
I	Reference information:
   	<ul> <li>z/OS JES2 Installation Exits for coding an Exit 14 routine to replace normal JES2 job selection processing and for a complete list of WAVFUNCD and WAVREQST values used by Exits 36 and 37.</li> </ul>
 	<ul> <li>z/OS JES2 Commands for use of the \$Djob and Tjob commands used by operators and automation scripts.</li> </ul>
I	z/OS JES2 Migration
I	Update JES2 Exit 34 to support PSO unallocation flagging
	<b>Description:</b> JES2 Exit 34's (Subsystem interface data set unallocation) "register contents when the exit receives control" has been modified. The R1 offset at decimal 16 is the address of a PDDB (peripheral data definition block). Previously this address could be set to zero only if the data set type is a regular internal reader or an unknown data set type. It is now also set to zero if a PSO unallocation was performed after the JOB-step TCB ended.
 	You should examine your Exit 34 code to ensure that the potential zero address for PSO unallocation can be processed correctly.
I	When change was introduced: z/OS V1R5.
I	Reference information:
I	• z/OS JES2 Installation Exits for coding an Exit 34 routine to affect subsystem
1	interface data set unallocation.
I	• Z/US JES2 Migration

#### I Examine/update JES2 exits to recognize null service class for WLM processing I L **Description:** MVS uses the default workload manager (WLM) policy when MVS is started without a WLM couple data set or if there is a problem or error when L I accessing the current policy in the WLM couple data set. The default WLM policy assigns a null service class (SRVCLASS= on a \$Djob command) to all jobs. I You should examine your exit routines and automation code and revise them as 1 appropriate so they recognize a null service class as valid for jobs awaiting and in Т execution. Also, WLM-managed initiators will now select jobs with a null service I class. L When change was introduced: z/OS V1R5. I I **Reference information:** I z/OS JES2 Commands for use of the \$Djob command used by operators and I automation scripts. • z/OS JES2 Installation Exits for coding exit routines. I I • z/OS JES2 Migration Dynamic proclibs and INCLUDE initialization statement I **Description:** Customer IPL outages are aggravated by a defective JES2 start I PROC. z/OS V1R2 JES2 addresses this problem in these ways: L I Minimizes the information in the JES2 PROC (thus limiting the chance that some change in the system makes the PROC unusable). 1 Provides the ability to start JES2 with a generic PROC, such as IEASYSAS for 1 those cases where the JES2 PROC does become unusable. The two most I frequently updated statements in the JES2 PROC are the proclib data set 1 concatenations and the JES2 initialization data sets. Now, JES2 provides initialization statements for these two data sets. 1 Provides PROCLIB and INCLUDE initialization statements. The PROCLIB initialization statement allows you to define a logical DD name that the converter T can use. Up to 255 data set names can be associated with each PROCLIB initialization statement. The INCLUDE initialization statement gives you the ability T to include additional initialization streams into your initialization process. I JES2 z/OS V1R2 provides the INCLUDE initialization statement to help you to 1 reduce the need to update the JES2 PROC. Instead of declaring a concatenation of I initialization data set members or data sets in the JES2 PROC, you can use the I INCLUDE initialization statement that includes other initialization streams as part of the JES2 initialization process. The INCLUDE initialization statement requires a data set name (and optional member name) that specifies where the additional initialization stream can be found. Also, you can include a D INCLUDE statement in your initialization stream to display the current data set that is being processed. I The following commands provide additional flexibility in specifying proclib data sets: I I \$ADD PROCLIB creates a new dynamic proclib concatenation. \$DEL PROCLIB deletes an existing dynamic proclib. This command does not affect the static proclibs defined in the JES2 PROC. L I \$T PROCLIB updates an existing dynamic proclib

 \$D PROCLIB displays the current dynamic proclibs only and does not display the static ones. This command has a DEBUG option that provides additional information about the dynamic proclib concatenation as well as logically deleted dynamic proclibs that are still in use.

### When change was introduced: z/OS V1R2.

Reference information: z/OS JES2 Initialization and Tuning Reference.

### Spinning JESLOG data sets for long running jobs

**Description:** When you have a job that runs for an extended period of time (such as days or even weeks), JESLOG data needs to be periodically spun as the job runs. JES2 provides for the spinoff or suppression of JESLOG data (specifically, the data sets JESMSGLG and JESYSMSG). "Spinning off" a JESLOG data set means that a portion of the log is printed, or placed on the hold queue and made available to TSO users, applications, or external writers, while the job continues to run and possibly generate more messages to the JESLOG data sets. This periodic ability to spin off JESLOG data improves the use of JES2 resources as it allows spool space from the spun data sets to be reused without ending and restarting the job in question.

Spinning or suppressing JESLOG data is accomplished with the following changes:

- A JES2 JOBCLASS initialization statement keyword, JESLOG, is added to allow you to specify whether to spin off or suppress the output of JESLOG data sets. The JESLOG parameter on the JOBCLASS initialization statement along with the JESLOG parameter on the JOB card makes the specification complete. The specification on the JOB card overrides what is specified on the JOBCLASS initialization statement.
- The SPOOL data set browse (SDSB) interface is updated to allow the fetching of the logical JESMSGLG and the logical JESYSMSG data sets.
- The \$T job,SPIN command causes immediate spinning of JESLOG data sets provided either JESLOG=SPIN or JESLOG=(SPIN,xxx) is specified.
- The \$T JOBCLASS(*x*),JESLOG=(SPIN,*yyy*) command lets you alter your setting on the JOBCLASS initialization statement, where *x* is the job class for which you want to alter the SPIN value, and *yyy* is the SPIN option you specify. This command can be issued at any time and only affects those jobs converted after the change is made.
- The \$T REQJOBID, JESLOG=(SPIN, yyy) command lets you set the SPIN value for Request Jobid jobs much the same way \$T JOBCLASS(xx), JESLOG=(SPIN, yyy) does for ordinary jobs.
- The Request Jobid SSOB extension, IEFSSRR, allows attributes (including SPIN values) to be set for Request Jobid jobs in the same way that JCL statements do for ordinary jobs.

### When change was introduced: z/OS V1R2.

### **Reference information:**

- z/OS JES2 Initialization and Tuning Reference
- z/OS JES2 Commands

## **INCLUDE** initialization statement enhancements

**Description:** The INCLUDE initialization statement is enhanced as follows:

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	<ul> <li>It provides the ability to specify reading from the z/OS logical parmlib concatenation</li> </ul>
'   	<ul> <li>It provides the ability to read from another member of the current data set without specifying the data set name</li> </ul>
 	<ul> <li>It supports the ability to have a default logical parmlib member name used when starting JES2 instead of supplying a HASPPARM DD statement.</li> </ul>
I	When change was introduced: z/OS V1R4.
   	<ul> <li>Reference information:</li> <li>z/OS JES2 Initialization and Tuning Guide</li> <li>z/OS JES2 Migration</li> </ul>
Ι	\$QLOCNXT macro
 	<b>Description:</b> The \$QLOCNXT macro finds the next allocated job number after a specified job number.
I	When change was introduced: z/OS V1R2.
I	Reference information: z/OS JES2 Macros.
Ι	Checkpoint improvements
	<b>Description:</b> Prior to z/OS V1R2 JES2, switching between checkpoint modes required an all member warm start. Now, you can switch checkpoint modes using the \$T CKPTDEF,MODE=DUALIDUPLEX command. An all member warm start is not required. Changing to DUPLEX mode is always allowed. Changing to DUAL mode is NOT allowed when either CKPTn or NEWCKPTn is on the coupling facility or if DUPLEX=OFF is specified on the CKPTDEF initialization statement and both CKPTs are in use.
 	<b>Note:</b> You can use the <b>\$T CKPTDEF,MODE=DUALIDUPLEX</b> command even though some MAS members are not at the z/OS V1R2 JES2 level.
I	When change was introduced: z/OS V1R2.
   	<ul> <li>Reference information:</li> <li>z/OS JES2 Commands</li> <li>z/OS JES2 Initialization and Tuning Reference</li> </ul>
	PARTNUM=0 on INITDEF initialization statement supported
   	<b>Description:</b> Previously, PARTNUM had to be greater than zero. In z/OS V1R4, PARTNUM=0 is supported. This means that no JES2 initiators will be used. This in turn implies that JES2 will not build a PIT data area. The pointers to the PIT data area (\$PITABLE and CCTPIT) will be zero when PARTNUM is zero.
I	When change was introduced: z/OS V1R4.
   	<ul> <li>Reference information:</li> <li>z/OS JES2 Initialization and Tuning Reference</li> <li>z/OS JES2 Migration</li> </ul>

JES2

### JES2

Ι	SAPI JMR		
   		<b>Description:</b> In z/OS V1R4, JES2 is updated to pass the JMRUSEID field of the IEFJMR data area to the application by way of the SSS2USID field of the IAZSSS2 data area.	
Ι		When change was introduced: z/OS V1R4.	
   		<ul> <li>Reference information:</li> <li>z/OS MVS Using the Subsystem Interface</li> <li>z/OS JES2 Migration</li> </ul>	
Ι	SPOOL read S	SI	
 		<b>Description:</b> In z/OS V1R4, JES2 has been enhanced to provide an interface to the SPOOL SSI that will allow the return of in storage buffers.	
Ι		When change was introduced: z/OS V1R4.	
   		<ul> <li>Reference information:</li> <li>z/OS MVS Using the Subsystem Interface</li> <li>z/OS JES2 Migration</li> </ul>	
I	PARM operand	on JES2 START command	
   		<b>Description:</b> In z/OS V1R4, JES2 start processing is enhanced to support a MEMBER value specified by PARM on the START command or within the start PROC. This operand specifies a member of the z/OS logical parmlib concatenation that contains the JES2 initialization stream.	
   		If no source of initialization statements is specified either by MEMBER or by a successful open of the HASPPARM DD data set, then the default is the HAS <i>xxxx</i> member in the z/OS logical parmlib concatenation. ( <i>xxxx</i> is the subsystem name, such as JES2.)	
Ι		When change was introduced: z/OS V1R4.	
   		<ul> <li>Reference information:</li> <li>z/OS JES2 Migration</li> <li>z/OS JES2 Initialization and Tuning Guide</li> </ul>	
Ι	Warm start redesign		
     		<b>Description:</b> In the past, warm start processing could cause system malfunctions (such as a stopped system due to deadlock, and repeated abends) because of a shortage of block extension reuse tables (BERTs). To alleviate this shortage problem, JES2 warm start code is rewritten. The rewritten code is functional whether JES2 is operating in R4 mode or z2 mode.	
Ι		When change was introduced: z/OS V1R2.	
Ι		Reference information: z/OS JES2 Migration.	
Ι	New monitor a	ddress space	

# **Description:** A new (non-optional) address space called *xxxx***MON** is now started for each JES2 instance, where *xxxx* is a subsystem name, such as JES2. The new address space monitors the corresponding JES2 address space.

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I	When change was introduced: z/OS V1R4.
١	Reference information: z/OS JES2 Migration.
	Support for spool extents that end past the 64 KB track boundary on a volume
	<b>Description:</b> JES2 supports relative and absolute track addressing for processing the spool. An initialization option (RELADDR parameter of the SPOOLDEF initialization statement) indicates whether relative addressing is used, never used, or only used when needed. This option ensures that relative addressing is not used before any vendor product that looks at the spool is ready to use relative addressing.
   	The SPOOLDEF initialization statement is updated to allow you to specify whether you always, as needed, or never want to use relative module track records (MTTRs) in processing the JES2 spool. To specify your choice, you use the new parameter RELADDR with a value of ALWAYS, ASNEEDED, or NEVER.
	The size of a spool data set is still limited to a size of 64 KB tracks. The \$T SPOOLDEF command is updated to allow you to update the current setting for RELADDR. If relative addressing is being used for a volume, the \$D SPOOL,UNITDATA command displays a new parameter, BASETRAK. The value of BASETRAK must be added to the TT (part of MTTR) to convert a relative track address to an absolute track address.
   	A new interface is provided to read records from the JES2 spool. This interface is implemented as an option on the SSI 71 call. When you use this interface, you need not know about internal JES2 MTTR processing.
 	When change was introduced: z/OS V1R2 and rolled back to OS/390 V2R10 by PTFs.
Ι	Reference information:
 	<ul> <li>For information about using the new RELADDR parameter on the SPOOLDEF initialization statement, see z/OS JES2 Initialization and Tuning Reference.</li> </ul>
1	• For information about using \$1 SPOOLDEF, see <i>z/OS JES2 Commands</i> .
I	• For information about SSI 71, see Z/OS MVS Using the Subsystem Interface.
I	999 999 JES2 job numbers
 	<b>Description:</b> In JES2 R4 mode you can define up to 65 534 job numbers. In JES2 z2 mode the limit is increased to 999 999 job numbers.
I	When change was introduced: z/OS V1R2.
	Reference information: z/OS JES2 Migration.
I	JES3 new functions to consider
I	This section describes new JES3 functions in z/OS.

I	Advancing from the DAT prefix to data in spooled records
   	<b>Description:</b> Any user exits or modifications that use the DATCC value to advance from the DAT prefix to the data within a spooled record must use the IATXDATX macro instead.
I	When change was introduced: z/OS V1R5
	<ul><li>Reference information:</li><li>z/OS JES3 Customization for details about using the IATXDATX utility</li></ul>
	Updating the BFSIZ parameter on an NJERMT statement
   	<b>Description:</b> Starting in z/OS V1.5, JES3 spool records have an additional two bytes in the prefix. Because of this, the maximum buffer size for an NJERMT statement (BFSIZ parameter) is now the maximum buffer size on the BUFFER BUFSIZE parameter minus 46, instead of minus 44.
 	You must recode the BFSIZ parameter on your NJERMT statement to be BUFFER,BUFSIZE minus 46 instead of BUFFER,BUFSIZE minus 44.
I	When change was introduced: z/OS V1R5
	Reference information:
 	<ul> <li>z/OS JES3 Initialization and Tuning Reference for details about using the NJERMT statement</li> </ul>
	Updating operator procedures to account for "health" checker
	messages and commands
	<b>Description:</b> There are new messages and commands related to the "health" checker which might require you to revise your operator procedures.
 	Review your existing procedures and Health Checker documentation to determine if changes to your procedures are necessary.
I	When change was introduced: z/OS V1R5
Ι	Reference information:
I	<ul> <li>z/OS JES3 Messages for details about Health Checker messages.</li> </ul>
I	<ul> <li>z/OS JES3 Commands for details about Health Checker commands.</li> </ul>
I	<ul> <li>z/OS MVS System Commands for details about Health Checker commands.</li> </ul>
I	Using the optional NOREQ parameter
   	<b>Description:</b> Starting with z/OS V1.5 JES3, an optional parameter, NOREQ, may be specified in the Start JES3 operator procedure. Using the NOREQ parameter allows an operator to bypass the need to issue an *S,JSS command later.
I	Specify the NOREQ parameter in the Start JES3 operator procedure.
I	When change was introduced: 7/OS V1B5
I	Reference information:

DUPJOBNM p	arameter on the OPTIONS initialization statement
• • • • •	<b>Description:</b> You can now choose to allow multiple batch jobs to have the same name in your installation and allow these jobs to be active in the MAIN scheduler element (SE). You do this by using the DUPJOBNM parameter on the OPTIONS initialization statement. You can allow multiple names (YES) or disallow multiple names (NO). You can choose to alter this setting dynamically with the *MODIFY,Q,DUPJOBNM= command.
I	Some customization actions include:
   	<ul> <li>Evaluating your installation's processing of jobs with the same names</li> <li>Reviewing your operations to determine whether allowing multiple jobs with the same name is a viable choice in processing your workload</li> </ul>
I	When change was introduced: z/OS V1R2.
I	<b>Reference information:</b> z/OS JES3 Initialization and Tuning Reference.
ALTJCL paran	neter on the STANDARDS initialization statement
-       	<b>Description:</b> You can now choose how JES3 JECL statements are interpreted on a job's JCL by using the ALTJCL parameter on the STANDARDS initialization statement. You have options to interpret JES3 JECL statements with "/*" and "//*" in differing ways. You can choose to issue either error messages or warning messages and either cancel the job or allow it to run based on your use of the ALTJCL parameter.
 	Some customization actions include evaluating your installation's processing of jobs that contain JECL control statements.
I	When change was introduced: z/OS V1R2.
I	<b>Reference information:</b> z/OS JES3 Initialization and Tuning Reference.
Improved JES	LOG data set processing
	<b>Description:</b> Processing of JESLOG (JESMSGLG and JESYSMSG) data sets has been offloaded from the global to the user address space and made spinoff-capable. As a result, you should:
   	<ul> <li>Evaluate your STANDARDS Initialization statements.</li> <li>Evaluate your CLASS initialization statements and incorporate, as appropriate, the new JESMSG parameter.</li> </ul>
I	Review how your installation processes JESLOG data sets.
I	Review how your installation governs the suppression of JESLOG data sets.
I	When change was introduced: z/OS V1R2.
I	<b>Reference information:</b> z/OS JES3 Initialization and Tuning Reference.
Spinning JES	LOG data sets for long running jobs
	<b>Description:</b> When you have a job that runs for an extended period of time (such as days or even weeks), JESLOG data needs to be periodically spun as the job runs. JES3 provides for the spinoff or suppression of JESLOG data (specifically, the data sets JESMSGLG and JESYSMSG). "Spinning off" a JESLOG data set means that a portion of the log is printed, or placed on the hold queue and made available

     	to TSO users, applications, or external writers, while the job continues to run and possibly generate more messages to the JESLOG data sets. This periodic ability to spin off JESLOG data improves the use of JES3 resources as it allows spool space from the spun data sets to be reused without ending and restarting the job in question.
       	<ul> <li>Spinning or suppressing JESLOG data is accomplished with the following changes:</li> <li>A JES3 CLASS initialization statement keyword, SPIN, is added to allow you to specify whether to spin off or suppress the output of JESLOG data sets. The SPIN parameter on the CLASS initialization statement along with the JESLOG parameter on the JOB statement makes the specification complete. The specification on the JOB statement overrides what is specified on the JOBCLASS initialization statement.</li> </ul>
	<ul> <li>The *MODIFY,J=job,SPIN command causes immediate spinning of JESLOG data sets provided either JESLOG=SPIN or JESLOG=(SPIN,xxx) is specified.</li> </ul>
   	• The *F,C= command lets you alter your setting on the CLASS definition, where x is the job class for which you want to alter the SPIN value, and yyy is the SPIN option you specify. This command can be issued at any time and only affects those jobs converted after the change is made.
	<ul> <li>The *I,C= command displays the SPIN settings for the class, in addition to information that was previously displayed.</li> </ul>
   	<ul> <li>The Request Jobid SSOB extension, IEFSSRR, allows attributes (including SPIN values) to be set for Request Jobid jobs in the same way that JCL statements do for ordinary jobs.</li> </ul>
I	When change was introduced: z/OS V1R2.
   	<ul> <li>Reference information:</li> <li>z/OS JES3 Commands</li> <li>z/OS JES3 Initialization and Tuning Reference</li> </ul>
I JESMSG mac	ro enhancement
     	<b>Description:</b> A new parameter, LOG, is added to the JESMSG macro. LOG specifies whether to allow or suppress JESMSG use from the IATUX29 exit routine for individual jobs. LOG sets or resets an indication in the JCT. When the "suppress" parameter is specified (JESMSG LOG=NO), no other parameters can be specified on the JESMSG macro.
I	When change was introduced: z/OS V1R2.
I	Reference information: z/OS JES3 Customization.
Specifying the	e spool partition for NJE nodes Description: The following new JES3 keyword and commands manipulate the
   	<ul> <li>The NJERMT statement now supports a SPART= keyword. SPART specifies the spool partition that JES3 is to use for inbound NJE stream.</li> </ul>
	<ul> <li>*MODIFY NJE,NAME=nodename,SP=spart: modifies the name of the spool partition for the specified NJE node to the specified partition name.</li> </ul>
     	<ul> <li>*I NJE,NAME=nodename,SP: returns the name of the spool partition for the specified NJE node as defined by the SPART parameter on the NJERMT statement for the given node, or most recently modified using the *MODIFY NJE,NAME=nodename,SP=spart command. For example:</li> </ul>
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     	*i nje,name=node2,sp IAT8648 - NODE NODE2 , SPART=NONE *f nje,name=node2,sp=part5 IAT8460 NJERMT UPDATE COMPLETE. REQUEST HONORED. *i nje,name=node2,sp IAT8648 - NODE NODE2 , SPART=PART5*i nje,name=node2,sp IAT8648
I	When change was introduced: z/OS V1R4.
   	<ul> <li>Reference information:</li> <li>z/OS JES3 Initialization and Tuning Reference</li> <li>z/OS JES3 Commands</li> </ul>
Improved WA	NTDUMP handling
           	<b>Description:</b> JES3 temporarily "changes" the WANTDUMP parameter on the OPTIONS initialization statement from WANTDUMP=YES to WANTDUMP=ASK if too many abends occur during a specified time period. The number of failures and the time period that will be used as the basis for the limit are specified by new keywords on the OPTIONS statement, WANTDUMP=LIMIT and WANTDUMP=INTERVAL. The WANTDUMP information can be displayed by using one of the following commands: *I,WANTDUMP *I,WDMP *I,OPTIONS
	The WANTDUMP information can be modified by using one of the following commands:
 	*F,WANTDUMP=(NO,ASK) *F,WANTDUMP=YES,INTERVAL=m,LIMIT=n
I	When change was introduced: z/OS V1R4.
   	<ul> <li>Reference information:</li> <li>z/OS JES3 Initialization and Tuning Reference</li> <li>z/OS JES3 Commands</li> </ul>
⊢ <b>999 999 JES</b> 3	<b>B job numbers</b> Description: JES3 now allows a maximum of 999 999 job numbers.
I	When change was introduced: z/OS V1R2.
I	<b>Reference information:</b> z/OS JES3 Initialization and Tuning Reference.
Language Er	vironment new functions to consider
1	This section describes new Language Environment functions and new C/C++ and Run-Time Library Extensions functions in z/OS.
putenv() cha	nges for the X/Open CAE Specification Description: The putenv() function complies with the X/Open POSIX standard to place the input string directly into the environment array, rather than a copy.
 	When change was introduced: z/OS V1R5 (also available on earlier releases with APAR PQ61928).

1	<b>Reference information:</b> <ul> <li>z/OS Language Environment Run-Time Application Migration Guide</li> </ul>
Additional En	hanced ASCII support Description: Additional enhanced ASCII support is available.
I	When change was introduced: z/OS V1R5.
1	<b>Reference information:</b> <ul> <li>z/OS C/C++ Run-Time Library Reference</li> </ul>
Multilevel sec	urity support
     	<b>Description:</b> Multilevel security allows the classification of data and users based on a system of hierarchical security levels, combined with a system of non-hierarchical security categories. The security administrator classifies users and data, and the system then imposes mandatory access controls restricting which users can access data, based on a comparison of the classification of the users and the data.
1	Language Environment provides support for multilevel security through the following:
	<ul> <li>A port of entry function,poe(), used to determine various levels of permission checking</li> </ul>
	<ul> <li>Awritedown() function, used to query or change the setting of the write-down privilege</li> </ul>
	<ul> <li>Support for setting the new SECLABEL field in thechattr() andfchattr() functions and in related headers</li> </ul>
   	<ul> <li>Anlchattr() function to assign security labels to symbolic links</li> <li>Changes to thegetipc() function and related header to suport the IPCS display of _map resources</li> </ul>
I	When change was introduced: z/OS V1R5.
I	Reference information:
I	• z/OS C/C++ Run-Time Library Reference
Additional IEE	EE math functions
I	Description: New and changed math functions are available.
I	When change was introduced: z/OS V1R5.
1	<b>Reference information:</b> <ul> <li>z/OS C/C++ Run-Time Library Reference</li> </ul>
utoa() family (	<b>of functions</b> <b>Description:</b> The itoa(), Itoa(), utoa() functions, and the unsigned versions utoa(), ultoa(), and ulltoa(), are provided for porting UNIX applications.
I	When change was introduced: z/OS V1R5.
1	<b>Reference information:</b> <ul> <li>z/OS C/C++ Run-Time Library Reference</li> </ul>

### C Transactional VSAM

   	<b>Description:</b> For DFSMS 1.5, Transactional VSAM extends VSAM record level sharing by adding commit and logging support for batch. This allows for full concurrent sharing of batch and CICS online applications that use either recoverable or non-recoverable datasets.
Ι	When change was introduced: z/OS V1R5.
I	Reference information: None.
Ι	Status stop support
   	<b>Description:</b> Language Environment supports the use of the UNIX System Services STATUS STOP command, as part of the pthread_quiesce_and_get_np() function.
I	When change was introduced: z/OS V1R5.
I	Reference information: None.
Ι	Support of Java stack overflow error
	<b>Description:</b> Support is added in Language Environment for the Java stack overflow error. This supports the detection, reporting, and handling of overflow by the Java-specified soft stack limit. Support is provided in 31-bit XPLINK only. Using the new _set_stack_softlimit() and _far_jump() functions, you can set a soft stack limit and effectively perform a longjump() without a setjump(), thereby catching recursive storage leaks and avoiding setjump() overhead.
Ι	When change was introduced: z/OS V1R5.
 	<ul><li>Reference information:</li><li>z/OS Language Environment Vendor Interfaces</li></ul>
Ι	Heap pools serviceability
 	<b>Description:</b> Language Environment provides service support using tools and tracing capability to diagnose enabled heap pools.
Ι	When change was introduced: z/OS V1R5.
I	Reference information: None.
Ι	Heap pools cell size maximum increase
   	<b>Description:</b> The cell size maximum and the number of pools managed by the HEAPPOOLS run-time option are increased. This enhancement extends HEAPPOOLS support by allowing a greater number of buffer pools and by increasing the size of the storage blocks within the pools.
   	This improves the performance of multi-threaded applications with storage requests greater than 2KB and that use the HEAPPOOLS run-time option. The limit is increased to 64KB.
Ι	When change was introduced: z/OS V1R5.
Ι	Reference information: None.

XPLINK high-performance Language Environment functions		
	<b>Description:</b> Provides high-performance support for the following functions in an XPLINK environment:	
I	<ul> <li>free() (non-heappools)</li> </ul>	
l	<ul> <li>malloc() (non-heappools)</li> </ul>	
l	<ul> <li>pthread_mutex_lock()</li> </ul>	
	<ul> <li>pthread_mutex_unlock()</li> </ul>	
l	<ul> <li>pthread_rwlock_rdlock()</li> </ul>	
	<ul> <li>pthread_rwlock_wrlock()</li> </ul>	
l	<ul> <li>pthread_rwlock_unlock()</li> </ul>	
	•ufree()	
	•umalloc()	
I	When change was introduced: z/OS V1R5.	
I	Reference information: None.	
Support for de	ebugger application programming interface (API)	
	<b>Description:</b> A new API has been added to set and reset hooks. There is also a new onvironment variable to specify the name of the debug event handler that can	
	be loaded from the hierarchical file system (HFS).	
I	When change was introduced: z/OS V1R5.	
I	Reference information: None.	
Support for co	ode pages IBM-4933 and IBM-13124	
	<b>Description:</b> Support has been added to allow conversions with code pages	
	IBM-4933 and IBM-13124.	
I	When change was introduced: z/OS V1R5.	
I	Reference information: None.	
Additional G1	1N White Paper Currency support	
	<b>Description:</b> This support provides additional country support by locales.	
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	When change was introduced: z/OS V1R5.	
l	Reference information:	
I	• z/OS C/C++ Programming Guide	
Support of De	bug Tool for DB2 Stored Procedures	
	<b>Description:</b> Language Environment is enhanced to significantly improve	
	debugging of DB2 stored procedures, regardless of language. Two new debugger	
	event codes are provided for DB2 and the Debug Tool to debug the stored procedure repeatedly without having to recycle the stored procedure (SP) address.	
I	When change was introduced: z/OS V1R4.	
I	Reference information: None.	

## CICS trace of an application domain

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	<b>Description:</b> A new CICS trace allows users to monitor and determine the activity of a CICS transaction. This gives users the ability to trace key events in Language Environment while running CICS transactions. Every time CICS calls Language Environment, the feature trace is activated under the Extended Run-Time Library Interface (ERTLI). The CICS trace requires AP level 2 tracing to be active. By activating the feature trace records, trace points are added at strategic points.			
I	When change was introduced: z/OS V1R4.			
I	Reference information: None.			
I	Enhanced pthread guiesce and get np()			
	<b>Description:</b> Enhancements are made within pthread_quiesce_and_get_np() to improve reliability and performance.			
I	When change was introduced: z/OS V1R4.			
I	Reference information: None.			
I	IPv6 support			
	<b>Description:</b> Internet Protocol Version 6 (IPv6) is the base technology of the next generation Internet. z/OS provides IPv6 support in V1R4. Language Environment provides support for Communications Server through Application Programming Interfaces (APIs) and the C/C++ run-time library provides enhanced functions. Language Environment headers are also updated to meet IPv6 standards. z/OS UNIX support is also provided.			
I	When change was introduced: z/OS V1R4.			
I	Reference information:			
Ι	• z/OS C/C++ Run-Time Library Reference			
Ι	Transport Layer Security (TLS) Certificate Support			
 	<b>Description:</b> Thecertificate() function is updated to allow authentication of digital certificates. This enables better password support for File Transfer Protocol (FTP)			
I	When change was introduced: z/OS V1R4.			
I	Reference information: None.			
   	iconv() support for code page IBM-5488 Description: Support has been added to allow conversions with code page IBM-5488.			
I	When change was introduced: z/OS V1R4.			
I	Reference information: None.			
I	G11N White Paper Currency support			
	<b>Description:</b> This support provides additional country support by locales.			
I	When change was introduced: z/OS V1R4.			

• z/OS C/C++ Programming Guide

## z/OS.e support

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   	<b>Description:</b> z/OS.e is a version of the z/OS operating system intended to help you exploit the fast-growing world of next-generation workloads. Language Environment adds new messages that may be issued when errors occur in the z/OS.e environment.
I	The following restrictions apply to z/OS.e:
	<ul> <li>The following compilers are not licensed for use on z/OS.e:</li> </ul>
	– COBOL
	– PL/I
	– FORTRAN
	<ul> <li>The following subsystems are not licensed for use on z/OS.e:</li> </ul>
	– CICS
	– IMS
	<ul> <li>Execution of applications written in the following languages is not functionally supported on z/OS.e:</li> </ul>
   	<ul> <li>COBOL (except for precompiled COBOL DB2 stored procedures and other precompiled COBOL applications using the Language Environment preinitialization interface)</li> </ul>
I	– FORTRAN
I	<ul> <li>The following are not functional and/or not licensed for use on z/OS.e:</li> </ul>
I	<ul> <li>Language Environment Library Routine Retention (LRR)</li> </ul>
I	<ul> <li>Language Environment compatibility preinitialization for C and PL/I</li> </ul>
	<ul> <li>Run-time library services (RTLS)</li> </ul>
	<ul> <li>Customers are not permitted to use lower levels of Language Environment on z/OS.e.</li> </ul>
1	Customers will be able to run pre-compiled PL/I programs in z/OS.e. They will not be able to compile PL/I programs in z/OS.e.
I	When change was introduced: z/OS V1R4.
I	Reference information: None.
z/OS Managed	System Infrastructure for Setup support
   	<b>Description:</b> z/OS msys for Setup provides a set of functions and services to simplify system management. Specifically for Language Environment, setup is simplified for:
I	• BATCH and CICS default options settings, by customizing a ++USERMOD.
I	• Region-wide run-time options for CICS and IMS, by running an Assembler job.
I	When change was introduced: z/OS V1R3.
I	Reference information: None.

I	OMVS outage avoidance			
   	<b>Description:</b> OMVS outage avoidance provides the capability to IPL z/OS UNIX System Serviceswithout bringing down the z/OS system, which allows for more timely debugging of z/OS UNIX System Services.			
I	When change was introduced: z/OS V1R3.			
Ι	Reference information: None.			
I	Language Environment preinitialization services			
 	<b>Description:</b> Enhancements have been made to Language Environment preinitialization services to support XPLINK.			
I	When change was introduced: z/OS V1R3.			
I	Reference information: None.			
I	Vendor heap manager			
   	<b>Description:</b> This enables vendors to provide an alternate user heap manager for z/OS UNIX System Services applications that can detect memory leaks or storage damage beyond what is already provided in Language Environment.			
I	When change was introduced: z/OS V1R3.			
I	Reference information: None.			
	Thread-specific data performance enhancements			
I	Thread-specific data performance enhancements			
   	Thread-specific data performance enhancements Description: This optimizes the C/C++ pthread_getspecific() function to obtain peak performance in the z/OS UNIX System Services environment.			
   	<b>Thread-specific data performance enhancements Description:</b> This optimizes the C/C++ pthread_getspecific() function to obtain peak performance in the z/OS UNIX System Services environment. <b>When change was introduced:</b> z/OS V1R3.			
	Thread-specific data performance enhancements         Description: This optimizes the C/C++ pthread_getspecific() function to obtain peak performance in the z/OS UNIX System Services environment.         When change was introduced: z/OS V1R3.         Reference information: None.			
	Thread-specific data performance enhancements Description: This optimizes the C/C++ pthread_getspecific() function to obtain peak performance in the z/OS UNIX System Services environment. When change was introduced: z/OS V1R3. Reference information: None. Euro code page support			
	Thread-specific data performance enhancements         Description: This optimizes the C/C++ pthread_getspecific() function to obtain peak performance in the z/OS UNIX System Services environment.         When change was introduced: z/OS V1R3.         Reference information: None.         Euro code page support         Description: Support is extended for code pages currently supported within z/OS that have not yet been updated for Euro symbol support.			
	Thread-specific data performance enhancements         Description: This optimizes the C/C++ pthread_getspecific() function to obtain peak performance in the z/OS UNIX System Services environment.         When change was introduced: z/OS V1R3.         Reference information: None.         Euro code page support         Description: Support is extended for code pages currently supported within z/OS that have not yet been updated for Euro symbol support.         When change was introduced: z/OS V1R3.			
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Access Contro	<b>ol List (ACL) support</b> <b>Description:</b> ACL support provides security support for z/OS UNIX System Services users.	
I	When change was introduced: z/OS V1R3.	
I	Reference information: None.	
CICS dynamic	<b>storage tuning</b> <b>Description:</b> When Language Environment is running with CICS, support for automatic storage tuning is provided to improve performance of applications running under CICS. Automatic storage tuning is controlled with the CICS system initialization parameter AUTODST. Automatic storage tuning reduces GETMAIN and FREEMAIN activity associated with acquiring Language Environment stack or heap increments.	
I	When change was introduced: z/OS V1R2.	
I	Reference information: None.	
Heap storage	<b>diagnostics support</b> <b>Description:</b> >A new report is provided in CEEDUMP that shows show traceback information for storage that was allocated but not freed.	
I	When change was introduced: z/OS V1R2.	
I	Reference information: None.	
Documentatio	n improvements for traces Description: Documentation of traces has been improved.	
I	When change was introduced: z/OS V1R2.	
l I	Reference information:• z/OS Language Environment Debugging Guide	
CICS dump se	<b>Description:</b> The CICS transaction dump now includes CEEDUMP data.	
I	When change was introduced: z/OS V1R2.	
I	Reference information: None.	
Improvement	<b>in storage use</b> <b>Description:</b> Language Environment has been changed to favor 31-bit applications. This increases performance by eliminating the dependency for below-the-line storage in a 24-bit application.	
I	When change was introduced: z/OS V1R2.	
I	Reference information: None.	
I	Machine state	control block
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 		<b>Description:</b> All fields in the Language Environment machine state control block CEEMCH are externalized.
I		When change was introduced: z/OS V1R2.
I		Reference information: None.
   	Removal of SO	M <sup>™</sup> Support from Language Environment Description: SOMobjects <sup>®</sup> ADE and SOMobjects RTL have been removed from z/OS.
I		When change was introduced: z/OS V1R2.
Ι		Reference information: None.
I	Enhanced ASC	II Functionality
   		<b>Description:</b> Enhanced ASCII functionality makes it easier to port internationalized applications developed on, or for, ASCII platforms to z/OS platforms by providing conversion from EBCDIC to ASCII and from ASCII to EBCDIC.
   		To complement this support, a file tagging mechanism is introduced, which allows programmers to tag text files with an identifier indicating the encoding used to write the data. These tags can be used to translate from one encoding to another. This allows the use of EBCDIC programs against ASCII data files.
Ι		When change was introduced: z/OS V1R2.
		When change was introduced: z/OS V1R2. Reference information:
   		<ul> <li>When change was introduced: z/OS V1R2.</li> <li>Reference information:</li> <li>z/OS C/C++ Programming Guide for limitations of enhanced ASCII</li> </ul>
   	ISO/IEC 14882:	<ul> <li>When change was introduced: z/OS V1R2.</li> <li>Reference information:</li> <li>z/OS C/C++ Programming Guide for limitations of enhanced ASCII</li> <li>1998 Programming Language - C++</li> </ul>
	ISO/IEC 14882:	<ul> <li>When change was introduced: z/OS V1R2.</li> <li>Reference information: <ul> <li>z/OS C/C++ Programming Guide for limitations of enhanced ASCII</li> </ul> </li> <li>1998 Programming Language - C++ Description: The new C++ compiler adheres to the latest ISO 1998 C++ standard, including a compiler implementation of the ISO Standard C++ library and the ANSI Standard Templated Library (STL). This supports IBM's continuing adherence to openness and offers customers the increased portability of applications to and from other platforms that support the ISO 1998 C++ standard.</li> </ul>
	ISO/IEC 14882:	<ul> <li>When change was introduced: z/OS V1R2.</li> <li>Reference information: <ul> <li>z/OS C/C++ Programming Guide for limitations of enhanced ASCII</li> </ul> </li> <li>1998 Programming Language - C++ Description: The new C++ compiler adheres to the latest ISO 1998 C++ standard, including a compiler implementation of the ISO Standard C++ library and the ANSI Standard Templated Library (STL). This supports IBM's continuing adherence to openness and offers customers the increased portability of applications to and from other platforms that support the ISO 1998 C++ standard.</li> <li>When change was introduced: z/OS V1R2.</li> </ul>
	ISO/IEC 14882:	<ul> <li>When change was introduced: z/OS V1R2.</li> <li>Reference information: <ul> <li>z/OS C/C++ Programming Guide for limitations of enhanced ASCII</li> </ul> </li> <li>1998 Programming Language - C++ Description: The new C++ compiler adheres to the latest ISO 1998 C++ standard, including a compiler implementation of the ISO Standard C++ library and the ANSI Standard Templated Library (STL). This supports IBM's continuing adherence to openness and offers customers the increased portability of applications to and from other platforms that support the ISO 1998 C++ standard.</li> <li>When change was introduced: z/OS V1R2.</li> <li>Reference information: None.</li> </ul>
	ISO/IEC 14882: BiDi functional	<ul> <li>When change was introduced: z/OS V1R2.</li> <li>Reference information: <ul> <li>z/OS C/C++ Programming Guide for limitations of enhanced ASCII</li> </ul> </li> <li>1998 Programming Language - C++ Description: The new C++ compiler adheres to the latest ISO 1998 C++ standard, including a compiler implementation of the ISO Standard C++ library and the ANSI Standard Templated Library (STL). This supports IBM's continuing adherence to openness and offers customers the increased portability of applications to and from other platforms that support the ISO 1998 C++ standard.</li> <li>When change was introduced: z/OS V1R2.</li> <li>Reference information: None.</li> <li>ity and Arabic locale</li> </ul>
	ISO/IEC 14882: BiDi functional	<ul> <li>When change was introduced: z/OS V1R2.</li> <li>Reference information: <ul> <li>z/OS C/C++ Programming Guide for limitations of enhanced ASCII</li> </ul> </li> <li>1998 Programming Language - C++ Description: The new C++ compiler adheres to the latest ISO 1998 C++ standard, including a compiler implementation of the ISO Standard C++ library and the ANSI Standard Templated Library (STL). This supports IBM's continuing adherence to openness and offers customers the increased portability of applications to and from other platforms that support the ISO 1998 C++ standard. When change was introduced: z/OS V1R2. Reference information: None. ity and Arabic locale Description: Support is added for a BiDi routine to allow proper handling of Arabic and Hebrew data in applications. The interfaces handle the conversion of BiDi data from logical to visual and vice versa.</li></ul>
	ISO/IEC 14882: BiDi functional	<ul> <li>When change was introduced: z/OS V1R2.</li> <li>Reference information: <ul> <li>z/OS C/C++ Programming Guide for limitations of enhanced ASCII</li> </ul> </li> <li>1998 Programming Language - C++ Description: The new C++ compiler adheres to the latest ISO 1998 C++ standard, including a compiler implementation of the ISO Standard C++ library and the ANSI Standard Templated Library (STL). This supports IBM's continuing adherence to openness and offers customers the increased portability of applications to and from other platforms that support the ISO 1998 C++ standard.</li> <li>When change was introduced: z/OS V1R2.</li> <li>Reference information: None.</li> <li>ity and Arabic locale</li> <li>Description: Support is added for a BiDi routine to allow proper handling of Arabic and Hebrew data in applications. The interfaces handle the conversion of BiDi data from logical to visual and vice versa.</li> <li>When change was introduced: z/OS V1R2.</li> </ul>

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# Internet Protocol (IP) address conversion

**Description:** IBM intends to provide an integrated Internet Protocol Version 6 (IPv6) implementation that will enable application access using the new TCP/IP standard. Support is added in the C/C++ run-time library for IPv6 functions inet\_pton() and inet\_ntop() and global variables.

When change was introduced: z/OS V1R2.

Reference information: None.

### **POSIX threads extensions**

**Description:** This support provides the \_r functions that indicate thread-safe functions in UNIX 98 standards. Large applications in multi-threaded environments need verification that functions are thread safe.

- When change was introduced: z/OS V1R2.
- Reference information: None.

### Eurocurrency support

**Description:** Latin 9 support is provided for customers doing business in many different countries requiring National Language Support or Unicode support to operate efficiently on the z/OS platform.

When change was introduced: z/OS V1R2.

Reference information: None.

### Goal mode support

**Description:** A Language Environment transform is provided in support of z/OS UNIX System Services goal mode support for Workload Manager.

When change was introduced: z/OS V1R2.

Reference information: None.

### Enhancement to the uname utility

**Description:** This enhancement allows for continued support of the name OS/390 within the uname() field.

When change was introduced: z/OS V1R2.

Reference information: None.

### Chinese code conversion standard

**Description:** GB 18030 is a new code standard that provides encodings for approximately 30,000 Chinese characters. The iconv() function now supports GB18030 conversions. Customers can use this support to allow creation and processing of text documents containing these characters.

- When change was introduced: z/OS V1R2.
  - Reference information: None.

# Upgrade of IBM Open Class Library

	<b>Description:</b> The IBM Open Class Library (OCL) is a library of C++ classes. z/OS V1R2 includes a new level of IOC, which is consistent with that shipped in VisualAge <sup>®</sup> C++ for AIX V5.0. This is intended to ease porting from AIX, but is not intended for use in new development. Support will be withdrawn in a future release. New application development involving C++ classes should make use of the C++ Standard Library rather than the IBM Open Class Library.
I	When change was introduced: z/OS V1V2.
I	Reference information: None.
Server thread	task management
   	<b>Description:</b> As the complexity in managing many environments increases, this function provides automated management of server tasks running in the server space. Workload Manager can dynamically vary the number of server threads active to process work requests.
I	When change was introduced: z/OS V1R2.
I	Reference information: None.
TCP/IP resolv	er enhancement
1	<b>Description:</b> DNS and BIND transform conversions are provided for Communications Server.
I	When change was introduced: z/OS V1R2.
I	Reference information: None.
pread() and p	write()
	<b>Description:</b> The new pread() and pwrite() functions perform the same actions as read() and write(), except that they read or write from a given position in a file without changing the file pointer. This reduces system overhead and improves performance.
I	When change was introduced: z/OS V1R2.
I	Reference information: None.
Reusable enclaves for CICS scalable Java Virtual Machine (JVM)	
	<b>Description:</b> Java <sup>™</sup> programs can initialize once and then allow subsequent Java programs to begin running. A Language Environment enclave (CICS thread) remains active as needed.
I	When change was introduced: z/OS V1R2.
l	Reference information: None.
msys for Ope	rations new functions to consider

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This section describes new msys for Operations functions in z/OS.

### msys for Operations

**Description:** This is a new base element in z/OS V1R2. msys for Operations simplifies the day-to-day operation of a Parallel Sysplex configuration. Automation of typical customer tasks in a Parallel Sysplex provides greater operational awareness, reduces operations complexity, and improves system recoverability.

When change was introduced: z/OS V1R2 but rolled back to OS/390 V2R10 and z/OS V1R1 by an optional Web deliverable from http://www.ibm.com/eserver/zseries/zos/downloads/.

**Reference information:** *z/OS Managed System Infrastructure for Operations Setting Up and Using.* 

### msys for Setup new functions to consider

This section describes new msys for Setup functions in z/OS.

### msys for Setup

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**Description:** This is a new base element in z/OS V1R1. msys for Setup offers a new approach for configuring z/OS and products that run on z/OS. The configuration process is driven by a graphical user interface that greatly facilitates the definition of customization parameters. Updates are under the control of the msys for Setup user and are made directly to the system. The z/OS exploiters of msys for Setup (and the release the function was introduced) are Parallel Sysplex (z/OS V1R1), Communications Server – IP Services (z/OS V1R2), ISPF (z/OS V1R2), z/OS UNIX (z/OS V1R3), and Language Environment (z/OS V1R3). With z/OS V1R4, significant improvements with respect to usability, functionality, and quality are introduced, and the exploiters Parallel Sysplex and Communications Server – IP Services are functionally enhanced.

When change was introduced: z/OS V1R1 and enhanced in z/OS V1R4.

A package is available that updates msys for Setup for z/OS V1R1, V1R2, V1R3, or z/OS.e V1R3 to the functionality available in z/OS V1R4 msys for Setup. This msys for Setup coexistence FMID (JMSI743) is available at

http://www.ibm.com/eserver/zseries/zos/downloads/. Installing this FMID is required if multiple z/OS releases, with at least one system on z/OS V1R4 or later, are to be managed using a single management directory. The installation of the code is highly recommended in all other cases. There is migration support for the z/OS management directory.

#### **Reference information:**

- z/OS Managed System Infrastructure for Setup Installation
- z/OS Managed System Infrastructure for Setup User's Guide

#### RMF new functions to consider

This section describes new Resource Measurement Facility (RMF) functions in z/OS.

### RMF monitoring support for Performance Blocks (PB) State Sampling

**Description:** RMF provides monitoring for the WLM feature Performance Blocks state sampling In WLM, Performance Blocks are entities that represent performance management and performance measurement for transactions. As WLM extended

	the examination of the states of these PBs, RMF now collects and reports the additional PB states in Monitor I and Monitor III.
	When change was introduced: APAR OW52227
	Reference information: z/OS RMF Report Analysis.
RMF monitorin	<b>g support for Enqueue Contention Management</b> <b>Description:</b> RMF provides monitoring for the WLM feature Enqueue Contention Management. RMF collects and reports about enqueue contention and delay samples in the WLMGL report. This allows customers to understand when their work is being delayed by resource contention, and to what degree.
	When change was introduced: z/OS V1.5.
	Reference information: z/OS RMF Report Analysis.
Multilevel secu	<b>Description:</b> In support of multilevel security, RMF needs to restrict users or programs from accessing RMF measurement data containing data set names. In addition, RMF allows to prevent unwanted access to Monitor II and III measurement data by users of applications that call RMF sysplex data services. For example, customers are enabled to deny unauthorized users of RMF PM access to z/OS performance data.
	When change was introduced: z/OS V1.5.
	Reference information: z/OS RMF User's Guide.
Shared Memor	<ul> <li>y Support</li> <li>Description: Shared pages can be mapped to a virtual address above 2 GB (above the bar). RMF reports on shared memory above the bar by enhancing the Monitor I Paging and Virtual Storage reporting.</li> <li>When change was introduced: z/OS V1.5.</li> </ul>
	Reference information: z/OS RMF Report Analysis.
64-bit API Sup	port
	<b>Description:</b> With the introduction of the z/Architecture, applications are able to run

# 64-bit API Suppo

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D in 64-bit addressing mode. RMF offers a set of callable Sysplex Data Services (ERBDSQRY, ERBDSREC, ERB2XDGS, ERB3XDRS), which allow application programs to retrieve performance data for their own purposes. These are enabled for 64-bit callers.

When change was introduced: z/OS V1.5.

Reference information: z/OS RMF Report Analysis.

#### IBM RMF Spreadsheet Reporter Java (TM) Technology Edition L

Description: The RMF Spreadsheet Reporter is the powerful workstation solution for graphical presentation of RMF Postprocessor data. You can convert your RMF data to spreadsheet format and generate representative charts for all performance

   	relevant areas. All you need for data collection is an FTP Server running on the target host. Just specify any symbolic name for your system, the hostname (or IP address) and your TSO userID - and you are ready to go!
	With the new Java Edition, the concept of the RMF Spreadsheet Reporter has been significantly enhanced:
	<ol> <li>Ease of use - Manage the related resources by means of an Explorer-like GUI</li> <li>Fast path to graphical presentation - Prepare the SMF raw data in one single step</li> </ol>
I	3. Batch mode - Generate the spreadsheet files without any GUI interaction
	The RMF Spreadsheet Reporter is an integrated part of the RMF product offering and is free of additional charge.
I	When change was introduced: z/OS V1.5.
I	Reference information: z/OS RMF Report Analysis.
Support of Hi	iperSockets
     	<b>Description:</b> HiperSockets is a zSeries hardware feature that provides very high-speed, low-latency IP message passing between logical partitions (LPARs) on the same central electronics complex (CEC). RMF supports HiperSockets by including HiperSockets activity in all Channel Activity reports. In addition, new overview conditions are available for the Postprocessor.
I	When change was introduced: z/OS V1R2.
I	Reference information: z/OS RMF Report Analysis.
Monitor III da	ta gatherer
     	<b>Description:</b> Previously, the region for the Monitor III data gatherer (RMFGAT) had to be at least as large as the value specified with the WSTOR gatherer option. This requirement no longer exists, that is, you no longer need to ensure that the region size for the Monitor III data gatherer (RMFGAT) has to be at least as large as the value specified with the WSTOR gatherer option.
I	When change was introduced: z/OS V1R4.
I	Reference information: z/OS RMF User's Guide.
Support of W	'LM
     	<b>Description:</b> The RMF Monitor III data gatherer collects sub-capacity pricing information from workload manager (WLM) and reports the actual capacity consumed in millions of service units (MSUs) related to the defined capacity, as well as the softcapping status on its Monitor III Central Processor Complex (CPC) report. Furthermore, the RMF Performance Monitoring (PM) Java Edition component allows capacity planners to project the time until the system is
	softcapped based on the capacity consumption of the recent past.

Reference information: z/OS RMF Report Analysis.

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# Reporting of report class periods

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neporting of report class periods		
       	<b>Description:</b> Statistics about response times is a key performance metric used for groups of work having response time objectives. WLM report classes allow aggregation of performance data so that you can evaluate performance of applications independent of how they are managed. Now, reporting of report classes is available with the same granularity as for service classes. This is evident in the Postprocessor WLM Goal Mode (WLMGL) report and in several Monitor III reports: GROUP, STORS, SYSINFO, SYSRTD, SYSSUM, and SYSWKM.	
I	When change was introduced: z/OS V1R2.	
I	<b>Reference information:</b> <i>z/OS RMF Report Analysis.</i>	
Enhanced rep	orting for coupling facilities	
     	<b>Description:</b> Coupling facility (CF) duplexing ensures high application availability in a Parallel Sysplex configuration. The performance management aspects related to CF duplexing are supported by RMF in the Postprocessor CF Activity report about new peer CF connectivity. The reports allows you to evaluate and monitor your CF configuration, and apply the necessary changes to tune accommodation of new structure instances resulting from system-managed duplexing.	
I	When change was introduced: z/OS V1R2.	
I	Reference information: z/OS RMF Report Analysis.	
Support of FIC	CON switch cascading	
	<b>Description:</b> The FICON Director Activity report is enhanced to indicate that another switch is connected to a port in the case of FICON cascaded switches.	
I	When change was introduced: z/OS V1R4 by PTF for APAR OW52396.	
I	Reference information: z/OS RMF Report Analysis.	
State samples	breakdown in the WLMGL report	
     	<b>Description:</b> Previously, state samples were reported as a percentage of average transaction response time (response time breakdown). The response time was calculated when a transaction completed. This could result in percentages greater than 100 when samples were included for long running transactions that had not completed in the gathering interval.	
   	Now, percentages greater than 100 in the breakdown section are avoided by showing the state values as percentages of the total transaction samples (state samples breakdown) instead of percentages of response time.	
I	When change was introduced: z/OS V1R4 by PTF for APAR OW52227.	
I	<b>Reference information:</b> <i>z/OS RMF Performance Management Guide.</i>	
Support of Inte	elligent Resource Director (IRD)	
   	<b>Description:</b> The workload manager (WLM) is extended to work with Processor Resource/Systems Manager (PR/SM) on IBM @server zSeries 900 (z900) and later servers to dynamically expand resources that are available across logical partitions (LPARs). An LPAR cluster is the subset of the systems that are running as	

     	LPARs on the same central electronics complex (CEC). Based on business goals, WLM can direct PR/SM to enable or disable central processor (CP) capacity for an LPAR, without human intervention. This combination of WLM working with PR/SM on a z900 server is called Intelligent Resource Director (IRD). The three components of IRD, and the manner in which RMF supports them, are:
I	LPAR CPU Management
           	Based on workload resource demand, WLM is able to dynamically adjust the number of logical processors and the weight of a logical partition. This allows the system to distribute the central processing unit (CPU) resource in an LPAR cluster to partitions where the CPU demand is high. An LPAR cluster is defined as the set of logical partitions in a single CEC that belong to the same Parallel Sysplex. The dynamic adjustment of processor resources within the partitions is reflected in the Postprocessor CPU Activity (Partition Data) report, which provides LPAR views as well as aggregated views on LPAR cluster level. In addition, new overview criteria are available for the Postprocessor.
	Dynamic Channel Path Management
         	This component provides the capability to dynamically assign channels to control units in order to respond to peaks in demand for I/O channel bandwidth. This is possible by allowing you to define pools of so-called floating channels that are not related to a specific control unit. With the help of WLM, channels can float between control units to best service the work according to their goals and their importance. All channel and I/O queuing reports have been extended to differentiate static channels from floating channels. In addition, new overview criteria are available for the Postprocessor.
	Channel Subsystem Priority Queuing
I	This component is not reflected directly in any RMF report.
I	When change was introduced: z/OS V1R1.
	<ul> <li>Reference information:</li> <li>z/OS RMF User's Guide</li> <li>z/OS RMF Report Analysis</li> </ul>
Support of WL	M goal mode
     	<ul> <li>Description: WLM in goal mode is enhanced as follows:</li> <li>Classification by system name</li> <li>Separation of production from test CICS and IMS regions</li> <li>Address space storage isolation</li> <li>Proactive CPU protection</li> </ul>
   	These enhancements entailed new specifications (CPU protection and storage protection) in the service policy. RMF supports these enhancements in the WLMGL Postprocessor report and in several online reports:
I	Monitor II ARD/ARDJ report
I	Monitor III SYSWKM report
I	Monitor III DELAY report
I	Monitor III JOB report
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	Monitor III STORF report
	<ul><li>Monitor III STORF report</li><li>Monitor III ENCLAVE report - Details</li></ul>

#### Reference information: z/OS RMF Report Analysis.

### Support of the cryptographic hardware

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	<b>Description:</b> With the availability of the new cryptographic hardware (PCI Cryptographic Coprocessors and PCI Cryptographic Accelerators) on an LPAR basis, RMF now provides performance monitoring with the new Postprocessor Crypto Hardware Activity report, which is based on new SMF records type 70 subtype 2. These records are gathered by the new Monitor I gathering option CRYPTO. In addition, new overview conditions are available for the Postprocessor.
	The Crypto Hardware Activity report, introduced with z/OS V1R2 RMF, now includes measurements for the Cryptographic Coprocessor Feature (CCF). In addition, new overview conditions are available for the Postprocessor.
	<b>Note:</b> In z/OS V1R2, RMF provides support to report on the utilization of the cryptographic hardware. In order to get this information, the RMF Monitor I parmlib member must be updated to specify the CRYPTO keyword.
	When change was introduced: z/OS V1R2 with PTF UW99368, with additional enhancements in z/OS V1R4.
	Reference information: z/OS RMF User's Guide.
LDAP integrati	on
	Description: Nearly all performance data gathered by Monitor III is now accessible

**Description:** Nearly all performance data gathered by Monitor III is now accessible by using an open and standardized interface, the Lightweight Directory Access Protocol (LDAP). This allows other performance and systems management components to access performance data in a z/OS environment very easily.

#### When change was introduced: z/OS V1R2.

**Reference information:** *z/OS RMF User's Guide*.

### Enhanced reporting of IOP utilization

**Description:** The Monitor I I/O Queuing report has been enhanced by providing more information about the utilization of I/O processors. This will help you analyze your I/O processor (IOP) capacity and plan for future growth. In addition, new overview conditions are available for the Postprocessor.

#### When change was introduced: z/OS V1R2 with PTF UW99364.

Reference information: z/OS RMF Report Analysis.

# Online reporting of values related to zSeries software pricing

**Description:** With z/OS V1R2 or later running on a zSeries 900 (z900) server, the new RMF Monitor III CPC Capacity report provides the capability to monitor values related to software pricing as well as partition related processor activities. This report gives you an indication whether the defined capacity limits are correctly set. You can see the actual CPU consumption, the four-hours average, as well as the defined capacity limit. These values show whether the capacity setting are appropriate to the workload running on the system.

RMF PM has been enhanced to support CPC Capacity Report as well as metrics related to software pricing. Especially, the new metric called "remaining time until

   	capped" is introduced for projection purposes. Since you need a series of values in order to make a statement, this value is only accessible in RMF PM and not in the Monitor III report.
   	In addition, advanced channel path metrics are provided including a "total bytes read/sec" value. Furthermore, the usability of the RMF PM Java Client has been improved concerning Startup PerfDesks and historical data collection.
I	When change was introduced: z/OS V1R2 with PTF UW99366.
I	Reference information: z/OS RMF Report Analysis.
Support of FI	CON Director
     	<b>Description:</b> RMF offers new reporting capabilities for the FICON Director. Due to the different technology and implementation compared to ESCON, the new Postprocessor FICON Director Activity report provides information about director and port activities. This will assist you in analyzing performance problems and in capacity planning.
I	Additionally, the following enhancements are made:
I	<ul> <li>FCD is a new gathering option for Monitor I.</li> </ul>
	There are new overview criteria for the Postprocessor.
 	<ul> <li>Advanced channel path metrics are provided, including a "total bytes read/sec" value.</li> </ul>
	<ul> <li>The usability of the RMF PM Java Client is improved in regards to Startup PerfDesks and historical data collection.</li> </ul>
I	When change was introduced: z/OS V1R1.
l	<b>Reference information:</b> <i>z/OS RMF User's Guide.</i>
SDSF new fu	nctions to consider
I	This section describes new SDSF functions in z/OS.
Support for n	
	nultilevel security
	<b>nultilevel security</b> <b>Description:</b> SDSF adds a number of enhancements to support the multilevel security function in z/OS V1R5. Multilevel security allows the classification of data and users based on a system of hierarchical security levels combined with non-hierarchical security categories.
     	<ul> <li><b>Description:</b> SDSF adds a number of enhancements to support the multilevel security function in z/OS V1R5. Multilevel security allows the classification of data and users based on a system of hierarchical security levels combined with non-hierarchical security categories.</li> <li>When change was introduced: z/OS V1R5.</li> </ul>
       	<ul> <li><b>Description:</b> SDSF adds a number of enhancements to support the multilevel security function in z/OS V1R5. Multilevel security allows the classification of data and users based on a system of hierarchical security levels combined with non-hierarchical security categories.</li> <li>When change was introduced: z/OS V1R5.</li> <li>Reference information:</li> </ul>
	<ul> <li><b>Description:</b> SDSF adds a number of enhancements to support the multilevel security function in z/OS V1R5. Multilevel security allows the classification of data and users based on a system of hierarchical security levels combined with non-hierarchical security categories.</li> <li>When change was introduced: z/OS V1R5.</li> <li>Reference information:         <ul> <li>z/OS Planning for Multilevel Security</li> </ul> </li> </ul>
Control of sa	<ul> <li><b>nultilevel security</b></li> <li><b>Description:</b> SDSF adds a number of enhancements to support the multilevel security function in z/OS V1R5. Multilevel security allows the classification of data and users based on a system of hierarchical security levels combined with non-hierarchical security categories.</li> <li>When change was introduced: z/OS V1R5.</li> <li><b>Reference information:</b> <ul> <li>z/OS Planning for Multilevel Security</li> </ul> </li> <li><b>ving system commands</b></li> </ul>

#### When change was introduced: z/OS V1R5.

**Reference information:** None. (No customer action is necessary to exploit this enhancement.)

### Simplification of command authorization

**Description:** SDSF enhances the AUTH keyword in ISFPARMS to make it possible to authorize a group of users to all authorized SDSF commands, to all "operator" commands, or to all "end user" commands. Operator commands are those in group 2 of SDSF's sample ISFPARMS; end user commands are those in group 3. With this enhancement, system programmers can define their groups so they no longer need to update ISFPARMS when new authorized commands are added to SDSF.

When change was introduced: z/OS V1R5.

#### Reference information:

• z/OS SDSF Operation and Customization

### Server enhancement

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**Description:** SDSF adds a keyword to the COMM statement in ISFPARMS that causes SDSF to use predefined WebSphere MQ queues, rather than creating new queues during initialization with WebSphere MQ DEFINE commands. SDSF uses the queues to provide sysplex support for browse and device displays. If you choose to have SDSF use the predefined queues, the SDSF server does not need administrative authority to the WebSphere MQ DEFINE command. However, you must define the queues manually.

When change was introduced: z/OS V1R5.

#### Reference information:

• *z/OS SDSF Operation and Customization* 

# Saving INPUT and ACTION commands

**Description:** SDSF now saves the values for the INPUT and ACTION commands in the ISPF profile when SDSF is running as an ISPF dialog. INPUT controls whether SYSIN data sets are displayed when you browse a job. ACTION controls which WTORs are displayed at the bottom of the SYSLOG panel.

SDSF also adds the INPUT keyword to ISFPARMS, to allow an initial setting for INPUT to be made for a group of users.

- When change was introduced: z/OS V1R5.
- **Reference information:** No customer action is necessary to exploit this enhancement. For more information on the INPUT parameter in ISFPARMS, see *z/OS SDSF Operation and Customization*.

### SELECT with DSID on JDS

**Description:** On the JDS panel, the SELECT command now accepts DSID as a parameter. SELECT is a fast-path filter that temporarily overrides any existing filters.

When change was introduced: z/OS V1R5.

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**Reference information:** None. (No customer action is necessary to exploit this enhancement.)

# Controlling the format of CPU information

**Description:** SDSF adds an initialization option to control the format of CPU busy information on the title line of the DA panel. Installations can choose to display both the MVS and LPAR views (the default, when in LPAR mode) or only the MVS view. The option is specified with a new group-level keyword in ISFPARMS, CPUFMT.

When change was introduced: z/OS V1R5.

Reference information: z/OS SDSF Operation and Customization

### Column and action character enhancements

**Description:** SDSF adds a column for submittor group to the H, I, O and ST panels. It is added to the end of the alternate field lists, because access is delayed, but it can be arranged to a different location by the system programmer and the user.

SDSF adds an action character, Y, to the DA panel that generates an MVS P (STOP) command. This is useful for stopping started tasks. This action requires confirmation when confirmation is active. Confirmation can be controlled with the SET CONFIRM command.

- The reset action character on the ENC panel (which includes the quiesce function) now requires confirmation when confirmation is active.
  - The number of saved system commands entered through SDSF has been increased to twenty. Users can display previously issued system commands by typing a slash (/) by itself on the command line, or by adding a plus (+) to the end of a system command following a slash.

Installations with their own field lists in ISFPARMS may want to remove PGN and DOMAIN from the list for the DA panel, and PGN from the list for the ENC panel. These columns are never displayed, as they are not shown when the system is running in goal mode and, with z/OS V1R5, the system is always in goal mode.

When change was introduced: z/OS V1R5.

**Reference information:** No customer action is necessary to exploit these enhancements, unless customized field lists have been set up in ISFPARMS. In that case, the new columns must be added to the field lists. For more information, see *z/OS SDSF Operation and Customization*.

### Spool Volumes panel

**Description:** SDSF adds a new tabular Spool Volumes (SP) panel to simplify the management of JES2 spool volumes. The panel lists statistics about each spool volume and supports the use of action characters and an overtype to control them.

When change was introduced: z/OS V1R2.

Reference information: z/OS SDSF Operation and Customization.

Ι	Process panel	
   	-	<b>Description:</b> SDSF adds a new tabular Process (PS) panel to simplify the management of z/OS UNIX processes. The panel supports the use of action characters to display and cancel a process.
I		When change was introduced: z/OS V1R2.
I		Reference information: z/OS SDSF Operation and Customization.
I	Enclaves pane	I
 		<b>Description:</b> SDSF displays WLM enclaves on a new Enclaves (ENC) panel. Action characters on the ENC panel allow users to resume and quiesce enclaves.
I		When change was introduced: z/OS V1R2.
I		Reference information: z/OS SDSF Operation and Customization.
Ι	Server enhance	ements
		<b>Description:</b> SDSF makes it easier to use and manage the SDSF server, with these enhancements:
		<ul> <li>A default server removes the necessity for the SERVER keyword in the assembler ISFPARMS. You now need only the dynamic ISFPARMS.</li> </ul>
Ι		A new server startup option controls the destination of the server log.
		<ul> <li>MQSeries<sup>®</sup> clustering support simplifies definition of queues. The COMM statement in ISFPARMS is enhanced with new keywords.</li> </ul>
I		When change was introduced: z/OS V1R2.
I		Reference information: z/OS SDSF Operation and Customization.
Ι	User-defined s	ymbols in the WHEN statement
   		<b>Description:</b> SDSF makes it easier to manage ISFPARMS by allowing user-defined symbols in the WHEN statement. The WHEN statement provides for conditional processing of statements in ISFPARMS.
I		When change was introduced: z/OS V1R2.
I		Reference information: z/OS SDSF Operation and Customization.
I	New action cha	aracters and columns
   		<b>Description:</b> SDSF adds new columns and action characters to a number of panels. Several of the columns can be overtyped. The new action characters include:
Ι		<ul> <li>EC (restart a job and hold it prior to execution) on DA, I and ST</li> </ul>
 		<ul> <li>K (system cancel), KD (system cancel with a dump), W (cause the jobs and message logs to spin) and Z (system force) on DA</li> </ul>
I		New columns show additional information about jobs, output, and devices.
I		When change was introduced: z/OS V1R2.
I		<b>Reference information:</b> <i>z</i> /OS SDSF Operation and Customization.

# Additional sysplex-wide panels

	<b>Description:</b> SDSF extends the sysplex support added for printers and initiators in OS/390 V2R10 to make the remaining device panels (LI, NO, PUN, RDR, and SO) sysplex-wide. With this enhancement, all of SDSF's device panels can show sysplex-wide data, regardless of which system the user is logged on to. Users can control which systems are to be included on the panels. The sysplex support requires that MQSeries for OS/390 Version 2 (or later) or WebSphere MQ be installed on each system that is to participate. SDSF uses MQ for communication between SDSF servers. If this communication is not available, SDSF shows data for a single system. The support also requires an SDSF server on each system.
I	When change was introduced: z/OS V1R2.
I	<b>Reference information:</b> <i>z</i> /OS SDSF Operation and Customization.
	Operlog performance improvement
   	<b>Description:</b> SDSF exploits the multiblock interface added to system logger in OS/390 V2R10. The multiblock interface is intended to improve performance when reading a logstream, and should improve the performance of SDSF's Operlog panel, which provides a sysplex-wide system log.
I	When change was introduced: z/OS V1R2.
 	<b>Reference information:</b> None. (No customer action is necessary to exploit this enhancement.)
I	Enhancements to the System Command Extension function
     	<b>Description:</b> SDSF enhances the System Command Extension function, which is used to enter long system commands, so that it is more like ISPF option 6. The System Command Extension pop-up now displays a list of 10 previously issued commands; users can select a command from the list by positioning the cursor on it and pressing Enter. Users can also clear the list by pressing F11. The list is scrollable.
   	A full-screen version of the System Command Extension function is also added. The full-screen version has a single input field that wraps across two lines, so that Insert can be used anywhere in the field. Users can move between the full-screen version and pop-up by pressing a PF key.
   	Users invoke the System Command Extension function by typing a slash (/) by itself on the command line, or by adding a trailing plus (+) to a command entered following a slash.
I	These enhancements are available only when running SDSF under ISPF.
I	When change was introduced: z/OS V1R4.
 	<b>Reference information:</b> None. (No customer action is necessary to exploit this enhancement.)
	Enhancements to the Reply Command Extension pop-up

**Description:** The Reply Command Extension pop-up, which can be used from the SR display to reply to a message, now shows the text of the reply message. The message is shown on two lines at the top of the pop-up.

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I	When change was introduced: z/OS V1R4.
 	<b>Reference information:</b> None. (No customer action is necessary to exploit this enhancement.)
Filter enha	ncements
   	<b>Description:</b> Previously, turning off filtering for a panel or entering a new FILTER command discarded any previously entered filters. SDSF introduces filters that are available but not active, and the ability to use the FILTER command to add a new filter to existing filters.
I	When change was introduced: z/OS V1R2.
	<b>Reference information:</b> None. (No customer action is necessary to exploit this enhancement.)
Long form	s of display and list action characters
   	<b>Description:</b> For consistency with other SDSF panels, the long form of the display action (DL) is added to the INIT, PR, RDR, and PUN panels. The long form of the list action (LL) is added to the O, H, and ST panels.
I	When change was introduced: z/OS V1R4.
 	<b>Reference information:</b> None. (No customer action is necessary to exploit this enhancement.)
JES2 elimi	nation of APPLCOPY support
   	<b>Description:</b> z/OS JES2 no longer supports APPLCOPY for the checkpoint data set. If APPLCOPY is specified on the JESDATA keyword in ISFPARMS, it is ignored. SDSF automatically uses VERSIONS instead.
I	When change was introduced: z/OS V1R2.
	<b>Reference information:</b> None. (No customer action is necessary to exploit this enhancement.)
Security Security Security	erver new functions to consider
I	This section describes new Security Server functions in z/OS.
     	Beginning with z/OS V1R5, Security Server consists of RACF only. DCE Security Server, Open Cryptographic Enhanced Plug-ins (OCEP), Firewall Technologies, LDAP Server, Network Authentication Service, and Enterprise Identity Mapping (EIM) now make up the Integrated Security Services element. Public Key Infrastructure Services (PKI Services) are now included in the Cryptographic Services element.
   	See "Integrated Security Services new functions to consider" on page 130 for new DCE Security Server, OCEP, Firewall Technologies, LDAP Server, Network Authentication Service, and EIM functions.
	See "Cryptographic Services new functions to consider" on page 70 for new PKI Services functions.

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# **RACF: Multilevel security support**

   	<b>Description:</b> Multilevel security support builds on the existing multilevel security features that enabled MVS/SP V3R1.3 and RACF 1.9 to previously obtain an evaluation under the Trusted Computer Systems Evaluation Criteria.
   	This support extends mandatory access checking to the UNIX System Services environment, and allows networking in a more secure environment. It also adds additional security features, such as limiting the ability of users to see the names of data sets and files if they do not have READ access.
I	A number of RACF interfaces have been updated to support multilevel security:
1	<ul> <li>New multilevel security keywords are added for the SETROPTS command to activate and inactivate additional security options.</li> </ul>
     	<ul> <li>Output has changed for RLIST and LISTDSD so inactive security label profiles and profiles that contain inactive security labels may not be listed if SETR SECLBYSYSTEM is active, because only users with SPECIAL or AUDITOR authority are allowed to view inactive security labels.</li> </ul>
I	• The RACPRIV command has been added to set and list the write-down privilege.
I I	• ADDMEM and DELMEM have been added for SECLABEL class to RALTER and RDEFINE.
   	<ul> <li>SERVAUTH is now added as a value for WHEN in a conditional access list for the PERMIT command, and also to allow WHEN(PROGRAM()) for the SERVAUTH class.</li> </ul>
   	• Two new callable services are added. R_setfsecl is used to change the security label of a UNIX file or directory. R_writepriv is used to change or query the setting of a write-down privilege.
     	<ul> <li>RACROUTE REQUEST=FASTAUTH is updated to support security label checking when the SECLABEL class is active, as well as the SETROPTS MLQUIET, MLACTIVE for failures and warning, SECLBYSYSTEM, SETR MLS (both warning and failures will be treated as failures) and SECLABELAUDIT options.</li> </ul>
1	<ul> <li>RACROUTE REQUEST=DIRAUTH previously generated a SMF record when one had not be requested. Those cases have been eliminated.</li> </ul>
	<ul> <li>New event code qualifiers are added for new callable services:</li> </ul>
	<ul> <li>R_setfsecl — event code 77(4D)</li> </ul>
	<ul> <li>R_writepriv — event code 78(4E)</li> </ul>
I	<ul> <li>Additional event code qualifiers and relocate types.</li> </ul>
   	Additionally, support for multilevel security introduces several new required and optional migration tasks. For additional detail, see <i>z/OS Security Server RACF Migration</i> and <i>z/OS Planning for Multilevel Security</i> .
I	When change was introduced: z/OS V1R5
I	Reference information:
I	z/OS Security Server RACF Migration
I	<ul> <li>z/OS Planning for Multilevel Security</li> </ul>
I	<ul> <li>z/OS Security Server RACF Security Administrator's Guide</li> </ul>
I	<ul> <li>z/OS Security Server RACF Macros and Interfaces</li> </ul>
I	• z/OS Security Server RACF Command Language Reference
I	• z/OS Security Server RACF Data Areas

	<ul> <li>z/OS Security Server RACF Messages and Codes</li> </ul>	
	<ul> <li>z/OS Security Server RACF Auditor's Guide</li> </ul>	
	<ul> <li>z/OS Security Server RACF Diagnosis Guide</li> </ul>	
l	<ul> <li>z/OS Security Server RACF Callable Services</li> </ul>	
l	<ul> <li>z/OS Security Server RACF System Programmer's Guide</li> </ul>	
l	z/OS Security Server RACROUTE Macro Reference	
	• z/OS MVS Programming: Assembler Services Guide	
l	<ul> <li>z/OS MVS Programming: Assembler Services Reference ABE-HSP</li> </ul>	
	<ul> <li>z/OS Communications Server: IP Migration and Exploitation</li> </ul>	
RACF: Dynami	ic Template enhancements	
	<b>Description:</b> Enhancements to Dynamic Template reduce system outages and	
	simplifies the installation of any future RACF releases or SPE that provide new versions of the templates. This includes the following support:	
   	<ul> <li>Change the templates to contain a level indicator that makes it possible to compare two sets of templates and to determine easily which level of template has a later set of definitions.</li> </ul>	
   	<ul> <li>Have RACF initialization determine at IPL time whether the database has the right level of templates or not. If not, RACF will ignore the templates on the database and use the proper set of templates from a new CSECT, IRRTEMP2, automatically.</li> </ul>	
	<ul> <li>When an SPE is applied to a live system, you can run IRRMIN00 and have RACF recognize the new templates without an IPL.</li> </ul>	
l	<ul> <li>Prevent installing a downlevel set of templates onto a RACF database.</li> </ul>	
 	<ul> <li>Prevent complete reinitialization of a RACF database, if that database is "live" on the system where IRRMIN00 is run.</li> </ul>	
	Additionally, these enhancements introduce a new required migration task. For additional detail, see <i>z/OS Security Server RACF Migration</i> .	
I	When change was introduced: z/OS V1R5	
l	Reference information:	
	z/OS Security Server RACF Migration	
l	<ul> <li>z/OS Security Server RACF Command Language Reference</li> </ul>	
	z/OS Security Server RACF System Programmer's Guide	
	<ul> <li>Z/OS Security Server RACF messages and codes</li> <li>z/OS Security Server BACF Diagnosis Guide</li> </ul>	
	<ul> <li>z/OS Security Server RACF Macros and Interfaces</li> </ul>	
RACF: DB2 Version 8 support		
l	<b>Description:</b> RACF support for DB2 Version 8 provides:	
l	<ul> <li>IRR@XACS for DB2 V8 is now shipped with DB2 as DSNXRXAC.</li> </ul>	
l	<ul> <li>New general resource classes, MDSNSQ and GDSNSQ</li> </ul>	
l	Support for long DB2 names	
I	Support for multilevel security	
 	<b>Note:</b> This support is in the version of IRR@XACS that is being shipped with DB2 FMID HDRE810 as part DSNXRXAC. If you are using DB2 V4, V5, V6, or	

   	V7, use IRR@XACS as shipped by RACF and found in 'SYS1.SAMPLIB'. If you are using DB2 V8, then you must use the version that is shipped with DB2 V8 as DSNXRXAC.	
I	When change was introduced: z/OS V1R5	
     	<ul> <li>Reference information:</li> <li>z/OS Security Server RACF Diagnosis Guide</li> <li>z/OS Security Server RACF Messages and Codes</li> <li>z/OS Security Server RACF Security Administrator's Guide</li> <li>z/OS Planning for Multilevel Security</li> </ul>	
	RACF: z/OS V1R5 FMID update	
   	<b>Description:</b> For compatibility with previous releases, the FMID HRF7708 is used as the RACF level, and is represented by the value 7708. The ICHEINTY, ICHETEST, ICHEACTN and RACROUTE macros have also been updated to accept the RELEASE=7708 parameter.	
	If you specify RELEASE=7708 on the RACROUTE macro, you must assemble the application on a system that is running z/OS V1R5. Also, if the application contains any other keywords on the RACROUTE macro that require RELEASE=7708, you must execute the application on a z/OS V1R5 system. However, you do not have to update or reassemble existing programs that specify a previous RACF level on the RELEASE= operand.	
 	The TSO/E CLIST variable &SYSLRACF and TSO/E REXX SYSVAR(SYSLRACF) functions return 7708 as the RACF release.	
I	When change was introduced: z/OS V1R5	
	<ul> <li>Reference information:</li> <li>z/OS Security Server RACF Data Areas</li> <li>z/OS Security Server RACF Diagnosis Guide</li> <li>z/OS Security Server RACF Macros and Interfaces</li> <li>z/OS Security Server RACROUTE Macro Reference</li> <li>z/OS TSO/E CLISTs</li> <li>z/OS TSO/E REXX Reference</li> </ul>	
RACF: DB2 Version 7 support		
	<ul> <li>Description: This support introduces the following new classes to support the DB2<sup>®</sup> Java archive (JAR) object introduced with DB2 Universal Database Server for OS/390 and z/OS Version 7 (5675-DB2). The RACF/DB2 external security module (IRR@XACS) is updated to map access requests for the new JAR object, and its USAGEAUTJ privilege, into the following new RACF resource classes:</li> <li>MDSNJR, which is a member class for the DB2 JAR object</li> <li>GDSNJR, which is a grouping class for the DB2 JAR object</li> </ul>	
Ι	The RACF/DB2 external security module is updated to pass database names in	

The RACF/DB2 external security module is updated to pass database names in support of DBADM authorization checking for the following privileges:

- CREATE VIEW
- ALTER INDEX
- DROP INDEX

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The RACF/DB2 external security module is also updated to include support for the new &ERROROPT customization option for use with DB2 Version 7. This support includes new and changed initialization reason codes for XAPLFUNC=1, and new and changed RACF messages.

When change was introduced: z/OS V1R2 and rolled back to OS/390 V2R6 by APAR OW45152.

#### **Reference information:**

- z/OS Security Server RACF Security Administrator's Guide
- z/OS Security Server RACF System Programmer's Guide
- DB2 Administration Guide
- DB2 Command Reference.

#### RACF: Mixed-case profile names

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**Description:** This support allows mixed-case profile names to be used for classes that are defined in the class descriptor table (CDT) using the new CASE=ASIS operand of the ICHERCDE macro. The following commands are updated as part of this support:

- ADDSD
- PERMIT
- RALTER
- RDEFINE
- RDELETE
- RLIST
- SEARCH

When change was introduced: z/OS V1R2.

#### **Reference information:**

- z/OS Security Server RACF Migration
- z/OS Security Server RACF Command Language Reference

### **RACF: Support of Network Authentication Service**

**Description:** This support provides the ability to store and retrieve keys encrypted using the DES3 and DESD (DES with derivation) encryption algorithms. Previously, DES was the only supported encryption algorithm.

This support also allows the administrator to choose which key types will be used for authentication of users and realms by setting new ENCRYPT options in the KERB segments of user and realm profiles. The new options are specified using the new KERB ENCRYPT operand of the ADDUSER, ALTUSER, RDEFINE, and RALTER commands. This support also provides a new SETROPTS KERBLVL option to control use of the new key types on a system-wide basis.

When change was introduced: z/OS V1R2.

**Reference information:** *z/OS Security Server RACF Security Administrator's Guide.* 

### **RACF: SAF trace**

**Description:** The System Authority Facility (SAF) Trace support enables the capture of interface parameters and other useful debug information without setting slip traps and acquiring dumps. Time and resources spent with the IBM support

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center resolving RACF problems can be reduced. This support enhances the RACF SET TRACE command with several suboperands to enable tracing for RACROUTE macro executions, RACF database manager requests, callable services, address spaces, and jobs.

When change was introduced: z/OS V1R2.

Reference information: z/OS Security Server RACF Diagnosis Guide.

# **RACF: Universal groups**

	<b>Description:</b> This support provides the new UNIVERSAL operand for the ADDGROUP command to define a universal group. A universal group is a group that allows an unlimited number of users to be connected. The member list of a universal group contains only entries for users connected with a group authority higher than USE, or for those with group-SPECIAL, group-OPERATIONS, or group-AUDITOR attributes. Therefore, all members of a universal group might not be listed using the LISTGRP command.
	<ul> <li>To list all members of a universal group, you should use the RACF database unload utility (IRRDBU00). The following two sample RACFICE reports, based on IRRDBU00, are added to SYS1.SAMPLIB in support of universal groups:</li> <li>CUG\$, which lists group names of all universal groups</li> <li>GPRM, which lists the user IDs of all members of a group, including a universal group</li> </ul>
	A new message, ICH05008I, is added to warn users who delete a universal group using the DELGROUP command that the remove ID utility (IRRRID00) should be run to ensure that all members are removed from the deleted group.
	When change was introduced: z/OS V1R2.
	<b>Reference information:</b> <i>z/OS Security Server RACF Security Administrator's Guide.</i>
RACF: Suppor	t of PKI Services
	<b>Description:</b> As of z/OS V1R3, RACF support of PKI Services includes certificate support for the following:
	<ul> <li>Extension of the R_PKIServ System Authority Facility (SAF) service to provide additional functions that support the programmatic request of certificates and certificate management used by the Web user and Web administrator functions.</li> </ul>
	<ul> <li>Ability to choose between the use of SAF as the provider of certificate generation or the use of the new PKI Services component to generate certificates. If you've already been using SAF to generate certificates (support provided in the OS/390 V2R10 SPE), you might want to continue to do so to allow coexistence.</li> </ul>
	As of z/OS V1R4, support of PKI Services includes the following:
	<ul> <li>e-mail notification for completed certificate requests and expiration warnings</li> </ul>
	<ul> <li>Support for MAIL, STREET, and POSTALCODE distinguished name qualifiers</li> </ul>
	<ul> <li>Enhancement of the RACDCERT command and R_PKIServ callable service to support PKCS#7 certificate chains</li> </ul>
	<ul> <li>Removal of clear text LDAP passwords from the pkiserv.conf file by storing them in RACF profiles</li> </ul>

1	<ul> <li>Use of the PCI Cryptographic Coprocessor to generate a key pair, eliminating software key exposures</li> </ul>
I	Updated list of default CERTAUTH certificates
I	When change was introduced: z/OS V1R3, z/OS V1R4.
   	<ul> <li>Reference information:</li> <li>z/OS Cryptographic Services PKI Services Guide and Reference</li> <li>z/OS Security Server RACF Security Administrator's Guide</li> </ul>
RACF: Suppo	rt of Policy Director Authorization Services
 	<b>Description:</b> RACF support of the product Policy Director Authorization Services for z/OS and OS/390 (5655-F95) includes the following:
 	<ul> <li>Support for a new callable service, R_cacheserv (IRRSCH00), which provides cache management services for application invokers.</li> </ul>
   	<ul> <li>Support for another new callable service, R_proxyserv (IRRSPY00), which allows invokers to retrieve information from an LDAP directory without requiring a POSIX environment.</li> </ul>
	<ul> <li>RACF SMF data unload utility (IRRADU00) support for new SMF Type 80 records created by the Policy Director Authorization Services product for the aznAccess System Authority Facility (SAF) callable service. The maximum output record size for IRRADU00 is increased to 8192.</li> </ul>
I	<ul> <li>RACF database profile segment and command enhancements.</li> </ul>
I	When change was introduced: z/OS V1R3.
	<ul> <li>Reference information:</li> <li>z/OS Security Server RACF Auditor's Guide</li> <li>z/OS Security Server RACF Callable Services</li> <li>Policy Director Authorization Services for z/OS and OS/390 Customization and Use</li> </ul>
RACF: Suppo	rt of enterprise identity mapping (EIM)
	<ul> <li>Description: Enterprise identity mapping (EIM) is an infrastructure that user administration applications, servers, operating systems, and auditing tools can use to store identity mappings in a centralized, distributed registry (LDAP). EIM can provide solutions to two classes of problems you experience:</li> <li>Transforming the user identity associated with a work request as it moves between systems through a multitiered application</li> <li>Administering user IDs in a heterogeneous environment</li> </ul>
l I	The RACF support for EIM enables you to configure z/OS and servers to use an EIM domain.
I	When change was introduced: z/OS V1R4.
l I	<b>Reference information:</b> <i>z/OS Security Server RACF Security Administrator's</i> <i>Guide</i> .
RACF: z/OS U	NIX security usability enhancements
   	<b>Description:</b> The main objective of UNIX Security Management Usability Enhancements is to aid the RACF administrator in making sure that RACF users and groups run with a unique UNIX identity.

 A system-wide setting prevents assignment of a UID or GID value that is already 1 in use. To handle exceptions to the "one user ID/one UID" rule, a RACF 1 command parameter is provided that overrides the system setting and allows assignment of a shared UID or GID. A SEARCH command enhancement allows an administrator to determine the set of users or groups assigned a given UID or GID. A mechanism is provided to automatically assign an unused UID or GID value to a user or group, which helps reduce manual steps and potential administrative error. When change was introduced: z/OS V1R4. **Reference information:**  z/OS Security Server RACF Security Administrator's Guide **RACF: PADS enhancements** T Description: This enhancement provides improved usability and increased security 1 1 when you create a controlled program execution environment for z/OS UNIX daemons and program access to data sets (PADS). The increased security allows implementation of a new ENHANCED mode for program security that can make systems more resistant to malicious attacks. The improved usability allows specification in the conditional access list of the program the user actually executed, and makes it simpler to specify conditional access lists for PADS and to reduce administrator error. T When change was introduced: z/OS V1R4. **Reference information:** *z/OS Security Server RACF Security Administrator's* Guide. **RACF: Enhancements** The following enhancements have been made to RACF: Description: Support for DFSMS Enhanced Data Integrity (EDI) for PS Data Sets - RACF supports EDI processing and DFSMS will now allow the new support by using a SYS1.PARMLIB member. DFSMS has changed to allow specification of tape file sequence numbers up to 65535, and DFSMS and other system components must change the control blocks to use FIXED(16) fields to allow this range. - RACROUTE REQUEST=AUTH and REQUEST=DEFINE have been updated to increase their file sequence limit. - RACF command, ADDSD, has updated its parse processing for parameter validation to increase its value. The consistency of input for the RACF common command exit, IRREVX01, has been enhanced: Some previously documented limitations regarding mixed case resource names have been removed.

- Abbreviated RACF class names are fully expanded.
- Dataset names are fully expanded and enclosed within single quotes.
- As a result of these enhancements:

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- Some keywords may appear to the command exit in a different order than they would have prior to this release.
- Some command processor error messages may now display a fully qualified data set name, even when the user did not specify a fully qualified data set.

When change was introduced: z/OS V1R5.

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- z/OS Security Server RACROUTE Macro Reference
- z/OS Security Server RACF Messages and Codes
- z/OS Security Server RACF System Programmer's Guide
- z/OS Security Server RACF Command Language Reference
- Description: As an enhancement to superuser granularity, the RACF R\_chmod callable service (IRRSCF00) is updated to check the caller's authorization to resource SUPERUSER.FILESYS.CHANGEPERMS in the UNIXPRIV class if the caller's user ID does not have UID(0) or is not the owner of the file. If the user executing the chmod command has at least read authority to the resource, the user is authorized to change the file mode in the same manner as a user having UID(0).

#### When change was introduced: z/OS V1R2.

- Description: The z/OS UNIX file group ownership option enhancement provides administrators a system-wide mechanism of choosing how the group owner of a new HFS file is assigned. It can either come from the group owner of the parent directory, as it did prior to z/OS V1R4, or it can come from the effective GID of the creating process. If the administrator defines a UNIXPRIV profile named FILE.GROUPOWNER.SETGID, then the set-gid bit for a directory determines how the group owner is initialized for new objects created within the directory:
  - If the set-gid bit is on, then the owning GID is set to that of the directory.
  - If the set-gid bit is off, then the owning GID is set to the effective GID of the process.

In order to use the FILE.GROUPOWNER.SETGID profile in a shared HFS environment, all nodes sharing the HFS must be at z/OS V1R4 (or later). Between any two nodes sharing the HFS, if either of them is back-level, the group owner for a new file is set from the parent directory, regardless of whether FILE.GROUPOWNER.SETGID exists. If one node has a separate RACF database, then that node is considered back-level if the FILE.GROUPOWNER.SETGID profile does not exist, even if the node is at z/OS V1R4.

When change was introduced: z/OS V1R4.

- Description: A new audit function code, AFC\_SHUTDOWN\_REG, is added to support the z/OS UNIX shutdown registration service. The ck\_priv callable service is updated to audit this event based on the SETR LOGOPTIONS setting of the PROCESS class.
  - When change was introduced: z/OS V1R3.
- Description: The RACFICE tool in SYS1.SAMPLIB member IRRICE is updated to exclude profiles in the DIGTCERT class when searching for general resource profiles with UACC other than NONE.

When change was introduced: z/OS V1R2.

 Description: The processing for exits ICHDEX01 and ICHDEX11 is changed to add return code 16. When present, if one of these exits delivers return code 16 for an operation, RACF uses DES encryption for the storing of passwords. For the comparing of passwords, RACF first uses DES, and if DES processing fails,

1	RACF uses masking. In effect, if one of these exits delivers return code 16, RACF processes as if the exit were not present.
1	When change was introduced: z/OS V1R2.
• • •	<b>Description:</b> You might see new messages issued by the IRRUT200 utility. With DFSORT Release 14, RACF can use the ICEGENER utility to copy the RACF database, as opposed to the IEBGENER utility which would have otherwise been used. ICEGENER produces more detailed messages than IEBGENER produces.
	When change was introduced: z/OS V1R3.
• • • •	<b>Description:</b> Additional multilevel security support is being added. The SETROPTS command is changed to update the MLACTIVE and MLS options. Upon installation, an administrator will not be allowed to enable these options unless the SECLABEL class is active. Also, the installation will not be able to deactivate the SECLABEL class if either MLS or MLACTIVE is enabled.
1	Two new messages, ICH14076I and ICH14077I, replace messages ICH14037I and ICH14038I.
1	When change was introduced: z/OS V1R4.
• •	<b>Description:</b> A new report, NWPI, is added to the IRRICE member in SYS1.SAMPLIB to support user IDs that have a password interval value of NOINTERVAL.
 	A new report, GIDS, is added to locate instances of shared UNIX GIDs. This is similar to the existing UIDS report.
I	When change was introduced: z/OS V1R4.
• • •	<b>Description:</b> When there is an error with the RACF data manager during the use of REQUEST=VERIFY or REQUEST=VERIFY(X), an abend with code 483 occurs. A new keyword, ERROROPT, is added to this support to issue a return and reason code instead of the abend code.
1	When change was introduced: z/OS V1R4.
• • • • • •	<b>Description:</b> For compatibility with previous releases, the FMID HRF7707 is used as the RACF level and is represented by the value 7707. SMF records written by RACF now indicate the new FMID value, and the TSO/E CLIST variable &SYSLRACF and REXX SYSVAR(SYSLRACF) functions return 7707. The ICHEINTY, ICHETEST, ICHEACTN, and RACROUTE macros have been updated to accept RELEASE=7707, RELEASE=7706, or RELEASE=7705 as values for the RELEASE parameter. Programs using these macros do not need to be updated or reassembled unless new keywords will be added to take advantage of new function.
   	when change was introduced: RELEASE=//05 was introduced in z/OS V1R2, RELEASE=7706 was introduced in z/OS V1R3, and RELEASE=7707 was introduced in z/OS V1R4.

# **RACF: Service updates**

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The following changes have been made to RACF as a result of APARs:

• **Description:** APAR OW51885 provides new support that will change the content of some ICH408I messages issued because of actions taken by OS/390 UNIX users. New support will provide the actual audit function code, instead of the string 'LOOKUP'. This only occurs for ICH408I messages having CL(DIRSRCH). SMF records are not changed.

When change was introduced: z/OS V1R5.

• APAR OW53818 will provide documentation for the userid and password guidelines an application must follow when verifying that a user ID and password supplied by a user represent valid information to pass to RACF on RACROUTE

REQUEST=VERIFY or RACINIT. Abend reason codes 283–3C and 9C7–3C are changed to indicate that the PASSCHK=NO parameter was missing.

When change was introduced: z/OS V1R5.

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• APAR OW56843 will provide support for protected userids. The userids will no longer be revoked due to inactivity.

When change was introduced: z/OS V1R5.

• **Description:** APAR OW46174 modifies the logic in callable service check\_access to check the UNIXPRIV class (SUPERUSER.FILESYS) for read authority when doing a directory search. Also, Open checks for read authority, instead of update, when doing a search and Opendir checks for read authority.

When change was introduced: z/OS V1R3.

 Description: APAR OW52941 adds audit function code support for z/OS UNIX to RACF callable service ck\_access (IRRSKA00) to improve access checking for z/OS UNIX files and directories. In addition, UNIXPRIV authority is now checked for the existing AFC\_ACCESS audit function code, as long as the real, effective, and saved UIDs of the process are the same, and the real, effective, and saved GIDs of the process are the same.

When change was introduced: z/OS V1R4.

• **Description:** Reliability of RACF data sharing mode is improved by reducing the occurrence of RACF abends due to coupling facility failures. This support allows the RACF manager to retry requests that are in progress when a coupling facility rebuild takes place. This addresses APAR OW40605 which was closed as a suggestion.

When change was introduced: z/OS V1R2.

• **Description:** APAR OW42913 modifies RACROUTE REQUEST=VERIFY processing to validate new passwords against the installation's syntax rules before it invokes the password processing exit (ICHPWX01). This processing sequence is changed to match the sequence of new-password validation processing used by the PASSWORD and ALTUSER commands. This support also adds more information, such as user name, to the SMF data unload (IRRADU00) output record for new-password failures processed by ICHPWX01.

When RACROUTE REQUEST=VERIFY encounters multiple user errors, the order in which they are reported might be different than prior to z/OS V1R2. Also, IRRADU00 output records might contain more information related to new-password failures that were processed by ICHPWX01.

When change was introduced: z/OS V1R2.

- **Description:** APAR OW49124 modifies the RACF SMF data unload utility (IRRADU00) to store Relocate 47 data in the IRRADU00 utility output record. When change was introduced: z/OS V1R3.
- Description: APAR OW50327 enables RACF to allow program control access READ to the modules in SYS1.LINKLIB if they are accessed by way of UACC(NONE) on a \* or \*\* PROGRAM class profile. Otherwise, the specified access is used. If any access entry of ID(\*) with ACC(NONE) for this same profile is used with any UACC, then it is changed to READ. Also, new message ICH580I is issued by the SETR WHEN(PROGRAM) routine to indicate that one of these profiles was found.

When change was introduced: z/OS V1R4.

 Description: APAR OW54280 indicates that RACF commands that provide output listings (LISTDSD, LISTUSER, LISTGROUP, RLIST) are designed to be issued by users, not by programs. RACF list commands, such as LISTUSER \* 1

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and LISTGRP \*, can generate many thousands of lines of output. This consumes many address space resources. RACF does not support the command output as a programming interface.

When change was introduced: z/OS V1R4.

## **Run-Time Library Extensions new functions to consider**

See "Language Environment new functions to consider" on page 153 for Run-Time Library Extensions new functions to consider.

## SMP/E new functions to consider

This section describes new SMP/E functions in z/OS.

# LINK LMODS Command

**Description:** The new LINK LMODS command can be used to refresh the callable services for all load modules within a particular target zone. The LINK LMODS command can also be used to refresh the callable services only for those load modules that have a dependency on a particular set of CALLLIBS. The LINK LMODS command replaces the REPORT CALLLIBS command, which has been removed from SMP/E V3R2.

When change was introduced: SMP/E for z/OS V3R2.

#### **Reference information:**

• SMP/E Commands

# **REPORT CALLLIBS Command Removal**

**Description:** The REPORT CALLLIBS command has been removed from SMP/E V3R2. It has been replaced by the LINK LMODS command.

When change was introduced: SMP/E V3R2 for z/OS.

Reference information: None.

# **UPGRADE** Command

**Description:** New releases of SMP/E must sometimes make changes to SMP/E data sets that cannot be properly processed by prior SMP/E releases. SMP/E usually makes incompatible changes only when necessary to provide new and improved capabilities. For example, a new type of element requires a new entry type in SMPCSI data sets and these new entry types are typically not understood or processed correctly by SMP/E levels that have not been specifically updated to do so.

The UPGRADE command allows you to specify when SMP/E is permitted to make incompatible changes to SMP/E data sets. This, in turn, allows you to make the trade-off between exploiting new SMP/E functions and preserving compatibility with prior SMP/E releases.

A toleration PTF will enable OS/390 V2R7 SMP/E, z/OS V1R2 SMP/E, and SMP/E V3R1 to automatically check for incompatible changes made by a higher level of SMP/E. A toleration PTF will also provide a warning message should a user try to issue an UPGRADE command on a release of SMP/E prior to V3R2.

1	When change was introduced: SMP/E V3R2 for z/OS.
I	Reference information:
1	SMP/E Commands
GIMXSID Serv	ice Routine
     	<b>Description:</b> The GIMXSID service routine is used as part of the ShopzSeries offering. GIMXSID creates a single data source required by ShopzSeries to place customized software product and service orders. The data source created by GIMXSID, the software inventory data, is a composite of three kinds of information as follows:
   	<ol> <li>A list of FEATUREs found in the SMPCSI data sets. The Feature List is used by ShopzSeries to perform product requisite checking and also to prime the order checklist when ordering a ServerPac.</li> </ol>
   	<ol> <li>A list of the FMIDs found in the SMPCSI data sets. The FMID List is used by ShopzSeries to scope service orders to the PTFs applicable solely to the user's desired configuration of target and global zones.</li> </ol>
   	<ol> <li>A bitmap representation of the PTFs found in the specified target zones and global zones. The PTF Bitmap is used by ShopzSeries (CCSS) to produce service packages that do not contain PTFs that are already present in the user's configuration.</li> </ol>
I	When change was introduced: SMP/E V3R2 for z/OS.
I	Reference information: None.
GIMZIP: Archi	ve Segmentation
       	<b>Description:</b> The GIMZIP service routine has been enhanced with a new SEGMENT option to allow you to specify the maximum size for the network transportable objects produced by GIMZIP. Very large objects will be divided into archive segments that are within the specified size. The GIMUNZIP service routine and the RECEIVE FROMNETWORK and RECEIVE FROMNTS commands will now accept network packages that contain archive segments as input.
1	Also, you can now use the SMPWKDIR DD statement to specify a location for temporary files produced during GIMZIP processing.
   	SMP/E releases prior to SMP/E V3R2 cannot process GIMZIP output that contains segmented archive files. A toleration PTF will issue an error message should a user try to process GIMZIP output that contains segmented archive files on a release of SMP/E prior to V3R2.
I	Description:
I	When change was introduced: SMP/E V3R2 for z/OS.
   	Reference information:         • SMP/E Commands         • SMP/E Reference

# GIMZIP: User Defined Subdirectories

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**Description:** Users of GIMZIP may now specify subdirectories in which to store documentation, samples, readme files, and other files. This is done with the new

**subdir** attribute of the <FILEDEF> tag of the GIMZIP package control statement. 1 The subdirectory is created in the hierarchical file system, within the parent Т directory pointed to by the SMPDIR DD statement in the JCL used to invoke GIMZIP. Unless the required PTF is installed, SMP/E releases prior to SMP/E V3R2 cannot process GIMZIP packages that exploit user-defined subdirectories. When change was introduced: SMP/E V3R2 for z/OS. Reference information: None. **Java Archive Files** Description: Many z/OS software products developed with Java use Java Archive (JAR) files as the packaging format for Java application files. To better T accommodate such products, SMP/E V3R2 is introducing JAR file update support. For SMP/E, there will be two forms of JAR files; JAR replacement files and JAR update files. JAR replacement files are complete replacements for a JAR file and are treated simply as files in the hierarchical file system. SMP/E will copy replacement JAR files into the hierarchical file system, just as is done for all other hierarchical file system elements. JAR update files are archive files themselves, but do not contain all of the component files that make up the complete JAR file. A JAR update file contains only the new and changed component files. These new and changed component files are archived into a JAR file. SMP/E uses the JAR command and the contents of a JAR update file to update an existing JAR file. SMP/E releases prior to SMP/E V3R2 cannot process JAR replacement files or JAR update files, nor can they process the data entries for these elements. A toleration PTF will cause SMP/E to issue an error message if it encounters an unsupported JAR element or data entry. When change was introduced: SMP/E V3R2 for z/OS. **Reference information:** For information about the JAR command and JAR files. refer to the "Java Developer Connection, Using JAR Files: The Basics" at http://developer.java.sun.com/developer/Books/JAR/basics/index.html Т Smaller SMPLTS data set Description: The SMPLTS data set is used by SMP/E to save the base version of a product's load modules that use callable services. To reduce SMPLTS space Т requirements, SMP/E now saves a base version of a load module in the SMPLTS data set only if it contains both CALLLIBS and XZMOD subentries. If a load module contains CALLLIBS subentries, but no XZMOD subentries, this load module is not saved in the SMPLTS. The SMPLTS data set used by SMP/E V3R2 may not contain the base version of load modules with CALLLIBS subentries. Because of this, once the SMPLTS has been modified by SMP/E V3R2, you cannot use certain commands from older levels of SMP/E that depend on the base version of a load module being in the SMPLTS data set. Specifically, if any of the following updates were made to a zone with load modules containing CALLLIBS but no XZMOD subentries, the target zone T is marked: CLEANUP command is run against the zone Т · GENERATE command is run against the zone Т

• APPLY or RESTORE command is run and the base version of the load module is deleted from the SMPLTS

A toleration PTF against older releases of SMP/E allows certain commands to be processed against a target zone that has been marked to indicate that the SMPLTS data set can not be used. These commands do not depend on the base version of load modules existing in the SMPLTS:

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- BUILDMCS
- CLEANUP
- DEBUG
- GENERATE
- JCLIN
- LIST
- LOG
- RESETRC
- SET
- UCLIN
- UNLOAD
- ZONECOPY
- ZONEDELETE
- ZONEEDIT
- ZONEEXPORT
- ZONEIMPORT
- ZONEMERGE

The toleration PTF also prohibits the RESTORE or LINK MODULE command from being run against a target zone that has been marked.

When change was introduced: SMP/E V3R2 for z/OS.

#### Reference information:

• SMP/E Commands

### DUMMY data set for SYSDEFSD

**Description:** The SYSDEFSD DD statement defines the location for the binder to write IMPORT statements for all exported entries of a DLL load module. Whenever entries are to be exported, the binder expects the SYSDEFSD data set and, if it is not present, will issue a warning message to indicate the missing data set. Product developers who supply DLLs do not always want or need the IMPORT statements associated with a DLL retained. In these instances, the SYSDEFSD would be better defined as either a temporary or DUMMY data set.

SMP/E is defining a new ddname called SMPDUMMY, which will always be allocated as 'DD DUMMY'. Product packagers may now specify the SYSDEFSD DD statement in the JCLIN input stream as any of the following:

- //SYSDEFSD DD DSN=SMPDUMMY,DISP=xxx
- //SYSDEFSD DD DSN=NULLFILE
- //SYSDEFSD DD DUMMY

In each case, the SIDE DECK LIBRARY subentry of the LMOD entry will be set to SMPDUMMY. When needed for processing, SMPDUMMY will be dynamically allocated by SMP/E as a DUMMY data set.

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	process SYSMOD input that uses the SYSDEFSD DUMMY enhancement, nor can they process the data entries for these elements.
	When change was introduced: SMP/E V3R2 for z/OS.
	Reference information:
	SMP/E Reference
SMP/E Dialog	Customization
	<b>Description:</b> A new option, Option 0, has been added to the SMP/E Primary Option Menu GIM@PRIM to implement the current SMP/E customization options. This new option allows you to enter or change the values for the customization options that were previously found in panel GIM@UPRM. When you select option 0 from the GIM@PRIM panel, the panel GIM@PARM will appear. The options you then specify are saved permanently in the ISPF profile pool for later use by other SMP/E dialog processes.
	All dialog customization formerly specified on panel GIM@UPRM must now be specified using Option 0 on the SMP/E Primary Option Menu. When you move to a new release of SMP/E and continue to use the same ISPF profile data set, no migration actions are required to use the options previously entered and saved.
	When change was introduced: SMP/E V3R2 for z/OS.
	<b>Reference information:</b> For more information about SMP/E dialog customization, refer to the tutorial panels that accompany the SMP/E dialogs.

Unless the required PTF is installed, SMP/E releases prior to SMP/E V3R2 cannot

### **GIMUTTBL Removal**

**Description:** Module GIMUTTBL and load module GIMUTTBL are no longer supplied as part of SMP/E. Macro GIMDFUT, which was used to replace the IBM-supplied copy of GIMUTTBL, is also no longer supplied. GIMUTTBL was formerly used to specify which utility programs SMP/E can call.

You can specify which utility programs SMP/E can call by using the PROGRAM class of the z/OS Security Server (RACF). Refer to, for more information about how to use this function.

When change was introduced: SMP/E V3R2 for z/OS.

#### **Reference information:**

• z/OS Security Server RACF Security Administrator's Guide

### SMPPTS spill data sets

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**Description:** SMPPTS spill data sets are new. SMP/E RECEIVE processing can use SMPPTS spill data sets, if defined, to store SYSMODs when the primary SMPPTS data set is full. Up to 99 spill data sets, named SMPPTS1 through SMPPTS99, can be defined with DD statements or DDDEFs. By eliminating the tasks involved when recovering from an overflowing SMPPTS data set, the use of SMPPTS spill data sets can reduce the amount of manual intervention and data set management required to install software service.

**When change was introduced:** z/OS V1R2 and SMP/E V3R1. (The base element z/OS V1R2 SMP/E and the product SMP/E V3R1, 5655-G44, are functionally equivalent.) This function was rolled back to OS/390 V2R7 through z/OS V1R1 by PTF UR52518.

#### **Reference information:**

- SMP/E Reference
- SMP/E Commands

### SMP/E RECEIVE from network

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**Description:**SMP/E can now receive input from a network server, in addition to tape and DASD. This enables the delivery of SMP/E-installable products and service over the Internet or an intranet. By installing software directly from a network source, SMP/E enables a more seamless integration of electronic software delivery and installation. This reduces the tasks and time required to install software delivered electronically.

SMP/E also provides the GIMZIP and GIMUNZIP service routines to construct, and then later unwrap, network transportable packages of software. This allows you to create your own packages of SMP/E-installable software and then distribute them within your own enterprise or to other enterprises. Specifically, the GIMZIP service routine accepts partitioned or sequential data sets as input and creates a network transportable package as output

Once a package is made accessible on an FTP server, you can use the SMP/E RECEIVE command to transfer the package through a TCP/IP network directly into an SMP/E environment. The RECEIVE command has been extended with new DELETEPKG, FROMNETWORK, and FROMNTS operands to process these network transportable packages.

New CLIENT and SERVER data sets and SMPDIR and SMPNTS directories have been created to support this new processing.

When change was introduced: z/OS V1R2 and SMP/E V3R1. (The base element z/OS V1R2 SMP/E and the product SMP/E V3R1, 5655-G44, are functionally equivalent.) GIMZIP and GIMUNZIP are available on OS/390 V2R7 through z/OS V1R1 by PTF UR52471.

#### **Reference information:**

- For information about ICSF setup, which is required by this function, see *z/OS Cryptographic Services ICSF System Programmer's Guide*.
- For information about the GIMZIP and GIMUNZIP service routines, see *SMP/E Reference*.
- For information about the RECEIVE command changes, see SMP/E Commands.
- For information about CLIENT, SERVER, SMPDIR, and SMPNTS, see *SMP/E Reference*.

### Conditional JCLIN processing

**Description:** SMP/E now allows a packager to use special JCL comments in the JCLIN input to cause SMP/E to skip over parts of the JCLIN input based on the installation environment. The parts of the JCLIN input that are skipped are not processed by the JCLIN command and do not contribute to the structure information derived from JCLIN processing

   	When change was introduced: z/OS V1R2 and SMP/E V3R1. (The base element z/OS V1R2 SMP/E and the product SMP/E V3R1, 5655-G44, are functionally equivalent.)	
I	Reference information: SMP/E Commands.	
AMODE=64 ar	nd COMPAT=PM4 link-edit parameters	
1	<b>Description:</b> SMP/E now recognizes and saves the AMODE=64 and COMPAT=PM4 link-edit parameters when found in a JCLIN link-edit step.	
   	The AMODE option assigns the addressing mode for all of the entry points into a program module (the main entry point, its true aliases, and all of the alternate entry points). AMODE=64 instructs the binder to create AMODE 31/64 executables with 8-byte adcons.	
   	The COMPAT option identifies the compatibility level of the binder. COMPAT=PM4 allows the user to specify a compatibility level appropriate for AMODE=64 executables.	
   	When change was introduced: z/OS V1R2 and SMP/E V3R1. (The base element z/OS V1R2 SMP/E and the product SMP/E V3R1, 5655-G44, are functionally equivalent.) This function was rolled back to OS/390 V2R7 through z/OS V1R1 by PTF UR52568.	
I	Reference information: SMP/E Reference.	
Selected SMP	/E data sets may now reside in the HFS	
               	Description: SMP/E now allows the following data sets to reside in the hierarchical file system (HFS): • SMPCNTL • SMPDEBUG • SMPHOLD • SMPJCLIN • SMPLIST • SMPOUT • SMPPTFIN • SMPPUNCH • SMPRPT	
   	When change was introduced: z/OS V1R2 and SMP/E V3R1. (The base element z/OS V1R2 SMP/E and the product SMP/E V3R1, 5655-G44, are functionally equivalent.)	
I	Reference information: SMP/E Reference.	
HOLDDATA summary reports		
   	<b>Description:</b> SMP/E now provides additional HOLDDATA reports for APPLY and ACCEPT processing. The new reports provide you with ++HOLD information in the context of the APPLY or ACCEPT processing output. This frees you from having to manually collect this information, thus saving you significant research time.	
1	When change was introduced: z/OS V1R2 and SMP/E V3R1. (The base element z/OS V1R2 SMP/E and the product SMP/E V3R1, 5655-G44, are functionally	

Reference information: SMP/E Commands.

## HFS data set identification

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**Description:** The SMP/E File Allocation report and SMP/E library change file records have been enhanced to identify the physical HFS data sets where files in the hierarchical file system reside.

When change was introduced: z/OS V1R2 and SMP/E V3R1. (The base element z/OS V1R2 SMP/E and the product SMP/E V3R1, 5655-G44, are functionally equivalent.)

#### **Reference information:**

- For information about the File Allocation report, see SMP/E Commands.
- · For information about library change file records, see SMP/E Reference.

# z/OS UNIX new functions to consider

This section describes new z/OS UNIX functions in z/OS.

### Allocating SWA above the line

**Description:** You can specify whether SWA control blocks should be allocated above or below the 16 megabyte line by using the SWA parameter of the BPXPRMxx parmlib member.

When change was introduced: z/OS V1R5

Reference information: z/OS MVS Initialization and Tuning Reference

### Automount support for zFS

**Description:** You can use the automount facility for zFS.

- When change was introduced: z/OS V1R5
- Reference information: z/OS UNIX System Services Planning

### Basic partitioned access method (BPAM)

Description: You can set up read-only BPAM access to UNIX, zFS, and TFS files.

#### When change was introduced: z/OS V1R5

#### Reference information:

- z/OS UNIX System Services Planning
- z/OS DFSMS: Using Data Sets

# Copying HFS files to another HFS

**Description:** You can use BPXCOPY to copy an HFS file to another HFS file.

- When change was introduced: z/OS V1R5
  - Reference information: z/OS UNIX System Services Command Reference

Creating directories during z/OS UNIX initialization		
   	<b>Description:</b> You can use the MKDIR keyword on the ROOT and MOUNT statements of the BPXPRMxx parmlib member to specify that one or more directories are to be created in the mounted file system as part of mount processing during z/OS UNIX initialization.	
I	When change was introduced: z/OS V1R5	
   	<ul> <li>Reference information:</li> <li>z/OS UNIX System Services Planning</li> <li>z/OS MVS Initialization and Tuning Reference</li> </ul>	
Debugging pro	ograms that use 64-bit addressing	
	<b>Description:</b> You can use the <b>dbx</b> utility to debug programs that use 64-bit addressing.	
I	When change was introduced: z/OS V1R5	
   	<ul> <li>Reference information:</li> <li>z/OS UNIX System Services Programming Tools</li> <li>z/OS UNIX System Services Command Reference</li> </ul>	
Mounting file	<b>systems using symbolic links</b> <b>Description:</b> You can mount different file systems at a logical mount point that resolves to a different pathname on different systems.	
I	When change was introduced: z/OS V1R5	
I	Reference information: z/OS UNIX System Services Planning	
Starting the lo	<b>gin shell as a child shell</b> <b>Description:</b> You can use the <b>su</b> shell command to start the login shell as a child shell.	
I	When change was introduced: z/OS V1R5	
I	Reference information: z/OS UNIX System Services Command Reference	
Multilevel secu	<b>Description:</b> Multilevel security provides additional security for z/OS UNIX.	
I	When change was introduced: z/OS V1R5	
I	Reference information: z/OS UNIX System Services Planning	
Temporary file	e system (TFS) enhancements Description: The maximim file size that TFS will support has been increased. A new option for the PARM parameter specifies the blocking factor that is used to set the size of a TFS block.	

I	F	Reference information: z/OS UNIX System Services Planning
   	Support of mult	<b>Example 1 tipath links and SuperNet routes for IPV4 addresses</b> <b>Description:</b> When using the <b>su</b> command, you can specify that the login shell be started as a login shell.
I	N	When change was introduced: z/OS V1R5
I	F	Reference information: z/OS UNIX System Services Command Reference
   	Updating securi	ity procedures Description: Consider taking advantage of security features that you are not currently using. Examples are FACILITY classes, the UNIXPRIV class, and protected user IDs.
 	N S	When change was introduced: Various z/OS releases had additional functions for security
I	F	Reference information: z/OS UNIX System Services Planning.
I	Access control	lists (ACLs)
	                                   	<b>Description:</b> Access control lists (ACLs) allow you to control access to files and directories by individual user (UID) and group (GID). To manage an ACL for a file, you must either be the file owner or have superuser authority (UID=0 or have READ access to SUPERUSER.FILESYS.CHANGEPERMS in the UNIXPRIV class). UNIX file security on z/OS uses permission bits to control access to files, in accordance with the POSIX standard. However, the permission bit model does not allow for granting and denying access to specific users and groups, such as is possible using RACF profiles. This function is provided by the introduction of ACLs in the z/OS UNIX file system. An ACL is a construct that resides within the file system and is powned by the System Authority Facility (SAF). The RESTRICTED attribute of a user s now applicable to file and directory access.
I	١	When change was introduced: z/OS V1R3.
   	F • •	Reference information: z/OS UNIX System Services Planning z/OS Security Server RACF Security Administrator's Guide
I	Shutting down a	z/OS UNIX without re-IPLing
   		<b>Description:</b> You can now use the F OMVS,SHUTDOWN operator command to simplify the process of doing a planned shutdown and re-IPL. You should also consider using it if you plan to recustomize and reinitialize the z/OS UNIX environment without re-IPLing.
 	1 J	Note that you can use the F OMVS,RESTART operator command to restart z/OS UNIX.
I	N	When change was introduced: z/OS V1R3.
   		Reference information: • z/OS UNIX System Services Planning • z/OS MVS System Commands

# ISHELL enhancements

1	<b>Description:</b> Various enhancements have been added to ISHELL. If you are	
1	Contractumes change ettributes or chew full paths for files	
	Sort cournes, change attributes, or snow full paths for mes	
	Specify primary and secondary sort columns	
	Ose color to highlight various types and attributes	
	Execute actions based on cursor location	
1	You will also be able to do the following:	
	Issue TSO commands from the directory list with path substitution	
	• With the <b>su</b> command, change the user ID to a user other than 0	
	• Create an HFS file system on non-SMS storage	
	View time stamps as local time	
I	Edit fixed-length records	
I	When change was introduced: z/OS V1R4.	
I	Reference information:	
1	• For information about the various commands, see <i>z/OS UNIX System Services Command Reference</i> .	
l I	• For detailed information about ISHELL, see <i>z/OS UNIX System Services User's Guide</i> .	
Additional z/OS UNIX enhancements		
	<b>Description:</b> The following z/OS UNIX enhancements were made in z/OS V1R2:	
	<ul> <li>Application driven policy classification (in IP migration)</li> </ul>	
	Enhanced ASCII functionality	
	HFS control	
1	Enhancements to the more utility	
1	Preparing file systems for shutdown	
1	<ul> <li>Preventing applications from being interrupted by signals</li> </ul>	
1	Enhancements to the pread() and pwrite() functions	
1	Communications Server – IP Services (TCP/IP) resolver enhancement	
I	• uname utility enhancement	
1	The following z/OS UNIX enhancements were made in z/OS V1R3:	
1	Copying HFS data sets	
1	• copytree (new member for /samples)	
	<ul> <li>Monitoring the mount table limit used by shared HFS</li> </ul>	
	<ul> <li>msvs for Setup for z/OS UNIX</li> </ul>	
	Starting colony address space outside of JES	
I	Unmounting file systems that leave the sysplex	
1	The following z/OS UNIX enhancements were made in z/OS V1R4:	
1	Authenticating of certificates on the BPX1SEC service	
	Automove system list	
	BPXWDYN	
I	Distributed byte range lock manager (BRI M)	
1	Distributed byte range took manager (Direw)	
	Enhanced program security	
---	---	
	Enhanced pthread support	
	Process start/end exits	
	REXX functions	
	Sanction lists	
	<ul> <li>Support of /dev/fd/n files</li> </ul>	
	UID and GID enhancements	
	<ul> <li>Using the set-gid bit to assign group owners</li> </ul>	
I	When change was introduced: z/OS V1R2, z/OS V1R3, z/OS V1R4.	
	<b>Reference information:</b> z/OS UNIX System Services Planning.	

z/OS UNIX

## Chapter 2. z/OS elements and features

### z/OS base elements

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z/OS provides function equivalent to the following elements. For the version and release numbers of those elements that also exist as separately orderable products, see *z/OS* and *z/OS*.*e* Planning for Installation, GA22-7504.

An additional set of integrated features is available on an optional basis, see "z/OS optional features" on page 200.

The following is a list of z/OS base elements:

- Base Control Program (BCP)
- BookManager<sup>®</sup> READ
- Bulk Data Transfer (BDT)
- Communications Server
- Cryptographic Services (includes ICSF and PKI Services)
- DCE Application Support
- DCE Base Services
- Distributed File Service
- DFSMSdfp<sup>™</sup>
- Encina<sup>®</sup> Toolkit Executive
- EREP
- ESCON Director Support
- FFST<sup>™</sup>
- GDDM<sup>®</sup> (includes PCLK and OS/2<sup>®</sup> Link)
- HCD
- High Level Assembler (HLASM)
- IBM LibraryServer
- IBM HTTP Server
- ICKDSF
  - · Integrated Security Services
    - DCE Security Server
    - Enterprise Identity Mapping (EIM)
    - Firewall Technologies
    - LDAP Server
    - Network Authentication Service
    - Open Cryptographic Enhanced Plug-ins (OCEP)
- ISPF
- JES2
- Language Environment<sup>®</sup>
- MICR/OCR Support
- msys for Operations
- msys for Setup
- Network File System
- OSA Support Facility
- Run-Time Library Extensions
- SMP/E
- Text Search
- TIOC
- TSO/E
- UNIX System Services
- 3270 PC File Transfer Program

## z/OS optional features

Some optional features are not priced, but priced as well as unpriced features are included in z/OS integration-testing. All priced, host-based features are capable of being dynamically enabled or disabled. The only exception is VisualLift<sup>®</sup> for MVS, VSE, VM, which is shipped on a diskette. For the version and release levels of those features that also exist independently, see *z/OS and z/OS.e Planning for Installation*, GA22-7504.

The following is a list of z/OS optional features:

- BookManager BUILD
- Bulk Data Transfer (BDT) File-to-File
- Bulk Data Transfer (BDT) SNA NJE
- C/C++ without Debug Tool
- · Communications Server Security Level 3
- DFSMSdss<sup>™</sup>
- DFSMShsm
- DFSMSrmm<sup>™</sup>
- DFSMStvs
- DFSORT<sup>™</sup>
- GDDM-PGF
- GDDM-REXX
- High Level Assembler (HLASM) Toolkit
- Hardware Configuration Manager (HCM)
- IBM HTTP Server NA Secure
- Infoprint<sup>®</sup> Server
- JES3
- RMF<sup>™</sup>
- SDSF

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- Security Server (includes RACF)
- z/OS Security Level 3
  - OCSF Security Level 3
  - System Secure Sockets Layer (SSL) Security Level 3
  - Network Authentication Service Level 3

## Chapter 3. z/OS base elements descriptions

The following is a description of each base element in z/OS.

## **BCP (Base Control Program)**

The backbone of the z/OS system is the MVS Basic Control Program with JES2 or JES3. These provide the essential services that make z/OS the system of choice when you need to process your workloads reliably, securely, with complete data integrity and without interruption.

**Unicode support:**The Unicode Standard is the universal character encoding standard used for representation of text for computer processing. This support also takes advantage, if present, of native z/Architecture<sup>™</sup> Unicode HW instructions for faster processing. The Unicode Standard provides the capacity to encode all of the characters used for the written languages of the world. z/OS support for Unicode implements these Unicode Version 3.0 standards: Character codepage and case conversion and normalization. This support also takes advantage, if present, of native z/Architecture Unicode HW instructions for faster processing.

## **BookManager READ**

BookManager READ allows you to use any online BookManager book that you can access. Using the BookManager panels, windows, and function keys, you can manage, display, and search online books quickly and easily.

## **BDT (Bulk Data Transfer)**

Bulk Data Transfer (BDT) provides the base services that BDT File-to-File and BDT SNA NJE need to transfer data from one computer system to another.

## **Communications Server**

IP IP (formerly known as IBM TCP/IP) is a set of industry standard protocols and applications that allow you to share data and computing resources with other computers, both IBM and non-IBM. By using IP commands at your workstation, you can perform tasks and communicate easily with a variety of other systems and workstations. IP allows you to perform tasks independent of the computer type. UNIX applications use IP. Some common uses of IP include: electronic mail, file transfer, remote logon, and the Internet.

### **IP CICS Sockets**

IP CICS Sockets (integrated into the base TCP/IP stack) provides the ability to use the generalized Application Programming Interface (API) and socket applications in COBOL, PL/I, and assembler.

### **IP IMS Sockets**

IMS IP support (integrated into the base TCP/IP stack) allows the development of peer-to-peer applications in which IMS and an IP-connected peer form a client/server relationship. Using this support, IMS can be either client or server.

This element consists of three parts:

• The Sockets Extended Application Programming Interface. Using this API, IMS message processing programs can communicate with remote IP-connected hosts using socket protocol.

- If IMS is acting as the server, the IMS Listener can be used to collect incoming transaction requests from remote IP-connected hosts and schedule IMS message processing programs to service these requests.
- The IBM Assist module provides support for the IMS application programmer who wishes to code IP client/server application programs using the IMS API. When used, this optional function intercepts IMS message queue calls and replaces them with socket calls.

#### SNA (includes AnyNet<sup>®</sup>)

Formerly known as VTAM, SNA is a network communication access method (Systems Network Architecture) and Advanced Peer-to-Peer Networking<sup>®</sup> (APPN). It provides the interface between application programs in a host processor and other resources in an SNA network, and links peer users of the network. It establishes and terminates sessions between users of the network, forwarding session data to and from each session partner.

In addition to establishing and terminating sessions, it activates and deactivates resources under its control, including application programs, Network Control Programs (NCPs) and the devices they control, and devices to which SNA is directly attached. SNA also maintains information on the network configuration, active sessions, and network conditions.

To help users control a network, SNA receives commands from an operator to perform network services. It keeps the operator informed about those services, as well as about network conditions, through operator messages.

#### AnyNet

AnyNet implements the multiprotocol transport networking (MPTN) architecture. AnyNet enables application program types to communicate without change over different transport networks and across interconnected networks.

The AnyNet SNA over IP function enables SNA application programs to communicate over an IP network. SNA over IP provides support for dependent logical unit communications, such as printers and emulators, if the host is defined as a dependent LU server and dependent LU requester support is enabled at the workstation. In addition, SNA over IP supports all LU types, including LU 6.2, and supports concurrent sessions over the IP network to LUs in different SNA networks.

The AnyNet Sockets over SNA function enables application programs that use the C socket API to communicate over SNA networks with other application programs that also use the C socket interface.

AnyNet provides the UNIX application environment quick and easy access to the vast resources of the SNA/APPN network and all of the security and reliability that goes along with SNA/APPN. This support means that applications written to the sockets interface can dynamically and simultaneously communicate across either SNA/APPN, IP or both networks.

### Cryptographic Services

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Cryptographic Services provide cryptographic functions for data secrecy, data integrity, personal identification, digital signatures, and the management of cryptographic keys. It includes ICSF and PKI Services.

These functions are provided through the combination of secure cryptographic hardware, the ICSF cryptographic API, and the ICSF administration interface. The cryptographic services support a wide variety of applications with high performance,

security, and availability. ICSF supports the Common Cryptographic Architecture (CCA), as well as the DES algorithm, RSA public key cryptography, and the Digital Signature Standard.

Additional functions are:

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- Trusted Key Entry—the key entry unit for master keys has been replaced by a secure channel version implemented on a workstation known as the Trusted Key Entry Workstation. The unit is an optional cost feature.
- Commercial Data Masking Facility supports privacy functions.
- Public Key API (PKA Support) provides additional formatting or message digest standards.

Public Key Infrastructure Services (PKI Services) allows you to establish a PKI infrastructure and serve as a certificate authority for your internal and external users, issuing and administering digital certificates in accordance with your own organization's policies. You can use a PKI Services application to request and obtain certificates through their own Web browsers, while your authorized PKI administrators approve, modify, or reject these requests through their own Web browsers. The Web applications provided with PKI Services are customizable, and a programming exit is also included for advanced customization. You can allow automatic approval for certificate requests from certain users and, to provide additional authentication, add host IDs, such as RACF user IDs, to certificates you issue for certain users. You can also issue your own certificates for browsers, servers, and other purposes, such as virtual private network (VPN) devices, smart cards, and secure e-mail. PKI Services supports Public Key Infrastructure for X.509 version 3 (PKIX) and Common Data Security Architecture (CDSA) cryptographic standards.

## DCE (Distributed Computing Environment)

The DCE Services provides the strengths of a distributed computing environment:

- Transparency of data and logic
- Distributed, consistent directory service
- · Security for both clients and servers integrated in execution path
- Scalability of distributed applications
- Interoperability and portability.

DCE Services supports the following:

- Remote Procedure Call (RPC) lets calls between programs running on different platforms appear as local procedure calls to the programmer.
- Directory Services allows resources to be found anywhere in an enterprise without the need to know local names.
- Security Services solves security problems common in a distributed environment by handling identification and certification of users, clients, servers, and systems.
- Distributed Time Services synchronizes clocks running on different nodes.

All components supported are based on the Open Software Foundation (OSF) DCE level 1.2.1. The DCE Base Services support clients and servers that run on IP and SNA networks.

## **DCE** application support

This function provides distributed application support.

 Inbound transactional RPC support allows customers to develop and run DCE-based distributed transaction processing applications, which include IMS, on the z/OS platform. This support interfaces with Encina Toolkit Executive for two-phase commit, IMS OTMA for IMS support, and RRS for z/OS recovery services. TRPC promotes use of network computing by supporting Encina clients on a variety of platforms, including the internet.

• C Data Type support provides IDL compiler support for certain C Data types, in addition to the current COBOL data type support. This item expands the Application Support capabilities of DCE to include additional data types.

## **DFS (Distributed File Service)**

The Distributed File Service provides DFS<sup>™</sup> support which is the Distributing Computing Environment (DCE) distributed file service component. As developed by the Open Group Open Systems Foundation (OSF), DCE and DFS join heterogeneous systems to provide secure read/write access to file data stored on the system or on another DCE system. DFS joins file systems on different systems into a single, global file system accessible by a large number of users. DFS file servers export file data for access by DFS clients running on the same or remote DCE system. DFS clients and servers communication uses DCE RPC protocols and DCE security. DFS provides a uniform file name space for users on heterogeneous systems; client caching for improved performance; transparent file locations to enable file data replication and movement between DCE systems which result in high availability and scalability. A DFS server on z/OS can export DCE LFS, HFS, Sequential, VSAM and PDS(/E) data for access by DFS clients. HFS, Sequential, VSAM and PDS(/E) data exported by a DFS server can be shared with local z/OS users and applications.

The Distributed File Service Server Message Block (SMB) support provides a server that makes Hierarchical File System (HFS) files and data sets available to SMB clients. (Server Message Block (SMB) is a protocol for remote file/print access used by Windows<sup>®</sup> clients. This protocol is also known as Common Internet File System.) The data sets supported include sequential data sets (on DASD), partitioned data sets (PDS), partitioned data sets extended (PDSE) and Virtual Storage Access Method (VSAM) data sets. The data set support is usually referred to as Record File System (RFS) support. The SMB protocol is supported through the use of TCP/IP on z/OS. This communication protocol allows clients to access shared directory paths and shared printers. Personal Computer (PC) clients on the network use the file and print sharing functions that are included in their operating systems. Supported SMB clients include Microsoft<sup>®</sup> Windows 98, Windows NT<sup>®</sup> 4.0 Workstation, Windows 2000 Professional. At the same time, these files can be shared with local z/OS UNIX System Services applications and with DCE DFS clients. In addition, Windows SMB clients can make remote print requests to z/OS printers that are connected to Infoprint Server for z/OS.

The Distributed File Service zSeries File System (zFS) support provides a Physical File System (PFS) that can be used in addition to the Hierarchical File System (HFS). zFS file systems contain files and directories that can be accessed with the z/OS hierarchical file system file application programming interfaces. zFS file systems can be mounted into the z/OS UNIX hierarchy along with other local (or remote) file system types (for example, HFS, TFS, AUTOMNT, NFS, etc.). zFS generally provides improved performance over HFS.

## DFSMSdfp

DFSMSdfp provides the foundation for: **Storage management** DFSMSdfp includes ISMF, an interactive facility that lets you define and

maintain policies to manage your storage resources. These policies help to

improve the use of storage devices, and to increase levels of service for user data, with minimal effort required from users. SMS manages these policies for the operating system. You can also use the NaviQuest tool under ISMF to help you migrate to SMS, maintain your SMS configuration, and perform many testing, implementation, and reporting tasks in batch.

### Tape mount management

SMS provides a means for implementing tape mount management, a methodology for improving tape usage and reducing tape costs. This methodology involves intercepting selected tape data set allocations through the SMS automatic class selection (ACS) process, and redirecting them to a DASD buffer. Once on DASD, these data sets can be migrated to a single tape or small set of tapes, thereby reducing the overhead associated with multiple tape mounts.

#### Data management

DFSMSdfp helps you store and catalog information on DASD, optical, and tape resources, so that it can be quickly identified and retrieved from the system. You can use the catalog search interface, now part of DFSMSdfp, to access the catalog.

### Program management

DFSMSdfp combines programs into executable modules, prepares them to run on the operating system, stores them in libraries, and reads them into storage for execution.

### **Device management**

DFSMSdfp is involved in defining your input and output devices to the system, and in controlling the operation of those devices in the MVS/ESA<sup>™</sup> environment.

### **Distributed data access**

Distributed data access allows all authorized systems and users in a network to exploit the powerful features of system-managed storage, or automated storage management provided by DFSMS/MVS<sup>®</sup>. DFSMSdfp uses the Distributed FileManager (DFM) to support remote access of MVS data and storage resources from workstations, personal computers, or any other system on a SNA LU 6.2 network.

The z/OS UNIX System Services (z/OS UNIX) file system works in conjunction with z/OS UNIX to provide a full UNIX environment within the MVS system. MVS becomes a full-feature UNIX client or server when coupled with the z/OS Network File System (z/OS NFS). With the z/OS UNIX file system, MVS programs can directly access UNIX data. When the z/OS NFS client and z/OS UNIX are used together, MVS can act as a client and access data from any remote system, including another MVS or UNIX system that is connected using a TCP/IP network served by a Network File System server.

## **Encina Toolkit Executive**

Provides a set of tools for developing client components of distributed transactional applications. It also allows ephemeral (non-recoverable) client applications to be written.

## **EREP (Environmental Record Editing and Printing Program MVS)**

EREP edits and prints reports for the records placed in the error recording data set (ERDS) by the error recovery program (ERP) of the operating system. It helps IBM service representatives maintain customer data processing installations, because the service representative can analyze information in the EREP reports to determine if a problem exists, what the problem is, and where the problem is located.

### **ESCON Director Support**

When your installation uses ESCON directors, the ESCON Director Device Support feature enables reporting of ESCON director device errors to z/OS.

## FFST/MVS (First Failure Support Technology/MVS)

FFST/MVS provides immediate notification and first failure data capture for software events. FFST/MVS also incorporates its own technology by including software probes in its own code. When one of these probes is triggered, FFST/MVS issues a symptom string that describes the event.

FFST/MVS provides the following services for IBM products:

- Customized dumps
- · Symptom strings
- · Symptom records
- Messages
- Network notification

## GDDM (includes PCLK and OS/2 LINK)

GDDM provides presentation services and device-driving capability. GDDM has a powerful application-programming interface for creating, displaying, and storing vector graphics, images and alphanumerics. GDDM drives displays, printers and plotters, and includes several utilities for end users. GDDM's excellence as a graphics program and device driver is recognized worldwide, and as a result it is used extensively as a graphics enabler by other licensed programs, including other elements of z/OS, such as BookManager.

## HCD (Hardware Configuration Definition)

HCD is used to define both the operating system configuration and the processor hardware configuration for a system. Because HCD validates data when it is defined rather than when a device is accessed, inconsistencies can be corrected right away and unplanned system outages resulting from inconsistent definitions avoided. The defined configuration can be used to POR/IPL or dynamically reconfigure your system.

## HLASM (High Level Assembler)

High Level Assembler integrates almost all functions of past assemblers. It also provides extensions and improvements including:

 Many new and expanded cross reference facilities and diagnostics that enable substantial savings in time and in human and machine resources, and support integration of HLASM into tool and development environments.

- Numerous language enhancements that improve the speed and accuracy of application development and the quality and reliability of the resulting code.
- Assembly-time options extensions and enhancements that allow increased flexibility and precision in controlling the processes you use to manage application development.

HLASM helps to maximize the productivity of application programmers by relieving them of many tedious and unproductive tasks that can now be done by the assembler itself and helps organizations avoid the necessity for converting existing -- and working -- applications from Assembler Language to other languages.

### IBM LibraryServer

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IBM LibraryServer enables customers to provide entire libraries of documents via the World Wide Web. Customers are able to serve BookManager books to HTML browsers connected to either the Internet or an intranet. The information is stored in a virtual library, which is composed of books, bookshelves, and collections.

### **IBM HTTP Server**

The IBM HTTP Server provides for scaleable, high performance webserving for critical e-business applications. It is exclusive to z/OS. This element was previously known as a base element of z/OS under the names Lotus<sup>®</sup> Domino<sup>™</sup> Go, the Internet Connection Secure Server (ICSS) and the Internet Connection Server (ICS). In order to have secure communication, one of the following optional features must be installed: IBM HTTP Server Export Secure,, IBM HTTP Server NA Secure.

## ICKDSF (Device Support Facility)

ICKDSF enables you to perform functions needed for the installation and use of IBM DASD. You can also use it to perform service functions, error detection, and media maintenance.

## Integrated Security Services

Integrated Security Services includes:

### **DCE Security Server**

DCE Security Server provides user and server authentication for applications using the client server communications technology. Through integration with RACF, DCE support allows RACF-authenticated z/OS users to access DCE-based resources and application servers without having to further authenticate themselves to DCE. In addition, DCE application servers can, if needed, convert a DCR-authenticated user identity into a RACF identity into an RACF identity and then access z/OS resources on behalf of that user, with full RACF access control.

### **Firewall Technologies**

Firewall Technologies, implemented partly in the Security Server and partly in the Communications Server for z/OS, provide basic firewall capabilities on the z/OS platform to reduce or eliminate the need for non-z/OS platform firewalls in many customer installations. The Communications Server provides the firewall functions of IP packet filtering, IP security (VPN or tunnels), and Network Address Translation (NAT). The Security Server provides the firewall functions of FTP proxy support, SOCKS daemon support, logging, configuration, and administration.

### LDAP Server

LDAP Server provides secure access for applications and systems on the network to directory information held on z/OS using the Lightweight Directory Access Protocol.

### **Network Authentication Service**

Network Authentication Service, based on Kerberos Version 5, provides Kerberos security services without requiring that you purchase or use a middleware product such as Distributed Computing Environment (DCE). These services include native Kerberos application programming interface (API) functions, as well as the Generic Security Service Application Programming Interface (GSS-API) functions defined in Internet RFC 2078, Generic Security Service Application Program Interface, Version 2 and Internet RFC 2744, Generic Security Service API Version 2: C-bindings. Network Authentication Service performs authentication as a trusted third-party authentication service by using conventional shared secret-key cryptography. Network Authentication Service provides a means of verifying the identities of principals, without relying on authentication by the host operating system, without basing trust on host addresses, without requiring physical security of all the hosts on the network, and under the assumption that packets traveling along the network can be read, modified, and inserted at will.

#### **Open Cryptographic Enhanced Plug-ins (OCEP)**

OCEP provides an application interface for managing server certificates and help protect server private keys in a uniform and secure way. Applications complying with Common Data Security Architecture (CDSA) standard interfaces can use OCEP. OpenCryptographic Services Facility, a base z/OS element, provides these interfaces. Application developers and independent software vendors will find it easier to develop and port applications to the zSeries platform. It helps customers apply consistent security rules to e-business applications that use digital certificates and helps protect server private keys.

### **ISPF**

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ISPF provides facilities for all aspects of host-based software development.

- Programmers can use ISPF to develop and document batch and interactive programs.
- Data center administrators and system programmers can monitor and control program libraries, and communicate with MVS through TSO commands, CLISTs, or REXX EXECs.
- Terminal users can work with interactive applications called dialogs.
- Managers can prepare and print memos using ISPF Edit, BookMaster, and the Hardcopy utility.

#### ISPF has four major components:

### Dialog Manager (DM)

The Dialog Manager (DM) provides services to dialogs and end users. These include display, variable services, input and output, user and application profiles, table management, system interface services, and dialog testing and debugging aids.

#### Program Development Facility (PDF)

The Program Development Facility (PDF) provides services to assist dialog or application developers. These include Edit and Browse functions, a wide range of foreground and batch compilers, data set and catalog utilities, TSO or CMS command interfaces, and data set search and compare functions.

### Software Configuration and Library Manager (SCLM)

The Software Configuration and Library Manager (SCLM) is a tool that automatically controls, maintains, and tracks all of the software components of the application throughout the development cycle.

#### **Client/Server component**

The Client/Server component provides users who have a workstation running Windows, or UNIX with a Graphical User Interface to ISPF application panels.

### JES2

JES2 accepts the submission of work for the BCP. Major JES2 functions and design features include:

- The interpretation of job control language (JCL) statements
- The disposition of output
- A single-system image
- The ability to run multiple copies of JES2 (poly-JES)
- JES2 WLM for Sysplex

JES2 differs from JES3 in two main processing areas:

- JES2 exercises independent control over its job processing functions. JES3 exercises centralized control. Each JES2 processor in a multi-processor environment controls its own job input, job scheduling, and job output processing.
- JES3 does pre-execution of job setup. JES2 does not do this.

### Language Environment

Language Environment provides common services and language-specific routines in a single run-time environment. It ensures consistent and predictable results for your language applications, independent of the language they are written in.

Language Environment is the prerequisite run-time environment for applications generated with the following IBM compiler products:

- z/OS C/C++
- OS/390 C/C++
- C/C++ for MVS/ESA
- COBOL for OS/390 & VM
- COBOL for MVS & VM
- Enterprise COBOL for z/OS and OS/390
- AD/Cycle<sup>®</sup> C/370<sup>™</sup>
- PL/I for MVS & VM
- IBM VisualAge for Java, Enterprise Edition for z/OS
- VS FORTRAN and FORTRAN IV (in compatibility mode)

Language Environment supports the VS Fortran and Fortran IV compilers' object/load module compatibility, which means Fortran load modules can be run under Language Environment and object code can be link-edited with Language Environment and run under it. Language Environment also provides a set of assembler macros for running assembler language routines, and supports debugging of applications using the IBM Debug Tool stand-alone or in conjunction with the IBM VisualAge remote debugger.

Some benefits are that you can:

- Mix old code with new code.
- Handle conditions, such as program checks or abends, in your COBOL programs without having to use assembler.

- Share common run-time services.
- Run applications that conform to the POSIX 1003.1 standard or the X/Open Single UNIX Specification, also known as UNIX 95 or XPG4.2.
- Access CICS and IMS transactions and data through a C, COBOL, or PL/I server from any client in your network.
- Perform interlanguage communication more efficiently.
- Manage storage dynamically for your C/C++, COBOL, and PL/I routines with a common storage manager.
- Access a rich set of math services.

## **MICR/OCR**

- MICR/OCR provides the device support code for the following devices:
- 1287/1288 IBM Optical reader and page reader respectively
- 3540 IBM Disk device
- 3886 IBM Optical Character reader
- 3890<sup>™</sup> IBM Magnetic Ink Reader
- 3895 IBM Printer device

### msys for Operations

Managed System Infrastructure for Operations (msys for Operations) simplifies the day-to-day operation of z/OS Parallel Sysplex clusters. Through automation of typical operator tasks and events in a Parallel Sysplex, msys for Operations reduces operations complexity and improves system recoverability, thereby enhancing the availability of Parallel Sysplex clusters. Other benefits of using msys for Operations include better overall manageability of a Parallel Sysplex cluster, reduced operations complexity, and fewer outages due to operations errors.

### msys for Setup

Managed System Infrastructure for Setup (msys for Setup) is part of a major ease-of-use initiative within IBM, and is the strategic solution for product installation, configuration and function enablement. msys for Setup allows the use of consistent interfaces with wizard-like configuration dialogs that provide defaults and best-practice values whenever possible and derive low-level values from answers to high-level questions. After the configuration parameters have been specified, msys for Setup can automatically update the system configuration directly. The user can see in detail what the changes will be before they are made. This also relieves the user of the intricacies of the multitude of traditional z/OS configuration interfaces, such as parmlib members. msys for Setup stores its configuration data in the z/OS management directory that has been introduced with msys for Setup as a part of z/OS. It will become the central repository for all configuration data.

## **Network File System (NFS)**

NFS acts as a file server to workstations, personal computers, or other authorized systems in a IP network. It also provides an MVS client. It enables client users to remotely access MVS data sets or z/OS UNIX Services files from any system on an IP network that uses client software for the SUN Network File System protocol. The remote data sets or files are mounted from the mainframe to appear as local directories and files on the client system.

## **Open Systems Adapter Support Facility (OSA/SF)**

OSA/SF is an element that supports S/390<sup>®</sup> Open System Adapter (OSA-Express and OSA-2) hardware features to deliver connectivity via directly-attached local area clients using:

- Transmission Control Protocol/Internet Protocol (IP) network protocol
- Systems Network Architecture Application Peer-to-Peer Networking
- Internet Packet Exchange (IPX)

The OSA-2 and OSA Express features connect to Ethernet, Fast Ethernet (FENET), and Asynchronous Transfer Mode (ATM), and 1000Base-T Ethernet networks. OSA-Express also connects to Gigabit Ethernet, while OSA-2 supports Fiber Distributed Data Interface (FDDI) and token-ring connection. OSA/SF provides a user-friendly interface for monitoring and controlling the OSA features. OSA/SF Version 2 introduces support for a new Windows-based GUI interface as well as support for the new OSA-Express features. OSA/SF Version 2 continues support for the OSA-2 features and continues to provide the OS/2-based GUI.

## Run-Time Library Extensions

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Run-Time Library Extensions delivers the following libraries and utilities to support existing programs:

### **Common Debug Architecture (CDA) Libraries**

CDA is introduced with z/OS V1R5 to provide a consistent format for debug information on z/OS. The CDE Libraries provide a set of APIs to access this information.

### c89 Utility

This utility compiles, assembles, and binds z/OS UNIX System Services C/C++ and assembler applications

### UNIX System Laboratories (USL) I/O Stream Library

The USL I/O Stream Library provides the standard input and output capabilities for C++.

### **IBM Open Class DLLs**

The IBM Open Class run-time libraries are delivered with z/OS V1R5 to support existing programs. Application development using the IBM Open Class libraries have been withdrawn from service effective with z/OS V1R5, specifically, the Application Support Class Library and Collection Class library static objects, headers, source, samples and sidedecks are removed in z/OS V1R5. We recommend that you migrate to the Standard C++ libraries.

For more information about migrating away from the IOC libraries, see *IBM Open Class Library Transition Guide*.

Note: The UNIX System Laboratories (USL) I/O Stream Library and Complex Mathematics Library are still supported on z/OS, AIX, and OS/400. Although support for these classes is not being removed at this time, it is recommended that you migrate to the Standard C++ iostream and complex classes. This is especially important if you are migrating other IOC streaming classes to Standard C++ Library streaming classes, because combining USL and Standard C++ Library streams in one application is not recommended. For more information about the Standard C++ I/O Stream Library, see *Standard C++ Library Reference*.

## SMP/E

SMP/E is a tool for installing and maintaining software, and for managing the inventory of software that has been installed. SMP/E provides a consistent and reliable method for installing and upgrading the software in a z/OS system.

## Time Sharing Option/Extensions (TSO/E)

TSO Extensions is a base interactive interface that provides non-DP professionals, end users, system and application programmers, and administrators with an extensive set of commands, services, facilities and programming languages to do productive work on z/OS, and helps to ease systems management. TSO/E is an integral part of z/OS, and serves as a platform for other elements, such as BookManager READ/MVS, HCD, and ISPF.

## **Terminal Input Output Controller (TIOC)**

TIOC is the interface between TSO and VTAM. It allows TSO to communicate with the terminal hardware.

## **Text Search**

Text Search consists of two components: the IBM Text Search Engine and the NetQuestion Solution for a single Web server.

#### **Text Search Engine**

The Text Search Engine is an advanced search engine. The most important components are client/server handling, linguistic support for different languages, and queue mechanisms. Free-text searching, Boolean logic, and fuzzy searches are supported. The search results can be ranked by relevance.

### **NetQuestion Solution**

The NetQuestion Solution is a ready-to-run text search solution based on the Text Search Engine. It provides a full-text search service for documents stored on the z/OS operating system. The search service can be accessed through TCP/IP-connected workstations using an HTML browser.

### UNIX System Services (X/Open UNIX 95 functions)

UNIX System Services Application Services (Shell, Utilities, and Debugger)

Shell and Utilities provides the standard command interface familiar to interactive UNIX users. z/OS includes all of the commands and utilities specified in the X/Open Company's Single UNIX Specification, also known as UNIX 95 or XPG4.2. This feature will allow your UNIX programmers and other users to interact with z/OS as a UNIX system without necessarily having to learn the z/OS command language or other interactive interfaces. The z/OS UNIX Services Debugger provides a set of commands that allow a C language program to be debugged interactively. The command set is familiar to many UNIX users.

### **UNIX System Services Kernel**

These services add the world of open UNIX-based computing to the z/OS operating system. With Language Environment, they support industry standards for C programming, shell and utilities, client/server applications, and the majority of the standards for thread management and the X/Open Single UNIX Specification. Application developers and interactive users using these interfaces can exploit the capabilities of z/OS without having to understand z/OS itself. The combination of open computing and z/OS

allows the transparent exchange of data, easy portability of applications, cross-network management of data and applications, and the exploitation of traditional MVS system strengths in an open environment.

## 3270 PC File Transfer Program

This program transfers files from the host to the workstation for off-line data manipulation or transfers local data for storage on the host.

## Chapter 4. z/OS optional features descriptions

The following is a description of each optional feature in z/OS.

### **BookManager BUILD**

BookManager BUILD lets you create your own online books from files marked up with:

- GML (Generalized Markup Language) Starter Set
- IBM Publishing Systems BookMaster<sup>®</sup>

Instead of preparing the files for a printer, BookManager BUILD takes the files and produces a single file that contains the text and artwork for an online book.

Books built with BookManager BUILD can be read with any of the BookManager READ or BookServer products, such as:

- BookManager READ/MVS, which is part of the z/OS base
- BookManager READ/VM
- BookManager READ/2
- BookManager READ/6000
- BookManager READ for Windows
- BookManager READ/DOS
- BookManager BookServer

## Bulk Data Transfer (BDT) File-to-File

The BDT File-to-File element allows users at one z/OS system in a SNA network to copy data sets to or from another z/OS system in the network.

## Bulk Data Transfer (BDT) SNA NJE

The BDT JES3 SNA NJE element allows users with the JES3 element to transmit jobs, output (SYSOUT), commands, and messages from one computer system to another within a SNA network.

## C/C++ without Debug Tool

This language-centered C/C++ application development environment on the z/OS platform includes a C compiler, a C++ compiler, and some C/C++ application development utilities. This feature exploits the C/C++ runtime environment and library of runtime services available with the Language Environment and Run-Time Library Extensions elements of z/OS.

## **Communications Server Security Level 3**

This feature provides authentication and security services in an IP network environment. It provides support for packet filtering, tunnels, and network address translation (NAT), which enables secure communication over private and public networks. It uses the DES algorithm and it includes SSL triple DES (TDES), SNMPv3 56-bit, and IPSec TDES.

## DFSMS Features (DFSMSdss, DFSMShsm, DFSMSrmm)

There are four DFSMS features:

### DFSMSdss

DFSMSdss is a DASD data and space management tool. DFSMSdss can be used to copy and move data sets between volumes; dump and restore data sets, entire volumes, or tracks; convert data sets and volumes to and from SMS management; compress partitioned data sets; release unused space in data sets; and consolidate free space on volumes.

#### DFSMShsm

DFSMShsm is a DASD storage management and productivity tool for managing low-activity and inactive data. It improves DASD use by automatically managing space and data availability in a storage hierarchy. Working with SMS, DFSMShsm performs space management and availability management of data sets as directed by their management class attributes.

#### DFSMSrmm,

DFSMSrmm allows you to manage your removable media as one enterprise-wide library across systems that can share DASD. DFSMSrmm manages your installation's tape volumes and the data sets on those volumes. DFSMSrmm manages all tape media, such as cartridge system tapes and 3420 reels, as well as other removable media you define to it. For example, DFSMSrmm can record the shelf location for optical disks and track their vital record status; it does not manage the objects on optical disks.

#### **DFSMStvs**

DFSMS Transactional VSAM Services, an optional feature, enables running batch jobs concurrently with CICS online transactions to allow updates to the shared VSAM data sets. Multiple batch jobs and online transactions can be run against the same VSAM data sets. DFSMStvs ensures data integrity for concurrent batch updates while CICS provides it for online updates.

### DFSORT

DFSORT is IBM's high performance sort, merge, copy, analysis and reporting product for z/OS. This high-speed, flexible data processing tool provides fast and efficient sorting, merging, copying, reporting and analysis of business information, as well as versatile data manipulation at the record, field and bit level.

DFSORT is designed to optimize the efficiency and speed with which operations are completed through synergy with processor, device, and system features (for example, hiperspace, data space, striping, compression, extended addressing, DASD and tape device architecture, processor memory, processor cache, and so on) and other products (for example, The SAS System<sup>\*\*</sup>, COBOL, PL/I, IDCAMS BLDINDEX, and so on).

DFSORT includes the high-performance ICEGENER facility, the versatile ICETOOL utility, multiple output and reporting capability with the powerful OUTFIL feature, the time-saving ability to use Symbols for fields and constants in DFSORT and ICETOOL statements, and much more.

For more information on DFSORT, visit the DFSORT Website at:

### http://www.ibm.com/storage/dfsort/

### GDDM-PGF

GDDM-PGF (Presentation Graphics Facility), a set of programs for creating presentation material in a variety of styles, provides:

### **Interactive Chart Utility**

The Interactive Chart Utility (ICU), an easy-to-use end-user program for creating business charts.

### **Vector Symbol Editor**

The (VSE), a means of creating and modifying symbols for use with the ICU or other GDDM functions.

### An application programming interface

An application programming interface that enables programs to call either the ICU or a set of presentation-graphics routines for chart creation.

### **Online Presentation Services (OPS)**

GDDM-PGF now incorporates an enhanced presentation-producing capability, Online Presentation Services (OPS). GDDM-OPS provides a command interface, which is simple and easy to use, yet which is also powerful enough to allow the very concise creation of high-quality presentations. These can then be used from displays (perhaps using the built-in automatic scrolling feature), or can be saved for printing or plotting.

Typical applications of GDDM-OPS are:

- · Public presentations using a video monitor or projector
- · Educational sessions for private or public display
- · Scrollable interactive presentations of business charts
- Production of high-quality foils.

### GDDM-REXX

GDDM-REXX/MVS is a productivity tool that enables programmers to prototype GDDM applications and to create small routines and utility programs quickly and easily.

## HCM (Hardware Configuration Manager)

HCM is a PWS-based client/server interface to z/OS Hardware Configuration Definition (HCD). It combines the logical and physical aspects of z/OS hardware configuration management. In addition to defining the logical connections (accomplished via HCD), you can also manage the physical aspects of your configuration. For example, you can effectively manage the flexibility offered by the ESCON infrastructure.

All updates are done with HCM's intuitive graphical user interface, and all changes are written into the IODF and fully validated for accuracy and completeness by HCD, avoiding unplanned system outages that are due to incorrect definitions.

## **High Level Assembler Toolkit**

This toolkit provides a powerful set of capabilities to improve application development, debugging, and recovery.

### **IBM HTTP Server NA Secure**

The IBM HTTP Server North American Secure feature, in conjunction with the IBM HTTP Server, uses Secure Sockets Layer (SSL) to provide secure communications over an open communications network, such as the Internet. The HTTP server uses SSL to initiate a secure connection between the client and itself. The server then uses SSL to decrypt and encrypt all of the information in the client request and the server response.

### Infoprint Server

Infoprint Server consists of several components that support printing on a z/OS system:

### **Print Interface**

This component accepts print requests from z/OS UNIX System Services and from remote systems in your IP network. It allocates output data sets on the JES2 or JES3 spool for printing on local or remote printers.

#### **IP PrintWay**

This component transmits output data sets from the JES2 or JES3 spool to remote printers in an IP network or SNA network.

#### NetSpool<sup>™</sup>

This component intercepts print output from VTAM applications and allocates output data sets on the JES2 or JES3 spool for printing on local or remote printers.

#### **Infoprint Central**

This component is a Web-based application that lets help desk operators and other authorized users or job submitters work with print jobs (output data sets) on the JES spool, printers controlled by IP PrintWay extended mode or PSF, and NetSpool logical units. It also lets operators see system status and printer definitions.

#### Windows Client

This component contains the Infoprint Port Monitor for Windows, which transmits documents and job attributes to Infoprint Server.

## **JES3**

You might choose to enable JES3 as an alternative to the base JES2 element. It also accepts the submission of work for the BCP. Major JES3 functions and design features include:

- The interpretation of job control language (JCL) statements
- The disposition of output
- A single system image
- Workload balancing
- Deadline scheduling
- Dependent job control
- · Control flexibility

JES3 differs from JES2 in two main processing areas:

- JES3 exercises centralized control over its job processing functions. JES2 exercises independent control. With JES3, a single, global processor controls job, device, and workflow for all processors in a multi-processor environment.
- JES3 does pre-execution of job setup. JES2 does not do this.

### **RMF (Resource Measurement Facility)**

RMF is the window on z/OS resource usage. It gathers information at sysplex, single-system or address-space level, and provides reports at any system in a sysplex. The user can choose between reports about activities and delays, and can focus on storage, I/O or processor data. A wide range of options allows selection of the relevant information, including the attainment of Workload Manager goals.

The RMF monitors present snap-shot and short-term reports real-time in ISPF dialogs with on-line help, and you can have the results printed if you wish. The RMF Postprocessor provides long-term reports for detailed analysis of historical data gathered by RMF. These reports can be printed or displayed.

In addition to host-based reporting functions in RMF, there are other components available that offer reporting capabilities at the workstation. The RMF PM Java Edition provides an interface between the workstation and the z/OS sysplex through a TCP/IP connection that gives you the flexibility to create unique scenarios to monitor the performance of your sysplex. The Spreadsheet Reporter, running on your Windows workstation, gives you the ability to extract reports from RMF Postprocessor output to convert them into a common spreadsheet format and allows your spreadsheet application to use the RMF data. This function enables you to integrate RMF data into your business process. It also means you can easily produce presentation graphics which illustrate performance analysis results.

## SDSF (System Display and Search Facility)

SDSF provides you with information to monitor, manage and control your z/OS system. SDSF provides an easy and efficient way to control job processing (hold, release, cancel and purge jobs) and to control devices (such as printers, lines and initiators). It allows you to monitor jobs while they are running and browse output without printing it. You can also browse the system log, including the sysplex-wide operations log. SDSF provides sort, filter, arrange, search, and print functions to help you locate and organize information. Single-character commands eliminate the need to learn and remember complex system commands. You can easily change characteristics of an object, such as a job or node, by typing over a displayed value. An optional action bar and pop-up windows make it easy to find and use SDSF functions. You can establish security for SDSF using SDSF's own security parameters, or with IBM's standard interface, SAF (System Authorization Facility).

SDSF provides complete online help and an interactive tutorial. In addition, ISPF users can view online documentation directly from SDSF, using the BookManager Read/MVS product.

## **Security Server**

The Security Server includes: Resource Access Control Facility (RACF)

RACF provides a strong security base that enables the Security Server element of z/OS to incorporate additional components that aid in securing your system as you make your business data and applications accessible by your intranet, extranets, or the Internet.

## z/OS Security Level 3

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z/OS Security Level 3 includes OCSF Security Level 3, System Secure Sockets Layer (SSL) Security Level 3, and Network Authentication Service Level 3

## Appendix. Accessibility

Accessibility features help a user who has physical disabilities, such as restricted mobility or limited vision, to use software products successfully. The major accessibility features in z/OS enable users to:

- · Use assistive technologies such a screen-readers and screen magnifier software
- · Operate specific or equivalent features using only the keyboard
- · Customize display attributes such as color, contrast, and font size

## Using assistive technologies

Assistive technology products, such as screen-readers, function with the user interfaces found in z/OS. Consult the assistive technology documentation for specific information when using it to access z/OS interfaces.

## Keyboard navigation of the user interface

Users can access z/OS user interfaces using TSO/E or ISPF. Refer to *z/OS TSO/E Primer, z/OS TSO/E User's Guide*,and *z/OS ISPF User's Guide Volume I* for information about accessing TSO/E and ISPF interfaces, including the use of keyboard shortcuts or function keys (PF keys). Each guide includes the default settings for the PF keys and explains how to handle their functions.

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