

zEnterprise 196, System z10, System z9 and @server
zSeries



Open Systems Adapter-Express Customer's Guide and Reference

zEnterprise 196, System z10, System z9 and @server
zSeries



Open Systems Adapter-Express Customer's Guide and Reference

Note!

Before using this information and the products it supports, be sure to read the general information under "Notices" on page 267.

Twelfth Edition (August 2010)

This edition, SA22-7935-11, applies to the IBM z196, System z10, System z9 and zSeries Open Systems Adapter-Express features, Open Systems Adapter Support Facility H0GI400 (as part of Program Number 5694-A01) for the following operating systems: z/OS Version 1 Release 2 or higher (5694-A01), Open Systems Adapter Support Facility for z/Virtual Machine/Enterprise (z/VM) Version 3 Release 1, Version 4 Release 2 (Program Number 5654-A17), and Version 4 Release 3 or higher (Program Number 5739-A03), OSA/SF for VSE Version 2 Release 2 (part of VSE Central Functions 6.1.1, 5686-066) in VSE/ESA Version 2 Release 2.6 (5690-VSE) or higher, and to all subsequent releases and modifications until otherwise indicated in new editions or technical newsletters.

There may be a newer version of this document in PDF format available on **Resource Link**. Go to <https://www.ibm.com/servers/resourceLink>

and click on **Library** on the navigation bar. A newer version is indicated by a lower case, alphabetic letter following the form number suffix (for example: 00a, 00b, 01a, 01b).

A form for readers' comments is provided at the back of this publication. If the form has been removed, address your comments to:

International Business Machines Corporation
MHVRCFS, Mail Station P181
2455 South Road
Poughkeepsie, NY 12601-5400
United States of America

FAX (United States & Canada): 1+845+432-9405

FAX (Other Countries):

Your International Access Code +1+845+432-9405

IBMLink (United States Customers only): IBMUSM10 (MHVRCFS)

Internet e-mail: mhvrcfs@us.ibm.com

World Wide Web: <http://www.ibm.com/servers/eserver/zseries/zos/webqs.html>

If you would like a reply, be sure to include your name, address, telephone number, or FAX number.

Make sure to include the following in your comment or note:

- Title and order number of this document
- Page number or topic related to your comment

When you send information to IBM, you grant IBM a nonexclusive right to use or distribute the information in any way it believes appropriate without incurring any obligation to you.

© Copyright IBM Corporation 2003-2010.

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

Contents

Figures	ix
About this Document	xi
Who Should Use This Document	xi
Where to Find More Information	xi
z/OS	xi
z/VM	xii
VSE/ESA	xii
Linux	xiii
TCP/IP	xiii
NetView	xiii
TPF	xiii
On the LANs and LAN Cables that OSA Supports	xiii
z900	xiii
z800	xiii
z990	xiii
z890	xiii
z9 EC	xiv
z9 BC	xiv
z10	xiv
z196	xiv
zSeries	xiv
OSA-2 Publications	xiv
A Note on Terminology	xv
Summary of Changes	xvii
Summary of Changes for SA22-7935-11	xvii
Summary of Changes for SA22-7935-10	xvii
Summary of Changes for SA22-7935-09	xvii
Summary of Changes for SA22-7935-08	xvii
Summary of Changes for SA22-7935-07	xvii
Summary of Changes for SA22-7935-06	xvii
Summary of Changes for SA22-7935-05	xviii
Summary of Changes for SA22-7935-04	xviii
Summary of Changes for SA22-7935-03	xviii
Summary of Changes for SA22-7935-02	xviii
Summary of Changes for SA22-7935-01	xviii
Part 1. OSA-Express Guide	xviii
Part 2. OSA-Express Reference	xix
Messages	xix

Part 1. OSA-Express Guide 1

Chapter 1. Introducing OSA-Express, OSA Express2 and OSA-Express3 . . .	3
OSA-Express Characteristics	5
Port Sharing Among Images	5
Supported CHPID Types	6
OSD CHPID Type (QDIO Mode)	6
OSE CHPID Type (Non-QDIO Mode)	7
OSN CHPID Type (OSA NCP)	7
OSA-Express Physical Feature Descriptions	8
The OSA-Express, OSA-Express2 and OSA-Express3 Gigabit Ethernet Features	8

The OSA-Express2 and OSA-Express3 10 Gigabit Ethernet Feature	9
The OSA-Express FENET and OSA-Express, OSA-Express2 and OSA-Express3 1000Base-T Ethernet Features	9
The OSA-Express Token Ring Feature	11
OSA-Express supported functions	12
The OSA-Express Layer 2 Transport	14
Virtual LAN (VLAN) Support	15
VLAN Priority Tagging	17
IPv6 on z/OS, Linux, and z/VM	17
Dynamic Host Configuration Protocol	18
IP Multicast Support	18
IP Broadcast Traffic	19
Port name relief	19
OSA-Express2 and OSA-Express3 supported functions	19
Segmentation Offload (Large Send)	19
640 TCP/IP Stacks	20
Multiple Control Unit Support	20
Concurrent LIC Update	20
VLAN Management (GVRP) support	21
Layer 3 Virtual MAC for z/OS environments	21
OSA-Express Network Traffic Analyzer (OSAENTA)	22
QDIO Diagnostic Synchronization (QDIOSYNC)	22
QDIO connection isolation	23
OSA support for Link Aggregation (IEEE 802.3ad)	23
OSA NCP	24
OSA-Express3-only supported functions	25
OLM - Optimized Latency Mode	25
Inbound workload queueing	26
Enhanced Network Availability	27
ARP Takeover	27
Primary and Secondary Default Routing	28
Virtual IP Addressing (VIPA)	29
Dynamic Virtual IP Addressing (DVIPA)	30
Enterprise Extender	30
Support for Simple Network Management Protocol (SNMP)	31
The Communications Server SNMP TCP/IP Subagent	31
The OSA-Express Direct SNMP Subagent	32
Open Systems Adapter/Support Facility (OSA/SF)	32
Deciding Whether OSA/SF is Required	32
OSA/SF Management Span	33
OSA/SF Management of an OSA	34
Chapter 2. OSA-Express Hardware Configuration	37
Using HCD for Hardware I/O Configuration	37
Configuring an OSA using HCD	39
QDIO One Control Unit – 480 Unit Address Support	41
OSA QDIO Multiple Control Unit Support – z890 and z990 or Higher	41
640 TCP/IP Stacks (1920 Devices) Support – OSA-Express2 and OSA-Express3	42
Stack and Device Maximums	42
Define the Channel Path	43
Define a Control Unit	46
Define OSA Devices	47
Define OSN and 3745 Devices	50
Define the OSAD Device for OSA/SF	52
VM Hardware I/O Configuration	52

VSE/ESA Hardware Configuration	53
IOCP	53
Chapter 3. Setting Up OSA/SF on z/OS	55
Choosing the OSA Modes	55
OSA/SF and the z/OS Environment	55
Set up the Started Procedure Task	56
Define the Startup Profile	57
Set up the Configuration and Master Index Files	60
Setting up z/OS to run as a guest of VM	60
Checklist for the OSA Configuration and Master File Index	61
Set up APPC/MVS and VTAM for OSA/SF	61
Set up the Communications Server SNMP TCP/IP subagent	64
Controlling Access to OSA/SF	64
Starting OSA/SF	67
Verifying That OSA/SF Started	67
Deciding which OSA/SF Interface to Use	67
Stopping OSA/SF	67
Chapter 4. Setting Up OSA/SF on z/VM	69
Choosing the OSA Modes	69
OSA/SF and the z/VM Environment	69
Install OSA/SF	70
Define OSA/SF to a z/VM Guest Environment	71
Set Up APPC	71
Set Up OSA/SF	72
Decide whether to Specify RMCHINFO	74
Controlling Access to OSA/SF for z/VM	75
Notes on Handling Problems with OSA/SF	77
Deciding which OSA/SF Interface to Use	78
Chapter 5. Setting Up OSA/SF on VSE/ESA	79
Determine the OSA Modes	79
OSA/SF and the VSE Environment	80
Define the Partition for OSA/SF Jobs	80
Create the Working Sublibrary (PRD2.OSASF) for OSA/SF	80
Copy the Skeleton Job for the Master Index (IOAINX)	80
Copy the Skeleton Job for IOAMAIN	81
Copy the Skeleton Job for IOACMD	82
Move the Jobs into the Power RDR Queue	82
VSE/ESA Running as a Guest of VM	83
Stopping OSA/SF	83
Chapter 6. Setting up and Using the OSA/SF Interfaces	85
Setting Up the REXX Command Interface	85
Setting up the REXX Command Interface for z/OS	86
Setting up the REXX Command Interface for z/VM	86
Setting up the REXX Command Interface for VSE	86
Using the IOACMD EXEC Interface	87
Full Prompting	87
Command Prompting by the IOACMD EXEC	87
Entering Parameters without Prompting	88
Starting the IOACMD EXEC and Asking for Help	88
For More on IOACMD	88
Setting up an OSA/SF GUI	89
Customize a TCP/IP Connection	89

Download and Install the Java Runtime and JavaHelp™ Files	92
Download the IOAJAVA GUI Code and Define the CLASSPATH Environment Variable.	92
Starting the OSA/SF GUI	96
Using the OSA/SF GUI	96
OSA/SF Host Open Window	96
OSA/SF Commands	97
CHPID View Window to display Channel Information	97
Using the OSA/SF GUI with Different OSA/SF Hosts	97
Problems starting the OSA/SF GUI	98
Debugging the OSA/SF GUI startup	98
Chapter 7. Host Program Setup	101
Overview	101
z/OS	101
z/VM	102
VSE/ESA	103
Linux	103
QDIO Definitions for Channel Type OSD on z/OS.	104
Setting Up a TRLE Statement for QDIO	104
Updating the TCP/IP Profile for QDIO	105
Setting Up Priority Queuing	105
IP Modes for Channel Type OSE (non-QDIO) on z/OS.	105
TCP/IP Definition Requirements for OSE CHPID IP Modes	105
SNA Modes for Channel Type OSE on z/OS	106
External Communication Adapter (XCA) Major Node for SNA	107
Switched Network (SWNET) Major Node for SNA	108
At the Physical Unit (PU).	110
Chapter 8. Configuring OSA-Express Modes	111
Using the REXX Command Interface to Configure OSA-Express CHPIDs	112
REXX Command Interface Instructions for Configuring OSA-Express CHPIDs	112
1) Getting and Modifying a Configuration File	112
2) Getting an OAT Template.	113
3) Modifying the OAT Template	114
4) Activating the Configuration	114
5) Verifying the Configuration	114
Using the GUI to Configure OSA-Express CHPIDs	115
Start Managing an OSA	115
Creating or Modifying a CHPID Configuration	115
FENET and 1000Base-T Configuration Data.	116
Token Ring Configuration Data	117
The TCP/IP OAT Entries	117
SNA Settings	117
The SNA OAT Entries	124
Activating the Configuration.	124

Part 2. OSA-Express Reference 125

Chapter 9. OSA Port Management	127
Enabling and Disabling Ports	127
Using the GUI.	127
Using IOACMD	127
Using the Support Element	128
MAC Addresses	128

Maximum number of media access control (MAC) addresses	128
Local MAC Address.	128
Group MAC Address	129
Setting MAC Addresses	130
Querying and Purging the ARP Cache	130
OSA-Express Direct SNMP Support.	131
Query support.	131
Trap and set support	132
Requirements	132
Setting up OSA-Express Direct SNMP Support for z/OS	132
OSA-Express Direct SNMP Support for Linux	135
Chapter 10. Problem Determination Aids	137
Using OSA/SF Problem Determination Aids	137
OSA/SF Message Log.	137
OSA/SF Trace Table	138
OSA/SF Dump	138
IOACMD Debug Data Sets	139
OSA/SF Workstation Debug Settings	139
CHPID Problems.	140
Performance Data	141
Resource Measurement Facility	142
Reporting OSA/SF Problems to IBM	143
Chapter 11. Servicing OSA-Express and OSA/SF	145
Service for an OSA Hardware Replacement.	145
Installing a PTF for OSA/SF	145
Migrating to the OSA/SF Java-based GUI	145
Migrating to a New Version or Release of OSA/SF on z/OS	146
Removing Data Sets or Files	146
Examples of Removing Data Sets or Files from the System	146
Migrating to a New Version or Release of OSA/SF on VM	149
Migrating to a New Version or Release of OSA/SF on VSE	149
Migrating From OSA-2 to OSA-Express	149
Chapter 12. About the OSA Address Table (OAT)	151
The OAT Format.	151
Image Line	151
OAT Definition Line	152
Additional OAT Lines	153
The Default OAT.	153
Guidelines for Changing an OAT	154
OAT Examples	155
TCP/IP with Port Sharing Between Images	155
TCP/IP with Multiple IP Addresses	156
SNA	156
Chapter 13. OSA/SF Commands for REXX	157
How to read syntax diagrams	158
Symbols	158
Syntax items	158
Syntax examples.	159
CLEAR_DEBUG CLR CLR_DEBUG CLEAR	160
CONFIG_OSA	161
CONVERTOAT	162
GET_CONFIG	163

GET_DEBUG	164
GET_OSA_ADDRESS_TABLE GET_OAT GET_OSA GET_TABLE	166
INSTALL	167
QUERY	169
SET_PARAMETERS SET_PARM SET_PARMS	172
SHUTDOWN	174
START_MANAGING	175
STOP_MANAGING	177
 Chapter 14. OSA/SF Messages and Codes	 179
OSA/SF Messages	179
SNMP Subagent Messages	241
OSA Reject Codes	246
Internal Errors	247
OSA Network Traffic Analyzer Error Codes	248
OSA IDX Failure Return Codes	248

Part 3. Appendixes 249

Appendix A. Physical Connection Information	251
Physical Ports and LEDs	251
OSA-Express	252
OSA-Express2	254
OSA-Express3	256
Fiber Optic Cabling	257
Fiber Optic Attachment Options For Gigabit Ethernet	257
Connecting a Singlemode OSA-Express Gigabit Ethernet Feature to a Multimode Cable	259
Cabling for OSA-Express 10 Gigabit Ethernet Feature	260
Cabling for Fast Ethernet (FENET) and 1000Base-T Ethernet	260
Cabling for Token Ring	261
 Appendix B. OSA-Express Functional Limits and LAN Transmission	
Summary	263
OSA-Express Speed/Mode Configuration Information	264
 Notices	267
Programming Interface Information	268
Trademarks	268
 Index	271

Figures

1.	Port Sharing that Allows Multiple Images Access to OSA-Express Channels	6
2.	Conventional routed network	16
3.	Switched VLAN network	16
4.	VLAN network organized for traffic flow	17
5.	OSA NCP Bridge Support	24
6.	IP Address Control that is Automatically Taken Over from Failing OSA-Express	28
7.	Secondary Router that Provides Path to Unknown IP Addresses When Primary Router Fails	29
8.	DVIPA that Automatically Relocates When TCP/IP Stack Fails	30
9.	Multiple OSA/SF GUI sessions to access images on the z990	34
10.	Step One in a Four-Step Process.	37
11.	Defining an OSA-Express Port Connection	38
12.	Add Channel Path	44
13.	Allow for more than 160 TCP/IP stacks panel	45
14.	Define Access List	45
15.	Define Candidate List	46
16.	Add Control Unit (1 of 2 panels)	46
17.	Add Control Unit (2 of 2 panels)	47
18.	Define Device	48
19.	Device / Processor Definition	48
20.	Device / Processor Definition — Define Device / Processor	49
21.	Define 3745 Device	50
22.	Device / Processor 3745 Definition	51
23.	Define OSN Device / Processor Definition	51
24.	Step Two (z/OS) in a Four-Step Process	55
25.	Sample Started Procedure (IOA.SIOASAMP Member IOAOSASF)	56
26.	Sample Startup Profile (IOA.SIOASAMP Member IOASPROF)	58
27.	Member IOAAPPL from IOA.SIOASAMP	63
28.	Sample Started Procedure (IOA.SIOASAMP Member IOASNMP)	64
29.	Step Two (VM) in a Four-Step Process.	69
30.	OSA/SF on a z/VM guest system in a z/VM Environment	71
31.	Setup Tasks for OSA/SF in the VM Environment	73
32.	Step Two (VSE) in a Four-Step Process	79
33.	OSA/SF Jobs	80
34.	Job to Create PRD2.OSASF	80
35.	Master Index	81
36.	IOAMAIN Job	81
37.	IOACMD Job	82
38.	Step Two (for all operating systems) in a Four-Step Process.	85
39.	IOACMD Job	87
40.	OSA/SF IOASRV Startup Procedure	90
41.	AUTOLOG Section of the TCP/IP Profile	90
42.	TCP/IP Port Number	90
43.	OSA/SF Host Open Logon	97
44.	Step Three in a Four-Step Process	101
45.	Step Four in a Four-Step Process	111
46.	Sample Procedure (Member IOBSNMP).	133
47.	Example of a Message Log	138
48.	Specify GUI Trace and Dump Options	140
49.	CHPID Performance Data in Channel Settings	142
50.	RMF Channel Path Activity Report	142
51.	Example of OAT for TCP/IP with Port Sharing.	155
52.	Example of OAT for TCP/IP with Multiple IP Addresses	156
53.	Example of OAT for One SNA Entry	156

54.	OSA-Express Connections and LEDs	252
55.	OSA-Express2 Connections and LEDs	254
56.	OSA-Express3 Connections and LEDs	256

About this Document

This document describes the Open Systems Adapter-Express feature and the Open Systems Adapter Support Facility (OSA/SF) with the goal of helping you to define, install, and use these products. An OSA is an integrated IBM System z10, System z9 and @server zSeries hardware feature that combines the functions of an I/O channel with the functions of a network port to provide direct connectivity between System z10, System z9 or zSeries applications and their clients on the attached network.

Detailed instructions are provided in Part 1 to help you set up and use the OSA-Express feature and OSA/SF. Reference information in Part 2 includes commands, sample configurations, messages, and other supporting information. The Appendixes in Part 3 contain cabling specifications and information of interest to OSA-Express users, as well as notes on how OSA-Express features were set up in test scenarios.

Who Should Use This Document

Anyone who is responsible for connecting the System z10, System z9 or zSeries processor to a LAN should use this document.

This book does not discuss details of the hardware features or functions of System z9 or @server zSeries processors. Before you use this book, see *zSeries 800 System Overview*, *zSeries 890 System Overview*, *zSeries 900 System Overview*, *zSeries 990 System Overview*, *System z9 109 System Overview*, or *System z10 Enterprise Class System Overview* to familiarize yourself with those features or functions.

Where to Find More Information

This document contains all the instructions necessary to set up the OSA-Express feature and OSA Support Facility (OSA/SF). In some instances, there are references to other publications for detailed information.

Notes:

1. The *Program Directory for IBM Open Systems Adapter Support Facility for z/OS* (5694-A01) is distributed on the z/OS product tape.
2. The *Program Directory for IBM Open Systems Adapter Support Facility for VM* (5741-A05) is distributed on the z/VM product tape.
3. The *Program Directory for IBM Open Systems Adapter Support Facility for VSE* (part of *VSE Central Functions 6.1.1*, 5686-066) is distributed on the VSE product tape.

z/OS

z/OS Communications Server

- *z/OS Communications Server: IP System Administrator's Commands*, SC31-8781
- *z/OS Communications Server: IP Migration Guide*, SC31-8773
- *z/OS Communications Server: IP Configuration Guide*, SC31-8775
- *z/OS Communications Server: IP Configuration Reference*, SC31-8776
- *z/OS Communications Server: IP User's Guide and Commands*, SC31-8780
- *z/OS Communications Server: IP Diagnosis Guide*, GC31-8782

- *z/OS Communications Server: SNA Network Implementation Guide*, SC31-8777
- *z/OS Communications Server: SNA Resource Definition Reference*, SC31-8778
- *z/OS Communications Server: SNA Migration Guide*, SC31-8774
- *z/OS Communications Server: SNA Operation*, SC31-8779
- *z/OS Communications Server: SNA Network Implementation Guide*, SC31-8777
- *z/OS Communications Server: SNA Diagnosis: Volume 1*, GC31-6850
- *z/OS Communications Server: IP Programmer's Reference*, SC31-8787
- *z/OS Communications Server: IPv6 Network and Application Design Guide*, SC31-8885

HCD

- *z/OS HCD Users's Guide*, SC33-7988

MVS

- *z/OS MVS Initialization and Tuning Reference*, SA22-7592

Security Server (RACF)

- *z/OS Security Server (RACF) Server Administration and Using*, SC24-5923
- *z/OS Security Server (RACF) Command Language Reference*, SC22-7687

APPC

- *z/OS MVS Planning: APPC Management*, SA22-7598

RMF

- *z/OS RMF User's Guide*, SC33-7990
- *z/OS RMF Report Analysis*, SC33-7991

UNIX System Services

- *z/OS UNIX System Services: Planning*, GA22-7801
- *z/OS UNIX System Services: Command Reference*, SA22-7802
- *z/OS UNIX System Services: User's Guide*, SA22-7801

z/VM

- *z/VM: General Information*, GC24-5991
- *z/VM: VMSES/E Introduction and Reference*, GC24-5994
- *z/VM: I/O Configuration* SC24-6044
- *z/VM: CMS Application Development Guide*, SC24-6002
- *z/VM: CMS File Pool Planning, Administration, and Operation*, SC24-6058
- *z/VM: CP Command and Utility Reference*, SC24-6008
- *z/VM: CP Planning and Administration*, SC24-6043
- *z/VM: CMS Command and Utility Reference*, SC24-6010
- *z/VM: TCP/IP Planning and Customization*, SC24-6019
- *z/VM: TCP/IP User's Guide*, SC24-6020

VSE/ESA

- *VSE/ESA V2R7 Planning*, SC33-6703
- *VSE/ESA V2R4.0 Networking*, SC33-6708

Linux

- <http://www.ibm.com/shop/publications/order>
 - For the Linux 2.6 kernel: *Linux on System z - Device Drivers, Features, and Commands*, (SC33-8289)
 - For the Linux 2.4 kernel: *Linux on zSeries - Device Drivers and Installation Commands*, (SC33-8411)
- www.linux.org/docs

TCP/IP

- *TCP/IP V3R2 for MVS: Planning and Migration Guide*, SC31-7189
- *TCP/IP V3R2 for MVS: User's Guide*, SC31-7136

NetView

- *NetView Installation and Administration Guide (VM) V2R3*, SC31-6181

TPF

- *Transaction Processing Facility TCP/IP*, SH31-0120
- *Transaction Processing Facility Migration Guide (Volume 2)* GH31-0187

On the LANs and LAN Cables that OSA Supports

- *RFC 1231* is the TCP/IP protocol standard for IEEE 802.5 token ring MIB
- *RFC 1398* is the TCP/IP protocol standard for managed objects for the Ethernet-like interface types
- *IBM Local Area Network Administrator's Guide*, GA27-3748
- *Token Ring Network Introduction and Planning Guide*, GA27-3677
- *IBM Multisegment LAN Design Guidelines*, GG24-3398
- *IBM 8250/8260/8285 Planning and Site Preparation*, GA33-0285
- *IBM Cabling System Optical Fiber Planning and Installation Guide*, GA27-3943
- *Token Ring Network Architecture Reference*, SC30-3374

z900

- *zSeries 900 System Overview*, SA22-1027
- *Placement Report* and *CHPID Report* produced by the IBM Configurator (CFSYSTEM) which may be available from your IBM marketing representative.

z800

- *zSeries 800 System Overview*, SA22-1028
- *Placement Report* and *CHPID Report* produced by the IBM Configurator (CFSYSTEM) which may be available from your IBM marketing representative.

z990

- *zSeries 990 System Overview*, SA22-1032
- *PCHID Report* produced by the IBM Configurator (CFSYSTEM) which is available from your IBM marketing representative.

z890

- *zSeries 890 System Overview*, SA22-6832

- *PCHID Report* produced by the IBM Configurator (CFSYSTEM) which is available from your IBM marketing representative.

z9 EC

- *System z9 Enterprise Class System Overview*, SA22-6833
- *PCHID Report* produced by the IBM Configurator (CFSYSTEM) which is available from your IBM marketing representative.

z9 BC

- *System z9 Business Class System Overview*, SA22-1083
- *PCHID Report* produced by the IBM Configurator (CFSYSTEM) which is available from your IBM marketing representative.

z10

- *System z10 Enterprise Class System Overview*, SA22-1084

z196

- *zEnterprise 196 System Overview*, SA22-1086

zSeries

- *zSeries PR/SM Planning Guide*, SB10-7033
- *zSeries IOCP User's Guide*, SB10-7037
- *zSeries Hardware Management Console Guide* (See www.ibm.com/servers/resourcelink for current edition)
- *zSeries Support Element Operations Guide* (See www.ibm.com/servers/resourcelink for current edition)

OSA-2 Publications

Attention

This publication is not intended to address OSA-2 setup. See the following list of titles for more information.

Document Title	Document Hardcopy Order #	Document Softcopy File Name	In OS/390 Collection Kit # (Note 1)	Documentshelf File Name	Bookshelf Index File Name
<i>Planning for the S/390 Open Systems Adapter-2</i>	GC23-3870 (Note 2)	IOA1PGxx	SK2T-6700	IOA390xx	IOA390xx
<i>OS/390: OSA/SF User's Guide for OSA-2</i>	SC28-1855 (Note 2)	IOASUGxx	SK2T-6700	IOA390xx	IOA390xx
<i>VM/ESA: OSA/SF User's Guide for OSA-2</i>	SC28-1992	IOAVMSxx	SK2T-2067	IOAVUGxx	IOAVMSxx
<i>VSE/ESA: OSA/SF User's Guide</i>	SC28-1946	IOAVSExx	SK2T-0060	IOAVSExx	IOAVSExx

Notes:

1. The OS/390 collection kit, which is distributed with OS/390, is also available on the Internet through the OS/390 home page (www.s390.ibm.com/os390).

Double-click on the Library icon. *OS/390 Information Roadmap* should help you locate the OSA Planning Guide and OSA/SF User's Guide.

2. GC23-3870 and SC28-1855 are distributed on the OSA/SF bookshelf in the OS/390 softcopy collection kit. These documents can be ordered separately in hardcopy.

A note about IOAx messages for OSA/SF

Message numbers for OSA/SF messages in LookAt contain a lower case **x** that can represent different characters for use by IBM in problem determination. When you use LookAt to search for an OSA/SF message, be sure to specify the prefix IOAx. Message numbers which begin with IOAX, where the **X** is upper case, are not documented. For example, to search for message IOAC022E, specify:

IOAx022E

Not all OSA/SF messages are available to LookAt. For details, see Chapter 14, "OSA/SF Messages and Codes," on page 179.

A Note on Terminology

Throughout this publication, certain equipment terms and short versions of product names are used to make the information more easily understood. These are:

CS Communications Server

CCL IBM Communication Controller for Linux.

CDLC Channel Data Link Control protocol.

FENET

Fast Ethernet feature

1000Base-T

1000Base-T Ethernet feature capable of 10, 100, or 1000Mbps

GbE Gigabit Ethernet feature

Hub

A common connection point for devices in a network, typically connecting segments of a LAN. A hub contains multiple ports into which each segment is plugged. When a packet arrives at one port, it is copied to the other ports so that all ports see all packets.

MAU

Multistation Access Unit, allows multiple network nodes to access a LAN through a single device as opposed to a single network tap.

NCP

Network Control Program.

OSA

Abbreviation for Open Systems Adapter (OSA-Express and OSA-2) feature. Although this publication primarily addresses the OSA-Express features, Chapter 13, "OSA/SF Commands for REXX," on page 157 and Chapter 14, "OSA/SF Messages and Codes," on page 179 include information on OSA-2.

OSA-Express

Abbreviation for Open Systems Adapter-Express features.

OSD

The channel type name for OSA-Express features that run under Queued Direct Input/Output architecture (QDIO).

OSE The channel type name for OSA-Express features that do not use QDIO architecture (typically SNA/APPN/HPR applications).

OSN The channel type name for OSA-Express2 features that use QDIO architecture and CDLC protocol.

Queued Direct Input/Output (QDIO)

An architecture that allows an OSA-Express feature to communicate directly with system memory through the use of queues and a never-ending channel program.

QoS Quality of Service; tools to manage network congestion, shape network traffic, and set traffic policies end-to-end from the application across the network to the client.

Router

A device that moves packets between networks that use a common network layer protocol.

Switch

An intelligent hub that reads the destination address of a packet and propagates it only on the port through which that address can be reached.

TR Token Ring

Summary of Changes

Summary of Changes for SA22-7935-11

The following information has been added:

- Stack and device limits for OSA-Express3 have been changed on zEnterprise 196 (z196) processors
- Inbound workload queueing. See “Inbound workload queueing” on page 26
- Optimized latency mode. See “OLM - Optimized Latency Mode” on page 25.

Summary of Changes for SA22-7935-10

The following information has been added:

- OSA-Express3 1000 Base-T feature support
- OSA-Express3-2P 1000 Base-T feature support
- OSA-Express3-2P Gigabit Ethernet feature support
- QDIO Connection Isolation
- New OSA IDX failure return codes

Summary of Changes for SA22-7935-09

The following information has been added:

- OSA-Express3 Gigabit Ethernet and 10 Gigabit Ethernet features availability on z10 EC. New descriptions are in Chapter 1.
- Parameter descriptions of IOBSNMP in Chapter 9.

Summary of Changes for SA22-7935-08

The following information has been added:

- For z/OS environments:
 - Layer 3 Virtual MAC (VMAC)
 - OSA-Express Network Traffic Analyzer (OSAENTA)
 - QDIO Diagnostic Synchronization (QDIOSYNC)
- OSA support for Link Aggregation (IEEE 802.3ad)
- Updated error and reject codes in Chapter 14. OSA/SF Messages and Codes.

Summary of Changes for SA22-7935-07

The following information has been added:

- New description of layer 2 transport, in Chapter 1
- Minimum support level of Version 1 Release 5 for z/OS
- New table (Table 21 on page 253) describing the LEDs for the OSA FENET feature

Summary of Changes for SA22-7935-06

The following information has been added:

- OSA-Express2 1000Base-T Ethernet feature availability on the eServer z890 and eServer z990

- Ability to display the media access control (MAC) in the OSA address table (OAT)
- Message IOAC898W
- Technical hints for messages IOAB002I and IOAB032I

Summary of Changes for SA22-7935-05

The following information has been added:

- OSA-Express2 OSN CHPID type for the OSA Network Control Program (OSA NCP) support. OSA-Express2 OSN supports the Channel Data Link Control (CDLC) protocol to provide channel connectivity from the operating system to the Communications Controller for Linux (CCL).
- OSA-Express2 1000Base-T Ethernet support for z9-109
- OSA-Express Token Ring is no longer supported as of z9-109
- GVRP (GARP (General Attribute Registration Protocol) VLAN Registration Protocol) support for enhancing VLAN management

Summary of Changes for SA22-7935-04

The following information has been added:

- OSA-Express2 including 10 Gigabit support
- Layer 2 support
- 640 TCP/IP stacks per CHPID support
- Large Send
- Multiple Control Unit set-up
- Concurrent LIC update
- The limits matrix in Appendix C has been updated

Summary of Changes for SA22-7935-03

- This document has been updated to include information for z800, z900, and z890.
- Spanning Support for Logical Channel Subsystems was added.
- Trap and Set support for Direct SNMP was added.
- New messages have been added to the message section of Chapter 14, OSA/SF Messages and Codes.

Summary of Changes for SA22-7935-02

This document does not differ in content from the previous release. It was updated to enable element/feature messages so you can access them using the LookAt online message retrieval tool.

Summary of Changes for SA22-7935-01

Part 1. OSA-Express Guide

Chapters 1 through 8 have been updated for clarity and technical accuracy and edited to make this section of the book easier to understand.

Part 2. OSA-Express Reference

In Chapter 9, "OSA Port Management", the section titled Setting up OSA-Express Direct SNMP Support for z/OS has been updated.

Messages

New messages have been added to the message section of Chapter 14, OSA/SF Messages and Codes, and the chapter has been formatted to separate the SNMP Subagent Messages from the rest of the messages.

Part 1. OSA-Express Guide

Part 1 of the document describes the OSA-Express features, functions, and modes of operation. It provides instructions for defining the OSA hardware in the host I/O configuration, installing and setting up the OSA/SF application and interfaces, setting up the host program to handle OSA traffic, and ways to configure the mode of operation for the OSA using OSA/SF.

Chapter 1. Introducing OSA-Express, OSA Express2 and OSA-Express3

There are three generations of OSA-Express features: IBM® Open Systems Adapter-Express, IBM Open Systems Adapter-Express2, IBM Open Systems Adapter-Express3 . Each supports different LAN technologies and/or number of ports per feature.

The maximum number of the OSA-Express features that can be installed in a specific IBM System z10, System z9 or @server zSeries environment is as follows:

- IBM @server zSeries 800: 12
- IBM @server zSeries 890: 20
- IBM @server zSeries 900: 12
- IBM @server zSeries 990: 24
- IBM System z9 Enterprise Class (EC): 24
- IBM System z9 Business Class (BC) model R07: 16
- IBM System z9 BC model S07: 24
- IBM System z10 EC (all models): 24
- IBM System z10 BC: 24
- IBM System z196 EC: 24
- IBM System z196 BC: 24

OSA-Express: The first generation, OSA-Express, is available for the Fast Ethernet (FENET), 1000Base-T Ethernet, Gigabit Ethernet (GbE), and Token Ring (TR) LAN connections. Each has 2 separate channels for direct LAN attachment. If you install the maximum number of OSA-Express features (x), you will have twice that number of channels (2x) to use. For example, if you install 12 OSA-Express features, you will have 24 CHPIDs to use. Each version can be configured for QDIO and non-QDIO modes, except Gigabit Ethernet, which only supports QDIO mode.

OSA-Express2: The second generation, OSA-Express-2, is available for the 1000Base-T Ethernet, Gigabit Ethernet (GbE), and 10 Gigabit Ethernet (10GbE) LAN connections. The 1000Base-T and Gigabit Ethernet versions have 2 separate channels per feature for direct LAN attachment. The 10 Gigabit Ethernet version has only 1 channel per feature for direct LAN attachment. Only the 1000Base-T version can be configured for both non-QDIO and QDIO. Gigabit Ethernet and 10 Gigabit Ethernet can only be configured for QDIO mode.

OSA-Express3: The third generation, OSA-Express3, is available for Gigabit Ethernet (GbE) 10 GbE, and 1000Base-T Ethernet LAN connections. It is designed for high performance of standard and jumbo frames. The 10 GbE version has 2 separate channels per feature and 1 port per channel, for a total of 2 ports of connectivity for each 10 GbE feature. GbE and 1000Base-T Ethernet have 2 separate channels per feature, and each channel has 2 separate ports for a total of 4 ports of connectivity per feature. Only the 1000Base-T version can be configured for both non-QDIO and QDIO. Gigabit Ethernet and 10 Gigabit Ethernet can only be configured for QDIO mode.

OSA-Express3-2P: A reduced-cost version of OSA-Express3 is available for Gigabit Ethernet (GbE) and 1000Base-T Ethernet LAN connections. Running only on z10 BC, the GbE SX and 1000Base-T Ethernet features have 1 CHPID per feature, with

Introducing OSA-Express

each CHPID having 2 ports. The 1000Base-T version can be configured for both non-QDIO and QDIO. Gigabit Ethernet can be configured only for QDIO mode.

Table 1 summarizes the availability of the OSA-Express features.

Table 1. OSA-Express availability

Feature	@server zSeries 800 and 900	@server zSeries 890 and 990	System z9 EC and BC	System z10 and System z196	CHPIDs per feature	Ports per CHPID	Total ports
OSA-Express	Fast Ethernet	Fast Ethernet	Fast Ethernet		2	1	2
	1000Base-T Ethernet	1000Base-T Ethernet	1000Base-T Ethernet		2	1	2
	Gigabit Ethernet	Gigabit Ethernet	Gigabit Ethernet		2	1	2
	Token Ring	Token Ring			2	1	2
OSA-Express2		1000Base-T Ethernet	1000Base-T Ethernet	1000Base-T Ethernet	2	1	2
		Gigabit Ethernet	Gigabit Ethernet	Gigabit Ethernet	2	1	2
		10 Gigabit Ethernet	10 Gigabit Ethernet	10 Gigabit Ethernet	1	1	1
OSA-Express3				Gigabit Ethernet	2	2	4
				10 Gigabit Ethernet	2	1	2
				1000Base-T Ethernet	2	2	4
OSA-Express3–2P				1000Base-T Ethernet (z10 BC)	1	2	2
				Gigabit Ethernet SX (z10 BC)	1	2	2

All OSA-Express features are hot-pluggable and support the Multiple Image Facility (MIF), which shares channels across logical partitions (LPARs). They can be defined as a shared channel among LPARs within and across Logical Channel Subsystems (LCSSs).

All OSA-Express3 and OSA-Express2 features support QDIO mode. QDIO continues to be the preferred architecture on System z for high-speed communication, helping to reduce host interruptions and improve response time. The OSA-Express2 and OSA-Express3 1000Base-T Ethernet features also support non-QDIO mode (OSE). All the OSA-Express features help to ensure you have a balanced system to satisfy the bandwidth demands of your applications.

See Table 3 on page 13 for a summary of the OSA-Express supported functions.

Note: Unless otherwise indicated in this book, OSA-Express refers to OSA-Express, OSA-Express2, and OSA-Express3. Also, unless otherwise indicated, z9 refers to z9 EC and z9 BC, and z10 refers to z10 EC and z10 BC.

OSA-Express Characteristics

An OSA-Express is identified in the hardware I/O configuration by its channel path identifier (CHPID). For each OSA-Express CHPID installed, you must specify device numbers and unit addresses using Hardware Configuration Definition (HCD) or I/O Configuration Program (IOCP). During this hardware configuration process, you will also define the type of OSA-Express channel as either **OSD** (QDIO), **OSE** (non-QDIO) or **OSN** (OSA NCP). Chapter 2, “OSA-Express Hardware Configuration,” on page 37, shows you how this is done.

Note: OSD (QDIO) devices added or modified dynamically with the "activate" option of HCD do not require the OSA feature to be configured off/on. The only changes needed are updates to Communication Server (TCP/IP profile and VTAM TRLE). Refer to Chapter 2, “OSA-Express Hardware Configuration,” on page 37.

The OSA-Express channel can be shared among all images of the server and may span beyond a single channel subsystem. In some OSA documentation this is referred to as **port sharing** (page 5). A significant difference between OSA-Express features defined as OSD and OSN channels and those defined as OSE is that the OSA Support Facility (OSA/SF) is not required to set up port sharing.

Each OSA is shipped with a set of IBM-supplied default port parameters. Some of these port parameters can be set through OSA/SF, at the standalone Support Element (SE), or single object operations via the Hardware Management Console. Some port parameters, however, cannot be set through user input.

- The IBM-supplied default settings for port traffic and those parameters that can be altered, or changed by user input, appear in Chapter 9.
- A number of port parameters can be set only if an OSA is being run in SNA mode. These parameters, which can only be set with OSA/SF, can be used to enhance SNA session availability, to change the link level control timer values, and so on. A discussion on these SNA mode port parameters starts on page 117.

Each OSA-Express is shipped with a world-wide unique, or universal, Media Access Control (MAC) address. This MAC address permits the OSA to be uniquely identifiable on the attached LAN. If you prefer, you can use the OSA Support Facility (OSA/SF), the Hardware Management Console, or the Support Element to create and activate a local or group MAC address for a physical OSA port.

Port Sharing Among Images

An OSA channel path can be defined to be shared among those images to which it is defined in the system hardware I/O configuration (IOCDs). This allows access to a network port on the OSA to be shared by as many images as allowed on the system.

The principle of *port sharing* is shown in Figure 1 on page 6, where two IP programs share access to the OSA-Express physical port.

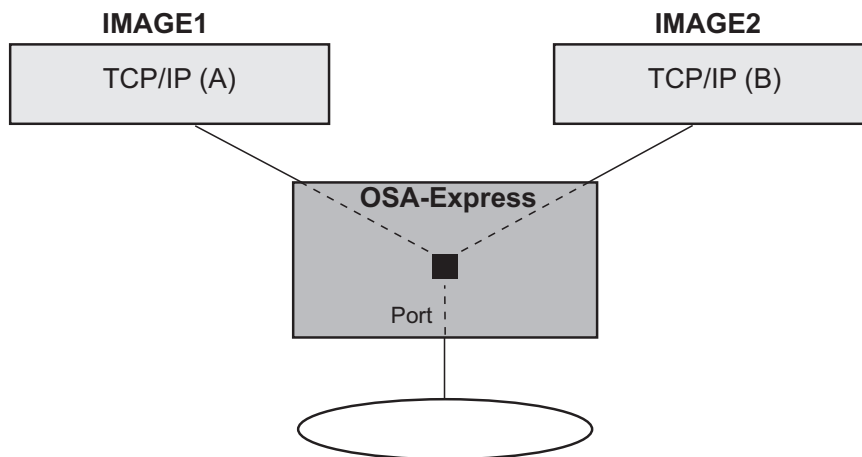


Figure 1. Port Sharing that Allows Multiple Images Access to OSA-Express Channels

When the OSA CHPID detects the packet destination is located in an image that is also connected to the (same) OSA CHPID, the packet is simply routed to the destination. The packet is not sent out on the LAN. This is sometimes called "image-to-image" communication.

Supported CHPID Types

One of the first tasks you perform is to define the OSA-Express feature to the hardware I/O configuration as a channel that uses QDIO or one that does not use QDIO:

- Define QDIO channels as channel type OSD (OSA-Express Direct).
- Define non-QDIO channels as channel type OSE (OSA-Express).
- Define channels used for OSA NCP as OSN.

OSD CHPID Type (QDIO Mode)

All OSA-Express features can handle IP traffic in QDIO mode. QDIO is a signalling protocol that minimizes I/O interruptions. Once the QDIO data queues are activated, continuous, direct data exchange between the OSA-Express and the Host Operating System is initiated and remains active without the need for additional instructions to start the subchannel.

The OSA adapter can be configured from the Host Operating System to run in either Layer 3 or Layer 2 mode. When running in QDIO Layer 3 mode, the OSA Adapter forwards LAN packets to the connected Operating Systems based on the Destination IP Address in the IP Header. (The IP Header portion of a LAN Packet resides at Layer 3). Since the Destination IP Address is used to determine how to forward the packet, only IP based traffic is supported in this mode. Each connected Operating System can register one or more IP Addresses to the OSA adapter. As IP Addresses are registered, the OSA Adapter constructs an internal table to map the IP Addresses to the owning Operating Systems. OSA will verify the same IP Address is not registered by two different Operating Systems. In Layer 3 mode, OSA will also handle IP Multicast and IP Broadcast traffic and forward the packets to all Operating Systems within the IP Multicast and IP Broadcast domain.

For details on Layer 2, see "The OSA-Express Layer 2 Transport" on page 14.

QDIO includes an IP assist function, which gathers Address Resolution Protocol (ARP) data during the mapping of IP addresses to media access (MAC) addresses. For z/OS, you can use the TSO NETSTAT ARP command to query the OSA-Express feature for this data for problem determination. z/OS V1R5 introduces an additional method for querying the ARP cache using the DISPLAY TCPIP NETSTAT ARP command.

OSE CHPID Type (Non-QDIO Mode)

You can configure OSA-Express FENET, 1000Base-T, and TR features to run as channel type OSE (non-QDIO) in TCP/IP Passthru, SNA modes, or both concurrently.

TCP/IP Passthru Mode

In TCP/IP Passthru mode, an OSA transfers data between a host IP program, to which it is defined, and clients on the following networks:

- An Ethernet LAN that is attached to the port on a FENET or 1000Base-T OSA-Express and supports one of the following frame protocols:
 - DIX II using the DEC Ethernet V 2.0 envelope
 - Ethernet 802.3 using the 802.2 envelope with SNAP
- A Token Ring LAN that is attached to the port on a TR OSA-Express and supports the following frame protocol:
 - Token Ring 802.5 using the 802.2 envelope with SNAP

SNA Mode

If an OSA is configured in SNA mode, VTAM and the SNA function of z/OS treat the OSA as an external communications adapter (XCA) that can have either switched or non-switched lines of communication. In this mode, an OSA acts as a SNA passthru agent to the clients that use the SNA protocol on the LAN that is directly attached to the OSA. Native SNA supports only 802.3 type frames. DIX II frames are discarded. This applies only to SNA traffic. TCPIP traffic will allow both.

OSN CHPID Type (OSA NCP)

OSA for the Network Control Program (OSA NCP) support provides a bridge between two distinct interfaces, the Channel Data Link Control (CDLC) protocol on the operating system side and the QDIO architecture on the Linux side that is running Communications Controller for Linux (CCL), which provides the NCP function. This is accomplished with OSA-Express2 (GbE or 1000Base-T Ethernet) defined as an OSN CHPID type.

This support eliminates the need to have any form of external medium and related hardware (ESCON-attached 734x Communications Controller and associated ESCON switches) while providing channel connectivity between the operating systems and the Linux NCP.

The OSN CHPID type does not support any additional network functions; its only purpose is to provide this bridge between the CDLC and QDIO interfaces to connect to the Linux NCP.

For more information, see “OSA NCP” on page 24.

OSA-Express Physical Feature Descriptions

OSA-Express supports various LAN types. The following is a table of the OSA-Express features available.

Table 2. OSA-Express Features

Feature Name	Channel Type	Feature Code
OSA-Express Gigabit Ethernet LX	OSD	1364
OSA-Express Gigabit Ethernet SX	OSD	1365
OSA-Express 1000Base-T Ethernet	OSE or OSD	1366
OSA-Express Gigabit Ethernet LX	OSD	2364
OSA-Express Gigabit Ethernet SX	OSD	2365
OSA-Express Fast Ethernet	OSE or OSD	2366
OSA-Express Token Ring	OSE or OSD	2367
OSA-Express2 Gigabit Ethernet LX	OSD or OSN	3364
OSA-Express2 Gigabit Ethernet SX	OSD or OSN	3365
OSA-Express2 10 Gigabit Ethernet LR	OSD	3368
OSA-Express2 1000Base-T Ethernet	OSE, OSD or OSN	3366
OSA-Express3 10 Gigabit Ethernet LR	OSD	3370
OSA-Express3 10 Gigabit Ethernet SR	OSD	3371
OSA-Express3 GbE LX	OSD	3362
OSA-Express3 GbE SX	OSD	3363
OSA-Express3 1000Base-T Ethernet	OSE, OSD or OSN	3367
OSA-Express3-2P GbE SX	OSD	3373
OSA-Express3-2P 1000Base-T Ethernet	OSE, OSD or OSN	3369
Notes: - Feature codes 1364 and 1365 cannot be ordered after the OSA-Express2 Gigabit Ethernet features are available. - Feature codes 2364, 2365, 2366 and 2367 can be carried forward on an upgrade from z900 to z990. - Feature code 2367 is not supported on z9 and above. - Feature codes 3373 and 3369 are available only on z10 BC.		

The OSA-Express, OSA-Express2 and OSA-Express3 Gigabit Ethernet Features

The OSA-Express, OSA-Express2 Gigabit Ethernet features support direct attachment through two separate channels to **Gigabit Ethernet** (GbE) LANs where clients communicate using Internet Protocol (IP). The OSA-Express3 Gigabit Ethernet feature supports two separate channels with two ports per channel for a total of four ports. The two-port OSA-Express3-2P Gigabit Ethernet SX feature is available only on z10 BC.

The OSA-Express Gigabit Ethernet feature:

- Is available as short (SX) and long (LX) wavelength features
- Provides 1000 Mbps/full duplex operation via point-to-point link
- Supports two types of frames:
 - IEEE 802.3 (ISO/IEC 802.3)
 - DIX V2.0, including jumbo frames (those larger than 1,518 bytes for OSA-Express). Larger frame sizes increase efficiency for data-intensive applications by reducing frame transmission processing.

Note: The MTU size can vary and can be set manually in the TCP/IP profile to a maximum of 1492 bytes, and to a maximum of 8992 bytes for jumbo frames.

- Supports multicast traffic but will only send Ethernet V2.0 (DIX) formatted frames
- Uses Queued Direct I/O architecture (QDIO)
- Can be upgraded and repaired while server is powered on
- Supports OSA NCP (OSA-Express2 only)

SNA traffic can be sent over an OSA-Express Gigabit Ethernet when Enterprise Extender is enabled (page 30).

The OSA-Express2 and OSA-Express3 10 Gigabit Ethernet Feature

The OSA-Express2 10 Gigabit Ethernet feature supports direct attachment through **one channel to 10 Gigabit Ethernet** (GbE) LANs where clients communicate using Internet Protocol IP). The OSA-Express3 10 Gigabit Ethernet feature supports two CHPIDs, with one port per CHPID. Both features:

- Are available as a long reach (LR) feature
- Provide 10 Gbps/full duplex operation via point-to-point link.
- Support two types of frames:
 - IEEE 802.3 (ISO/IEC 802.3)
 - Ethernet V2.0, including jumbo frames (those larger than 1,518 bytes). Larger frame sizes increase efficiency for data-intensive applications by reducing frame transmission processing.

Note: The MTU size can vary and can be set manually in the TCP/IP profile to a maximum of 1492 bytes for 802.3, and to a maximum of 8992 bytes for jumbo frames.

- Support multicast traffic but will only send Ethernet V2.0 (DIX) formatted frames
- Use Queued Direct I/O architecture (QDIO)
- Can be upgraded and repaired while server is powered on

The OSA-Express FENET and OSA-Express, OSA-Express2 and OSA-Express3 1000Base-T Ethernet Features

The OSA-Express Fast Ethernet (FENET) feature and OSA-Express, OSA-Express2 and OSA-Express3 1000Base-T Ethernet (1000Base-T) features provide direct attachment as follows:

- 1000 Mbps Ethernet LANs running in full-duplex mode for the 1000Base-T
- 100 Mbps or 10 Mbps Ethernet LANs running in either half- or full-duplex mode for FENET or 1000Base-T

Notes:

1. FENET is available on z890/z990 only as an upgrade from z800/z900.
2. The OSA-Express2 1000Base-T Ethernet feature was originally available on z9 EC (formerly z9-109). For the May 2006 version of Licensed Internal Code, it is available on @server z890, @server z990, and z9 BC.
3. For the OSA-Express2 and OSA-Express3 1000Base-T Ethernet features, concurrent patch is not available when defined as channel type OSE (non-QDIO).
4. The OSA-Express3 1000Base-T four-port feature is available on z10 EC and z10 BC.
5. The OSA-Express3-2P 1000Base-T two-port feature is available only on z10 BC.

FENET and 1000Base-T Ethernet features both support auto-negotiation with the attached Ethernet networking equipment. (Auto-negotiation is a process that takes control of the connection when a connection to a network device is established. It detects the various modes that exist in the device on the other end of the wire and advertises its own abilities in order to automatically configure the highest common performance mode of operation.)

FENET and 1000Base-T do NOT support devices that are only capable of using auto-sense. The highest common performance mode on this type of connection is 100 Mbps half-duplex.

The OSA adapter's speed/mode and port parameters (for example, auto-negotiate) are maintained under normal circumstances. Care should be taken to record these settings for future use in the event the OSA needs replacing. If the adapter should fail and need replacement, or the system type is upgraded, the CHPID may return to its default setting of auto-negotiate. Confusion may arise after a machine upgrade when an OSA fails to connect to the network due to the return to default settings. This confusion can also be avoided by always using auto-negotiate mode.

OSA-Express FENET and 1000Base-T Ethernet LAN Speeds and Duplex Modes

To configure these settings, you can use OSA/SF, the standalone Support Element (SE), or single object operations through the Hardware Management Console.

The LAN must conform either to the IEEE 802.3 (ISO/IEC 802.3) standard or to the DIX V2.0 specifications. It is important that the speed and mode settings on both the Ethernet-type OSA and Ethernet networking equipment match each other.

OSA-Express FENET and 1000Base-T Operating Modes

The OSA-Express FENET and 1000Base-T features handle IP traffic in QDIO mode when defined as an OSD CHPID (page 6). When set up for non-QDIO operation as an OSE CHPID, the features can run TCP/IP Passthru or System Network Architecture (SNA), or both concurrently. When set up for OSA NCP (OSN CHPID), the OSA-Express2 feature supports Communication Controller for Linux (CCL).

For TCP/IP Passthru mode, the default OAT may be used with no configuration or setup required. However, when using the default OAT, only one LPAR can use the CHPID. When running in SNA mode, OSA-Express FENET and 1000Base-T Ethernet support SNA management services provided by OSA/SF. For information about OSA/SF, see "Open Systems Adapter/Support Facility (OSA/SF)" on page 32.

The OSA-Express Token Ring Feature

The OSA-Express Token Ring (TR) feature provides direct attachment through two separate channels to 100, 16, or 4 Mbps LANs running in either half- or full-duplex mode. The OSA-Express TR also supports auto-sensing.

Token Ring LAN Speeds and Duplex Modes

You can choose any one of the following settings for the OSA-Express TR feature:

- Auto-sense
- 4 Mbps half-duplex
- 4 Mbps full-duplex
- 16 Mbps half-duplex
- 16 Mbps full-duplex
- 100 Mbps full-duplex

You can use OSA/SF, the standalone support element, or single object operations via the hardware management console to select these settings.

If you allow the LAN speed to default to auto-sense, the OSA-Express Token Ring feature will sense the speed of the attached hub, router, or switch and insert into the LAN at the appropriate speed. If the OSA-Express is the first station on the ring then it will join the ring at the speed and mode specified. If auto-sense is specified then OSA-Express will join at 16Mbps full duplex and, if unsuccessful, will default to half duplex. If there are existing stations on the ring then the specified values are ignored and the OSA-Express will join the ring at the speed and mode active on the ring.

The LAN must conform to the IEEE 802.5 (ISO/IEC 802.5) standard.

If you are not using auto-sense, the OSA will attempt to join the ring at the specified speed/mode, however, the speed/mode settings are only used when the OSA is first in the LAN or ring. If this fails, the OSA will attempt to join the ring as if auto-sense were specified.

Token Ring Operating Modes

The OSA-Express TR feature handles IP traffic in QDIO mode when defined as an OSD CHPID (page 6). When set up for non-QDIO operation as an OSE CHPID, it can run TCP/IP Passthru or System Network Architecture (SNA), or both concurrently.

For TCP/IP Passthru mode, the default OAT may be used with no configuration or setup required. When using the default OAT, only one LPAR can use the CHPID. When running in SNA mode, the OSA-Express TR supports SNA management services provided by OSA/SF. For information about OSA/SF, see “Open Systems Adapter/Support Facility (OSA/SF)” on page 32

Restrictions:

- The Token Ring feature is available only in OSA-Express on @server zSeries 800 and 900 and @server zSeries 890 and 990

OSA-Express supported functions

All functions require the following minimum support levels:

- z/OS Version 1 Release 5 or higher
- z/VM Version 3 Release 1.0, z/VM Version 4 Release 3 or higher
- VSE/ESA V2R6 or higher
- Linux kernel V2.4 or higher
- TPF V4.1 PUT 13

If there are different levels shown for either the hardware or software levels for a particular function, the entire list shows what is supported. For example, if a particular function specifies z/OS V1R7 and no others, then that function is only supported on z/OS V1R7 or higher. No other operating systems support that function.

The following is a summary overview of OSA-Express functions:

Table 3. OSA-Express Functions

Function	OSE	OSD	OSN
IPv4	X	X	
IPv6 (Ethernet only)		X	
Broadcast	X	X	
Multicast	X	X	
VIPA	X	X	
Primary/Secondary Routers	X	X (including VLAN)	
Multiple Primary Routers for VLAN (Ethernet only)		X	
Multiple Secondary Routers (Ethernet only)		X	
SNMP (CS TCP/IP SNMP Subagent and OSA/SF)	X	X	
Direct SNMP	X	X	
Direct SNMP SET/TRAP	X	X	
SNA	X		
VLAN (priority tagging- Ethernet only)		X	
VLAN (full — Ethernet only)		X	
GVRP (Ethernet only)		X	
ARP Query		X	
ARP Purge		X	
Layer 2 (Ethernet only; z990 and above only)		X	
640 TCP/IP Stacks (OSA-Express2 and OSA-Express3 only)		X	
Large Send (OSA-Express2 and OSA-Express3 only)		X	
Concurrent LIC Update (OSA-Express2 and OSA-Express3 only)		X	
Layer 3 Virtual MAC		X	
Network Traffic Analyzer (OSA-Express2 and OSA-Express3 only)		X	
QDIO Diagnostic Synchronization (OSA-Express2 and OSA-Express3 only)		X	
Link Aggregation (IEEE 802.3ad) (OSA-Express2 and OSA-Express3 only)		X	
OSA NCP (OSA-Express2 and OSA-Express3 1000Base-T or OSA-Express2 and OSA-Express3 GbE only)			X

Table 3. OSA-Express Functions (continued)

Function	OSE	OSD	OSN
QDIO Connection Isolation (OSA-Express2 and OSA-Express3 only)		X	
Optimized Latency Mode - OLM (OSA-Express3 only)		X	
Inbound Workload Queueing (OSA-Express3 only)		X	

The OSA-Express Layer 2 Transport

Layer 2 support provides Layer 2 (Ethernet) transport for Linux through the virtualization technology in both z/VM and the OSA-Express Adapter. The OSA-Express provides the Layer 2 trunk support required by the z/VM Virtual Switch for external LAN connectivity along with Media Access Control (MAC) and VLAN filtering. The z/VM's Virtual Switch, while providing a Layer 2 virtual networking fabric, also provides MAC address generation/assignment along with IEEE VLAN support for both the authorization and deployment of virtual LAN segments. In concert with z/VM and OSA-Express, the Linux QETH device driver for the OSA-Express feature was enhanced to exploit the Layer 2 networking capability in support of IP and non-IP based applications.

When running in QDIO Layer 2 mode, the Destination MAC Address in the MAC Header is used to forward LAN packets to the connected image (the MAC Header of a LAN packet resides at Layer 2). By using the Destination MAC Address to determine how to forward a packet, all protocol stacks, not just IP based traffic, can now be supported. Each connected image can register one or more MAC Addresses to the OSA Adapter. An OSA internal table is constructed to map the MAC Address to the owning Operating System. OSA will verify the same MAC Address is not registered by more than one Operating System. Layer 2 mode supports Multicast and Broadcast traffic and will forward packets to all Operating Systems within the Multicast and Broadcast domain.

Through the port sharing capability in the OSA-Express adapter, hosts operating in separate z/VM images or LPARs can communicate directly through the same OSA-Express adapter without data being sent over the physical network. The OSA-Express adapter supports concurrent layer 2 and Layer 3 connections on the same OSA port. With Layer 2 transport mode support, a restriction exists in this port sharing capability. Direct communications between these sharing host connections is only supported between hosts that are using the same transport mode. For example, a Layer 2 host can directly communicate with another layer 2 host on the same OSA port. Likewise, a Layer 3 host can communicate with a another Layer 3 host on the same OSA. Attempted communications between a Layer 2 host and a Layer 3 host sharing the same OSA-Express adapter results in a network timeout condition. To resolve this, you should have the Layer 2 host and the Layer 3 host on separate OSA-Express ports that are connected to the same LAN segment. With this solution, the communication between these hosts is now sent out onto the physical LAN segment and full MAC resolution will be achieved.

Beginning with the May 2006 version of Licensed Internal Code on z890, z990 and z9 systems only, this restriction has been lifted. With this version of Licensed Internal Code, a layer 2 host can directly communicate with a layer 3 host sharing the same OSA-Express port.

Hardware requirements

- z890 or z990 and above only
- OSA-Express with Licensed Internal Code level October 2004 or higher
- OSA-Express2, all levels
- OSA-Express3, all levels
- OSD only

Software requirements

- z/VM 5.1.0 GA deliverable (VM GA DDRs and Refresh Service Upgrade (RSU) 1) plus these PTFs:
 - VM63505
 - VM63506
 - VM63538 (Pseudo PTF - refreshed)
 - PQ97436

Note: If the z/VM Pseudo PTF had previously been applied it must first be removed following instructions found on the ESP FTP web site.

- Linux on System z9 and zSeries
 - SUSE SLES8 Security update, dated 20041215, kernel 2.4.21-266, available on the SUSE maintenance web
- For the May 2006 version of Licensed Internal Code: Displaying MAC in the OSA address table (OAT), requires the following OSA/SF APARs:
 - OA15169 (z/OS)
 - OA15170 (z/VM)
 - PK19250 (VSE)

For more information on z/VM's Layer 2 support, see *z/VM Connectivity 5.1.0*.

Virtual LAN (VLAN) Support

All OSA-Express features running QDIO support Virtual Local Area Networks (VLANs) as described in IEEE standards 802.1p and 802.1Q.

VLANs increase traffic flow and reduce overhead by allowing you to organize your network by traffic patterns rather than by physical location. In a conventional network topology, such as that shown in Figure 2 on page 16, devices communicate across LAN segments to different broadcast domains using routers. Although routers add latency by delaying transmission of data while using more of the data packet to determine destinations, they are preferable to building a single broadcast domain, which could more easily be flooded with traffic.

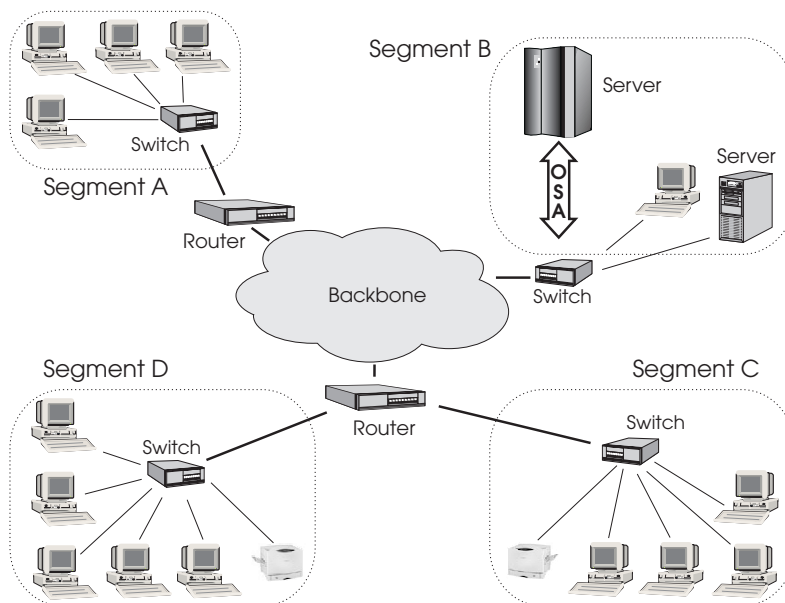


Figure 2. Conventional routed network

By organizing the network into VLANs through the use of Ethernet switches, distinct broadcast domains can be maintained without the latency introduced by multiple routers. As Figure 3 shows, a single router can provide the interfaces for all VLANs that appeared as separate LAN segments in Figure 2.

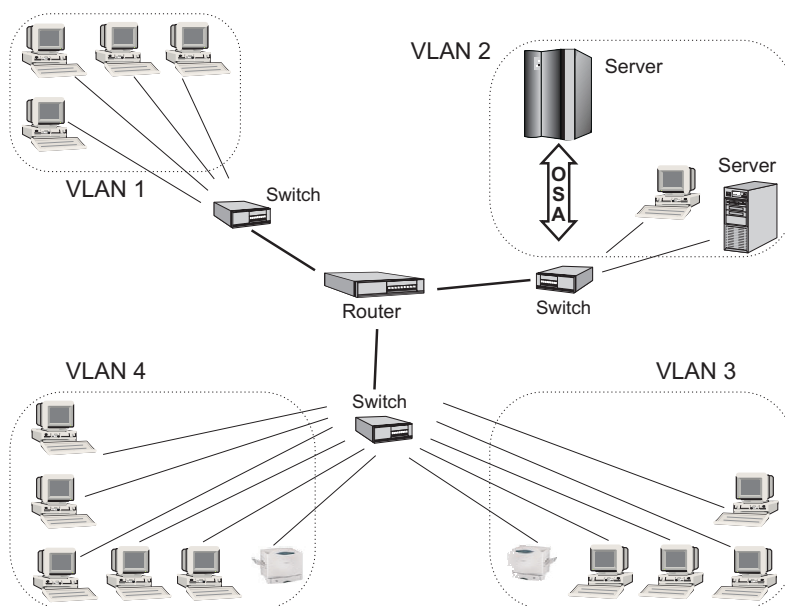


Figure 3. Switched VLAN network

Figure 4 on page 17 shows how VLANs can be organized logically, according to traffic flow, rather than being restricted by physical location. If workstations 1–3 communicate mainly with the small server, VLANs can be used to organize only these devices in a single broadcast domain that keeps broadcast traffic within the group. This reduces traffic both inside the domain and outside, on the rest of the network.

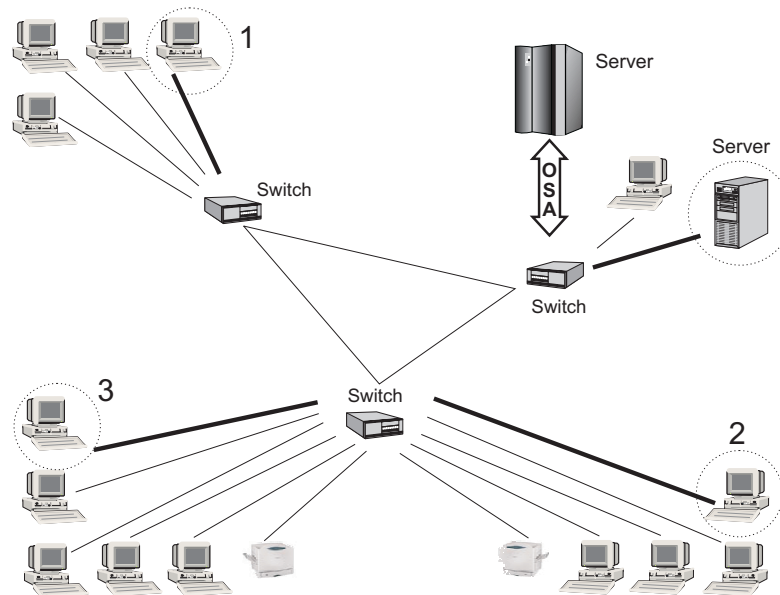


Figure 4. VLAN network organized for traffic flow

See *z/OS Communications Server: IP Configuration Guide* for more information. See *Linux for zSeries: Device Drivers and Installation Commands*, LNUX-1103, for configuration information.

VLAN Priority Tagging

VLAN priority tagging extends the capabilities of priority queuing beyond the server to include LAN bridges and switches. This function provides a way to manage consistent QoS traffic prioritization and service differentiation end-to-end, across switched LAN and WAN networks. VLAN priority tagging is supported by z/OS Communications Server.

By using standard based 802.1Q priority tagged frames and setting appropriate priorities based on policy, you can ensure that mission-critical traffic is not affected by non-critical traffic. The standard 802.1Q VLAN header enables interoperability with switch vendors, more flexibility in setting traffic priorities, and increased efficiency in switching and routing frames. See *z/OS Communications Server: IP Configuration Guide* for more information.

IPv6 on z/OS, Linux, and z/VM

All OSA-Express features running QDIO can use the IPv6 protocol.

Software requirements are:

- z/OS V1R5 or higher
- Linux 2.4.14 kernel or higher
- z/VM V5R1 or higher

IPv6 provides improved traffic management in the following areas:

128-bit addressing

Eliminates all practical limitations on global addressability. This means that private address space—and the network address translators (NATs) used between private intranet and public internet—are no longer needed.

Introducing OSA-Express

Simplified header formats

Allow for more efficient packet handling and reduced bandwidth cost.

Hierarchical addressing and routing

Keep routing tables small and backbone routing efficient by using address prefixes rather than address classes.

Improved support for options

Changes the way IP header options are encoded, allowing more efficient forwarding and greater flexibility.

Address autoconfiguration

Allows stateless IP address configuration without a configuration server.

In addition, IPv6 brings greater authentication and privacy capabilities through the definition of new extensions, and integrated Quality of Service (QoS) through a new traffic class byte in the header.

Certain commands that specify IP addresses, such as those dealing with VIPA addresses and IP address takeover, use syntax specific to a particular IP version.

See the following for more information:

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

z/OS Communications Server: IP Configuration Guide

z/OS Communications Server: IP Configuration Reference

Linux for zSeries: Device Drivers and Installation Commands, LINUX-1103

Dynamic Host Configuration Protocol

The Dynamic Host Configuration Protocol (DHCP) is an internet protocol which you can use to automate the configuration of computers that use TCP/IP. You can use DHCP to automatically assign IP addresses, deliver TCP/IP stack configuration parameters such as subnet mask and default router, and provide other configuration information such as the addresses of printers, time, and news servers.

The internet protocol requires that each device connecting to the internet have a unique IP address. A network administrator must provide an IP address for each device you attach to the internet and whenever you move a device to another physical location on your network. With DHCP your network administrator can supervise and distribute IP addresses from a central location and will automatically provide a new IP address when a device is moved.

See *z/OS Communications Server: IP Configuration Guide* for more information.

DHCP is supported in:

- z/OS — All supported versions of Communications Server
- z/VM — Level 4.3 and above
- Linux — Linux Kernel 2.4, June 2003 stream and above

IP Multicast Support

IP Multicast improves scalability by increasing data traffic recipients without a corresponding increase in bandwidth. Any application connecting to a multicast socket can pass traffic through any OSA-Express feature. OSA-Express features accept LAN packets based on multicast addresses, which are displayed through the Open Systems Adapter/Support Facility (OSA/SF). OSA supports the sharing of an

IP Multicast Address and will forward received IP Multicast packets to all Operating Systems that have registered the IP Multicast Address.

IP Broadcast Traffic

OSA will forward IP Broadcast packets received to all Operating Systems which have registered for Broadcast support within the same Broadcast domain (VLAN). OSA-Express features running in QDIO mode support IP broadcast traffic beginning with:

- z/OS V1R5
- z/VM V4R3
- Linux 2.4.14 kernel

Port name relief

For OSA-Express features running in QDIO mode, the port name identifies the OSA port for sharing by other operating system instances. When the port name is defined, all operating system instances that share the port must use the same port name. Beginning with a particular level of OSA-Express Licensed Internal Code (LIC) and some operating systems, this restriction has been lifted.

A port name is not required at the following OSA-Express LIC levels and operating system levels:

- z800 and z900 with OSA-Express (LIC) level September 2003 or higher
- z890 and z990 with all levels of OSA-Express LIC levels
- z9 and higher
- z/VM 4.3 with APAR PQ73878 and z/VM 4.4
- Linux
 - V2.4 kernel June 2003 stream and above
 - V2.6 kernel April 2004 stream and above

z/OS, VSE/ESA, and TPF require a port name, which must be the same when the OSA port is shared with the same operating system in different images or in a mixed OS environment. In addition, the port name must match the device name in the z/OS TCP/IP profile.

OSA-Express2 and OSA-Express3 supported functions

Segmentation Offload (Large Send)

Segmentation Offload (Large Send) improves performance by offloading TCP packet processing from the host to the OSA features. Off-load allows the Host to send IP Datagrams up to 60K in size. The IP Datagram size is controlled by the Host TCP/IP Stack. Sending larger data blocks reduces host processor utilization while increasing network efficiencies.

Hardware requirements are:

- OSA-Express2 and OSA-Express3
- QDIO mode only (CHPID type OSD)

Software requirements are:

- z/OS V1R6 with PTFs UK04060, UK04061, UA18116
- Linux V2.6 kernel

640 TCP/IP Stacks

Increasing the number of TCP/IP stacks supported by a single CHPID allows you to host more Linux images. OSA supports 640 TCP/IP stacks or connections per dedicated CHPID, or 640 total stacks across multiple LPARs using a shared or spanned CHPID.

Hardware requirements are:

- OSA-Express2 and OSA-Express3
- QDIO mode only (CHPID type OSD)

Software requirements are:

- z/OS V1R6
- Linux V2.6 kernel
- VSE/ESA V2.7.2 with PTF UD52625

Implementation Note: z/OS HCD on V1R4.1 and V1R5 will permit the definition of 640 TCP/IP Stacks as part of a migration aid and also to be used by Linux 2.6. The extra stacks are not usable by z/OS until z/OS V1R6.

Multiple Control Unit Support

Multiple control unit support allows more than one control unit to be defined per OSA CHPID. The support is valid for OSA-Express, OSA-Express2, and OSA-Express3 in QDIO mode. OSA CHPIDs defined as OSE are still restricted to one control unit. With multiple control units, the maximum number of devices can be defined to one LPAR (480 subchannels for OSA-Express, 1920 subchannels for OSA-Express2 and OSA-Express3). Multiple control units are not restricted to one LPAR, however. The OSA devices defined with all the control units can be distributed to any configured LPAR in the ACCESS or CANDIDATE list. (See “Configuring an OSA using HCD” on page 39).

Hardware requirements are:

- OSA-Express, OSA-Express2 and OSA-Express3
- QDIO mode only (CHPID type OSD)

Software requirements are:

- z/OS V1R4.1
- z/VM 5.1.0 GA deliverable or z/VM 5.1 ESP plus the latest Refresh Service Upgrade (RSU) service
- VSE/ESA V2.7.2 with PTF UD52625

Concurrent LIC Update

The increased memory of OSA-Express2 and OSA-Express3 features facilitate concurrent application of LIC updates without requiring a configuration off/on, thereby minimizing the disruption of network traffic during the update.

Hardware requirements are:

- OSD or OSN CHPID type

VLAN Management (GVRP) support

OSA supports VLAN prioritization (a component of the IEEE 802.1 standard) to extend support of VLANs to help simplify networking administration and management of VLANs. You may no longer be required to manually enter VLAN IDs at the switch.

Generic Attribute Registration Protocol (GARP) Virtual Local Area Network (VLAN) Registration Protocol, also referred to as GARP VLAN Registration Protocol (GVRP), is an application defined in the IEEE 802.1 standard that allows for the control of IEEE 802.1Q VLANs.

OSA communicates with GVRP-capable (IEEE 802.1Q) switches, registering its VLANs and dynamically updating its table as the VLANs change. VLANs are designed to ease the administration of logical groups of users; they can communicate as if they were on the same LAN. Traffic can be organized by traffic patterns (such as TELNET, FTP, banking transactions) rather than by physical location.

Note: Before attempting to implement the GVRP function, verify with your switch manufacturer that you have the proper support.

Hardware requirements

- z9 or higher
- OSA-Express2 and OSA-Express3
- QDIO mode only (CHPID type OSD)

Software requirements

- z/OS
- z/VM
- Linux on System z9 and zSeries

Layer 3 Virtual MAC for z/OS environments

The z/OS Layer 3 Virtual MAC (VMAC) function helps to simplify the network infrastructure and facilitates IP load balancing when multiple TCP/IP instances are sharing the same OSA port. With Layer 3 VMAC support, each TCP/IP instance has its own unique "virtual" MAC address instead of sharing the same universal or "burned in" OSA MAC address. Defining a Layer 3 VMAC provides a way for the device to determine which stack, if any, should receive a packet, including those for IP addresses that are not registered by any TCP/IP stack. With Layer 3 VMAC in a routed network, OSA appears as a dedicated device to the particular TCP/IP stack, which helps solve many port-sharing issues.

Layer 3 VMAC is an improved virtualization technique that can help do the following:

- Simplify network configuration
- Improve IP workload balancing
- Improve outbound routing
- Remove the dependency on Generic Routing Encapsulation (GRE) tunnels
- Remove the need for primary and secondary routing.

For details on how to implement Layer 3 VMAC, refer to the following z/OS Communications Server publications:

Introducing OSA-Express

- *z/OS Communications Server: IP Configuration Guide*
- *z/OS Communications Server: IP Configuration Reference*
- *z/OS Communications Server: SNA Network Implementation Guide*

Hardware requirements

- z9 EC and z9 BC or higher
- OSA-Express2 features defined as QDIO with Licensed Internal Code level May 2007 or higher
- OSA-Express3 features defined for QDIO
- QDIO mode only (CHPID OSD)

Software requirements

- z/OS Version 1 Release 8 with APAR PK36947

OSA-Express Network Traffic Analyzer (OSAENTA)

The Network Traffic Analyzer function provides a new diagnostic trace facility to allow OSA trace records to be sent to the host operating system. It allows z/OS system administrators to use and leverage the existing z/OS tool set and service aids to control, display, capture, and process these OSA trace records at the host operating system level to help monitor, debug, and diagnose network problems.

Support element controls and OSA authorization need to be set in order to exploit OSAENTA on z/OS.

For details on how to set up and use OSAENTA, refer to the following publications:

- *Support Element Operations 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 Diagnosis Guide*
- *z/OS Communications Server: SNA Operation*

Hardware requirements

- z9 EC and z9 BC or higher
- OSA-Express2 with Licensed Internal Code level May 2007 or higher
- OSA-Express3
- QDIO mode only (CHPID OSD)

Software requirements

- z/OS Version 1 Release 8 with APAR PK36947

QDIO Diagnostic Synchronization (QDIOSYNC)

QDIO Diagnostic Synchronization helps provide system programmers and network administrators the ability to coordinate and simultaneously capture both software (z/OS) and hardware (OSA) traces. The software signals to the OSA to stop traces and capture the current trace records.

For details on how to use QDIOSYNC, refer to the following z/OS Communications Server publications:

- *z/OS Communications Server: SNA Quick Reference*
- *z/OS Communications Server: SNA Diagnosis Vol 1, Techniques and Procedures*

- *z/OS Communications Server: SNA Operation*

Hardware requirements

- z9 EC and z9 BC or higher
- OSA-Express2 with Licensed Internal Code level May 2007 or higher
- OSA-Express3
- QDIO mode only (CHPID OSD)

Software requirements

- z/OS Version 1 Release 8 with APAR OA16646 (PTF UA27322)
- z/VM 5.1 or higher for z/OS Guest exploitation

QDIO connection isolation

QDIO connection isolation provides the ability to isolate an OSA's QDIO data connection(s) from hosts and LPARs sharing the OSA port to ensure complete network traffic isolation. If controlled access is required for the isolated QDIO data connection then the installation must set up routing to an external router with firewall or ACL capability. This helps to satisfy our customer's security requirements and also to meet our Enterprise Architecture network security so customers can ensure complete network isolation between all instances sharing physical network connectivity.

For more information see the following publications:

- *z/VM CP Planning and Administration*, SC24-6083
- *z/VM CP Commands and Utilities Reference*, SC24-6081
- *z/VM Connectivity*, SC24-6080.
- *Linux on System z: Device Drivers, Features, and Commands*, SC33-8411.

Hardware requirements

- z9 system and higher
- QDIO mode only (CHPID type OSD)
- OSA-Express2 with Licensed Internal Code level October 2008 or higher
- OSA-Express3 with Licensed Internal Code level October 2008 or higher

Software requirements

- z/VM 5.3.0 and 5.4.0 with APARs VM64463 and PK67610
- SUSE SLES 11 Kernel level 2.6.33 and above

OSA support for Link Aggregation (IEEE 802.3ad)

This function uses multiple Ethernet ports in parallel to increase the link speed beyond the limits of any single port.

This function is available on OSA through the ability to dedicate an entire OSA to a single host image. This is done through use of the Virtual Switch configured in Layer 2 mode. The Virtual Switch supports the aggregation of multiple OSA adapters for external LAN connectivity. By supporting the IEEE 802.3ad Link Aggregation protocols and mechanisms, the aggregation of individual physical links (adapters) makes this collection or group appear as one large link. The deployment of this type of configuration provides increased bandwidth and transparent recovery of adapter failures within the Link Aggregation group. This support provides only real switch-to-switch aggregation.

Hardware requirements

- z9 EC and z9 BC or higher
- OSA-Express2 features defined as QDIO with Licensed Internal Code level May 2007 or higher
- OSA-Express3 features defined for QDIO
- QDIO mode only (CHPID OSD)

Software requirements

- z/VM 5.3

OSA NCP

OSA NCP, available when OSA-Express2 and OSA-Express3 are defined as a CHPID type of OSN, provides the bridge between the operating systems using the CDLC protocol and the NCP and Communications Controller for Linux (CCL) using the QDIO architecture. OSA-Express2 and OSA-Express3 OSN appears to the operating systems as an ESCON channel connected to a 374x device type.

The following figure illustrates an overview of OSA NCP support.

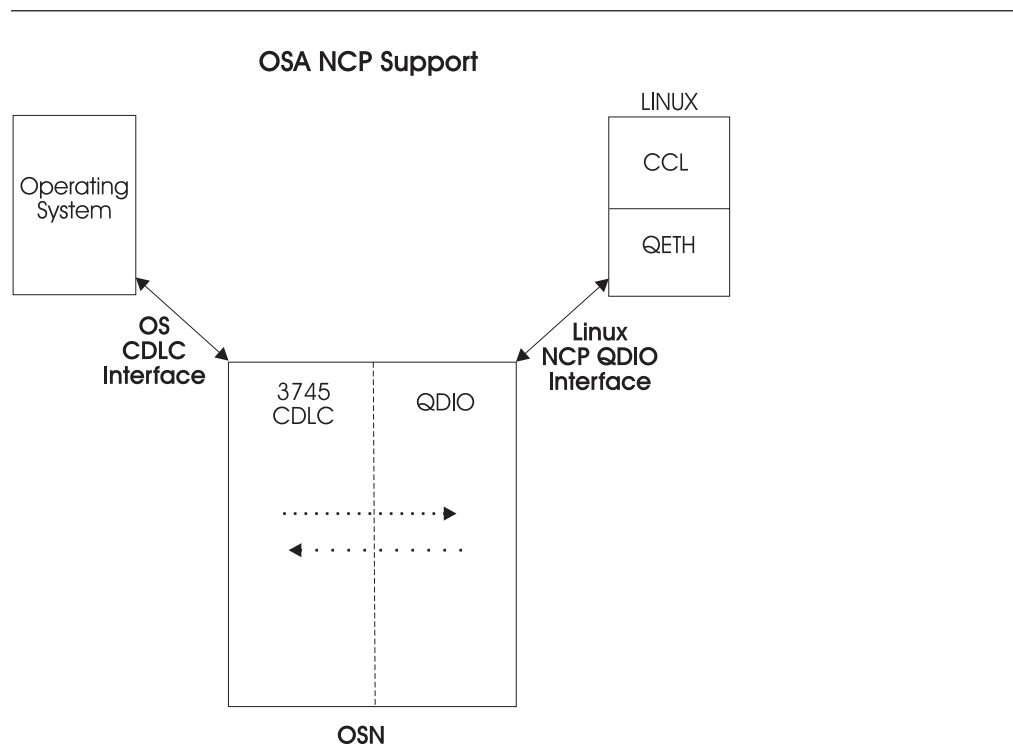


Figure 5. OSA NCP Bridge Support

- **CDLC side:** The operating systems communicate with the OSN CHPID through the CDLC protocol. To the operating systems, it is transparent that this is an OSN CHPID emulating an ESCON-attached 374x Communications Controller.
- **QDIO side:** The Linux image that is running CCL (which provides the NCP function) uses the QDIO architecture (Linux qeth device driver support) to communicate with OSA-Express2 and OSA-Express3 OSN.

- The CDLC and the QDIO sides "bind" to create a connection between the operating systems and the Linux NCP. No data can flow until the connection has been established.

With this setup, traffic between the operating system image and the CCL Linux image no longer flows on an external LAN or ESCON channel. Instead, traffic flows LPAR-to-LPAR on the same CPC.

OSA-Express2 and OSA-Express3 OSN supports both SNA PU Type 5 and PU Type 2.1 channel connectivity. It allows multiple connections between the same CCL image and the same host operating system as long as they reside within the same physical server (CPC). The OSN channel type can span Logical Channel Subsystems (LCSS).

Hardware requirements are:

- System z9 EC or higher
- OSA-Express2 and OSA-Express3 Gigabit Ethernet (both LX and SX)
- OSA-Express2 and OSA-Express3 1000Base-T Ethernet
- OSN CHPID type only

Note

For OSN CHPIDs, the port is totally disabled. Even if a cable is plugged in, there will be no light.

Software requirements are:

- z/OS V1.5 with PTFs
- z/VM V5.1 with PTFs
- VSE/ESA V2.7 with PTFs
- z/VSE V3.1 with PTFs
- TPF 4.1

For more information, see *Communication Controller for Linux on zSeries Implementation and User's Guide*.

OSA-Express3-only supported functions

OLM - Optimized Latency Mode

In this mode, the emphasis is placed on optimizing the processing related to interactive workloads to achieve the absolute lowest possible adapter latency. Performance objectives related to streaming and bulk data transfer workloads are not emphasized.

The primary use case for System z is remote SAP using DB2 Connect (Distributed Relational Database Architecture (DRDA) remote connections) accessing the z/OS DB2 images on System z for data base access (such as database inquiries). However, all System z applications which have a critical need for minimal response time when communicating with (or servicing) remote clients can benefit from this solution.

This function is applicable only to OSA-Express3 in QDIO mode (OSD CHPID). The function is compatible with both layer 2 and layer 3 modes (including L3-VMAC).

Introducing OSA-Express

For details on how to set up and use OLM, refer to the following publications:

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

Hardware requirements

- OSA-Express3 with LIC of August 2010 or higher
- QDIO mode only (CHPID type OSD)

Software requirements

- z/OS V1R11

Inbound workload queueing

OSA-Express3 for in QDIO mode running on z196 and above adds support called **inbound workload queueing**. Inbound Workload Queueing (IWQ) uses multiple input queues for each QDIO data device to improve TCP/IP stack scalability and general network optimization. IWQ creates multiple input queues and allows OSA to differentiate workloads "off the wire" and then assign work to specific input queues to z/OS. With each input queue representing a unique type of workload, each having unique service and processing requirements, the IWQ function allows z/OS to use appropriate processing resources for each input queue. This approach allows multiple concurrent z/OS processing threads to process each unique input queue, avoiding traditional resource contention. In a heavily mixed workload environment, this "off the wire" network traffic separation provided by OSA-Express3 IWQ reduces the conventional z/OS processing required to identify and separate unique work-loads, which is expected to result in improved overall system performance and scalability.

- When inbound workload queueing is enabled for a QDIO interface, inbound streaming bulk data is processed on an ancillary input queue (AIQ). This function is expected to improve throughput while reducing CPU consumption for inbound streaming bulk data.
- When inbound workload queueing is enabled for a QDIO interface, inbound Sysplex Distributor traffic is processed on an AIQ. This function is expected to improve performance for inbound Sysplex Distributor traffic that is routed to a target stack

For details on how to set up and use IWQ, refer to the following publications:

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

Hardware requirements

- OSA-Express3 on z196
- OSA-Express3 with LIC of August 2010 or higher
- QDIO mode only (CHPID type OSD)

Software requirements

- z/OS V1R12

Enhanced Network Availability

There are several ways to ensure network availability should failure occur at either the image or the CHPID/network connection level. Port sharing, redundant paths, and the use of primary and secondary ports all provide some measure of recovery. A combination of these can guarantee network availability regardless of the failing component.

Single-point-of-failure consideration

Because 2 channels share the same physical OSA feature, it is not recommended to configure both CHPIDs to a network (one as primary and one as backup) through the same physical OSA-Express feature. If the OSA fails, you lose both CHPID connections to the network. For availability, use different OSA-Express features as backup to ensure network availability in the event of an OSA failure.

ARP Takeover

ARP Takeover is designed to preserve Host to Client connectivity for both OSA and Host Operating System failures. When an OSA card fails, the Host Operating System will move the IP Addresses from the failed OSA to the backup OSA. When a Host Operating System fails, a backup Host Operating System will register the IP Addresses from the failing Host to OSA.

When TCP/IP is started in QDIO mode, it downloads all the home IP addresses in the stack and stores them in each OSA-Express feature. This service of QDIO architecture occurs automatically for OSD channels.

For OSA-Express features set up as OSE channels (non-QDIO), you must define multiple IP addresses in the OAT using OSA/SF as all the ARP functions reside in the Host TCP/IP Stack. The OSA-Express then responds to ARP requests for its own IP address, as well as for virtual IP addresses (VIPAs). The OSA that is planned to takeover the ARP responsibility should have its own IP address, VIPA address and the IP addresses that it is planned to takeover in its OSA Address Table.

If an OSA-Express feature fails while there is a backup OSA-Express available on the same network or subnetwork, TCP/IP informs the backup OSA which IP addresses (real and VIPA) to take over, and the network connection is maintained.

Figure 6 on page 28 shows two OSA-Express features, each storing the same four IP addresses that were either downloaded by TCP/IP for OSD channels, or defined in the OAT for OSE channels. Figure 6 on page 28 shows how this scenario works:

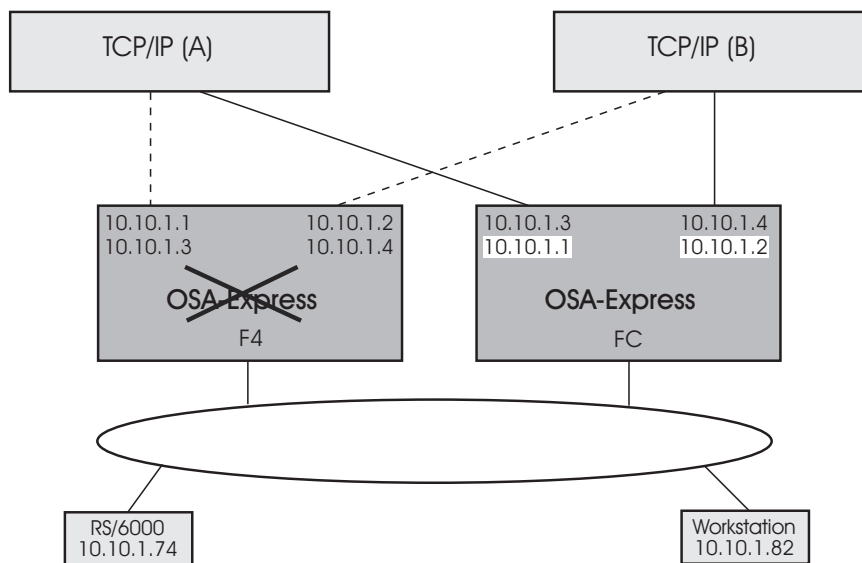


Figure 6. IP Address Control that is Automatically Taken Over from Failing OSA-Express

In Figure 6, under normal conditions, OSA-Express CHPID F4 controls the network connection to IP addresses 10.10.1.1 and 10.10.1.2, while CHPID FC controls the connection to 10.10.1.3 and 10.10.1.4. If CHPID F4 fails, OSA-Express CHPID FC automatically takes control of IP addresses 10.10.1.1 and 10.10.1.2, while maintaining control of 10.10.1.3 and 10.10.1.4. These changes are made dynamically in the CHPID's OSA Address Table and communicated to the clients, alerting them to the new path.

The ARP cache for a targeted TCP/IP stack can be queried and purged from the z/OS console. “Querying and Purging the ARP Cache” on page 130 shows command examples.

The `qetharp` utility is available on Linux to query and purge the ARP cache for a targeted TCP/IP stack. See “Querying and Purging the ARP Cache” on page 130 for usage information.

Primary and Secondary Default Routing

When multiple TCP/IP instances are using the same OSA-Express feature, you can designate one TCP/IP instance as the primary default router or secondary default router for handling unknown IP address destinations. (CS for z/OS uses the terms *primary router* and *secondary router*.) For the OSA-Express feature, you can designate a primary or secondary instance of TCP/IP in order to access an IP address on another LAN or LPAR. Only one TCP/IP instance can be registered as the primary default on any OSA-Express.

For OSA-Express Ethernet features running QDIO, multiple TCP/IP instances can be registered as secondary defaults, but for all other OSA-Express CHPIDs, only one TCP/IP instance can be registered as the secondary default. (See the description of the `PRIROUTER` and `SECROUTER` parameters on the `DEVICE` statement for MPCIPA in *z/OS Communications Server: IP Configuration Guide* for details on how to designate a primary or secondary router. For Linux, see *Linux for zSeries: Device Drivers and Installation Commands*, LNX-1103.)

When running the OSA-Express feature dedicated to one image, the primary router flag must be specified if the dedicated image is to be used as a router. When the

primary router flag is set, the OSA-Express feature will forward all IP packets received that do not contain a destination IP address registered with the feature. The HOME IP statements in each TCP/IP stack are the addresses registered to the OSA Express feature. If the primary router flag is NOT specified, then all packets received by the OSA-Express feature without a registered IP address are dropped. This includes all packets to be routed through the dedicated image that is serving as a router to other networks.

With VLAN Primary/Secondary capability, there can be a Primary/Secondary Router configuration on a per VLAN basis along with a single Primary/Secondary for non VLAN tagged packets. Both IPV4 and IPV6 are supported.

PRIROUTER and SECROUTER are only used by the OSA for packets that are received from the LAN. For packets that are received from an attached LPAR, the OSA uses the “next hop router” IP address obtained from the operating system. OSA does not use any IP address in the actual IP packet.

Note: PRIROUTER and SECROUTER are mutually exclusive with Layer 3 VMAC on the same connection. When Layer 3 VMAC is used, there are two new options on the LINK statement in the z/OS IP profile: ROUTEALL (the default) and ROUTELCL. For information on the use of Layer 3 VMAC, ROUTEALL, and ROUTELCL, see *z/OS Communications Server: IP Configuration Reference*. See *z/OS Communications Server: IP Configuration Guide* for details on OSA-Express virtual MAC routing.

In Figure 7, two OSA-Express features provide redundant paths to both TCP/IP instances, ensuring that both the RS/6000® and the workstation can access the client at IP address 10.30.8.5 on another LAN. TCP/IP instance A has failed, removing the primary path between the 10.10 LAN and the 10.30 LAN, but TCP/IP instance B provides a secondary path for recovery.

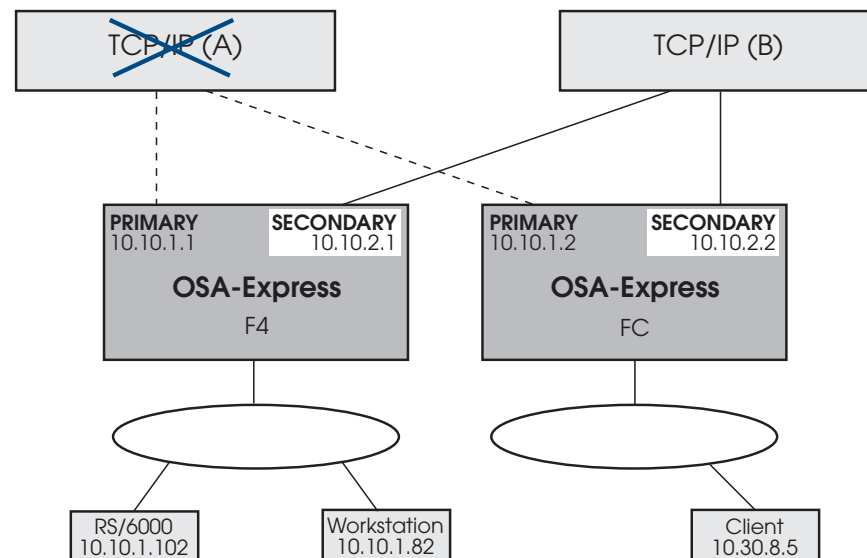


Figure 7. Secondary Router that Provides Path to Unknown IP Addresses When Primary Router Fails

Virtual IP Addressing (VIPA)

The Virtual IP Address (VIPA) adds another layer of protection against network connection failure. A Virtual IP Address (VIPA) is configured on a TCP/IP stack

rather than a physical adapter, and is therefore not associated with any particular endpoint device. By configuring multiple paths to a stack using VIPA in combination with conventional IP addresses, you can eliminate OSA hardware and transmission media as a single point of failure for many connections. A server can still become unavailable, however, if a TCP/IP stack or operating system fails. Such a problem can be fixed by moving the VIPA to another stack. Dynamic VIPA (DVIPA) automates this movement.

Dynamic Virtual IP Addressing (DVIPA)

Dynamic VIPA takeover allows a VIPA address to automatically move to a stack where an existing suitable application instance is already active and allows the application to serve the client formerly going to the failed stack. DVIPA for an application server allows an application to create and activate VIPA so that the VIPA moves when the application moves. This means that application instances on a failing node may be distributed among all surviving nodes.

In Figure 8, TCP/IP stack A has failed, but DVIPA 10.10.4.1 is automatically started on another node with the same application environment, which now handles all the failing node's clients.

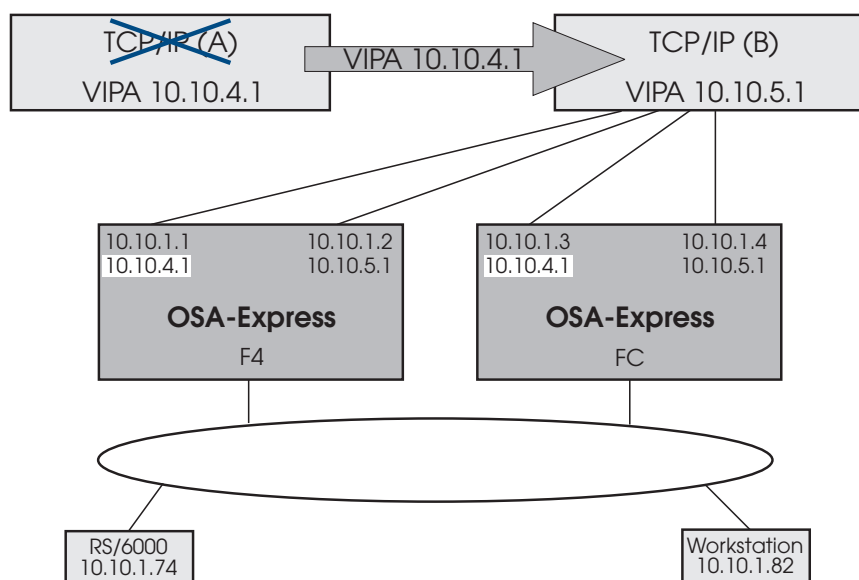


Figure 8. DVIPA that Automatically Relocates When TCP/IP Stack Fails

z/OS Communications Server: IP Configuration Guide contains a complete description and detailed examples of DVIPA configuration.

Enterprise Extender

The Enterprise Extender (EE) function of CS for z/OS allows you to run SNA applications and data on IP networks and IP-attached clients. It can be used with any OSA-Express feature running IP traffic. EE is a simple set of extensions to the open High Performance Routing technology that integrates HPR frames into User Datagram Protocol/Internet Protocol (UDP/IP) packets, providing:

- SNA application connectivity using an IP backbone support for
 - SNA-style priority
 - SNA parallel sysplex exploitation

- Improved throughput and response times
- Compatible support for TCP and UDP traffic on the IP portion of the application traffic path (SNA/HPR and UDP/IP traffic can coexist on an EE connection)

In order to enable EE, you must configure the TCP/IP stack with a virtual IP address (VIPA) and define an XCA major node. The XCA major node is used to define the PORT, GROUP, and LINE statements for the EE connections.

In addition, a switched major node is required when an APPN connection network is **not** used. The switched major node is used to define the PU statements for the EE connections. When an APPN connection network **is** used, the switched major node is not used on the dial-out side and is optional on the dial-in side. If a switched major node is not defined on the dial-in side, a PU is dynamically created.

To activate EE connections when starting VTAM, you must use either the TCPNAME start option or the IPADDR start option. No default values are applied. See *z/OS Communications Server: SNA Network Implementation Guide* for detailed instructions.

Support for Simple Network Management Protocol (SNMP)

You can use Simple Network Management Protocol (SNMP) to monitor and control your OSA-Express ports in real time, just as you would other network devices. OSA-Express features provide data for use by an SNMP management application such as Tivoli® or NetView®. This data is organized in two different SNMP management information base (MIB) modules, supported by two different SNMP subagents:

- The OSA-Express MIB is supported by the OSA-Express Direct subagent
- The IBM MVS™ TCP/IP Enterprise-specific MIB is supported by the z/OS Communications Server TCP/IP subagent

If you are running z/OS V1R5 or Linux kernel 2.4.14 or higher with an OSA-Express feature in QDIO mode, the OSA-Express MIB is directly accessible through an OSA-Express SNMP subagent. If you are running z/OS V1R6 or higher, the OSA-Express MIB is directly accessible through an OSA-Express SNMP subagent with an OSA-Express feature running in either QDIO or non-QDIO.

The Communications Server subagent for the IBM TCP/IP Enterprise Specific MIB requires OSA/SF for access and can be used by z/OS.

The Communications Server SNMP TCP/IP Subagent

Communications Server for z/OS provides SNMP support through OSA/SF, for the following OSA-Express features and modes:

FENET or 1000Base-T	Supported for OSE or OSD CHPIDs.
Gigabit Ethernet	Supported for QDIO (OSD CHPIDs) only.

Restriction: SNMP support is not provided for OSA-Express2 10 Gigabit Ethernet or any OSA-Express3 features. However, it does provide support for OSA-Express2 Gigabit Ethernet and 1000Base-T features. The preferred method of obtaining SNMP data is through the OSA Direct SNMP subagent as described in “The OSA-Express Direct SNMP Subagent” on page 32.

See “Set up the Communications Server SNMP TCP/IP subagent” on page 64 and *z/OS Communications Server: IP Configuration Guide*. For a complete description of

Introducing OSA-Express

the SNMP TCP/IP subagent support for OSA-Express management data, see the SNMP chapter of *IP System Administrator's Commands* in your Communications Server library.

The OSA-Express Direct SNMP Subagent

Communications Server for z/OS V1R5 and Linux kernel 2.4.14 support the OSA-Express subagent for accessing OSA-Express MIB. This subagent communicates directly with the OSA and does not require OSA/SF to access OSA MIBs as the CS SNMP TCP/IP subagent does. See “OSA-Express Direct SNMP Support” on page 131 for more information.

Open Systems Adapter/Support Facility (OSA/SF)

OSA/SF is a base element of z/OS, z/VM, and VSE/ESA. OSA/SF provides a user-friendly interface for monitoring and managing the installed OSAs. OSA/SF includes software that runs on a personal computer communicating with the server.

OSA/SF GUI: OSA/SF includes a graphical user interface (GUI) that runs on the following software platforms:

- Windows 2000, and Microsoft XP. (This publication refers to these workstation operating systems collectively as Windows.)
- Linux
- Any other platform that supports graphics and Java 1.4

REXX command interface (IOACMD EXEC): Instead of the GUI, you can use a REXX command interface (IOACMD EXEC) with OSA/SF.

For details on the OSA/SF interfaces, see Chapter 6, “Setting up and Using the OSA/SF Interfaces,” on page 85.

Deciding Whether OSA/SF is Required

OSA/SF **is required** for the following OSA-Express features in non-QDIO mode (channel type OSE):

- 1000Base-T Ethernet
- FENET
- TR

If any of these non-QDIO mode features use **ONLY** the Default OAT and do **NOT** use (require) port sharing, then OSA/SF is **not required**.

OSA/SF **is required** for SNMP support using the Communications Server SNMP TCP/IP SNMP subagent.

OSA/SF is **not required** for the OSA-Express Direct SNMP subagent. See “Support for Simple Network Management Protocol (SNMP)” on page 31 for more information.

OSA/SF is **not required** to set up any OSA-Express feature in QDIO mode (channel type OSD) or for OSA NCP (channel type OSN).

For these features, all data required to configure an OSD CHPID is automatically taken from the HCD hardware definition and software definitions input into the host TCP/IP profile. The only configuration information that you might need to define is the local or group MAC addresses and port speeds. If you choose to change the

MAC address that is shipped with the OSA-Express, you can use the Hardware Management Console, the Support Element, or OSA/SF to define the information. If your installation requires setting group addresses, you must use OSA/SF.

OSA/SF **is recommended** for monitoring network information and assisting with problem determination for **all OSA-Express features**. If you already have a previous OSA/SF installed, it is recommended that you migrate to the latest OSA/SF. If you have other OSAs installed or plan to install other OSAs in the future, you should install the latest OSA/SF. If this is your first and only OSA and setup time is critical, you can postpone installation of OSA/SF until later.

Install the Latest OSA/SF if any of the following conditions apply:

- A previous release of OSA/SF is already installed.
- Other OSA features that require OSA/SF are installed or planned.

The latest OSA/SF supports all OSA-Express features. If you install OSA/SF on the operating system, you can set up and manage OSA-Express features from one OSA/SF image as long as all CHPIDS are shared by the image and have the OSAD device defined.

- You do not have access to the Hardware Management Console (HMC) or the Support Element (SE) and you want to set a local MAC address in place of the MAC address that shipped with the OSA.

If you have access to either of these consoles, some of the tasks you can do are:

- Enable or disable the port
- Query port status
- View port parameters
- Set a local MAC address
- Collect trace information for service

Note: To review the instructions for accessing the OSA information from the HMC or SE, see “Using the Hardware Management Consoles (HMC or SE)” on page 130.

OSA/SF Management Span

In the z/OS, VM, and VSE environments, OSA/SF supports all OSAs and all OSA modes. While all of these images may query the OSA, only one image at a time can change the configuration/parameters of the OSA. The image that can change the OSA is called the **managing image**. Generally, therefore, one of these OSA/SF instances will be managing the OSAs that are defined to the images in which these operating systems are running.

With LCSS on the z890 or z990 processor prior to the May 2004 level of Licensed Internal Code (LIC), OSA/SF management is restricted to the channel subsystem on which both the instance of OSA/SF and the OSAs run. With the May 2004 level of Licensed Internal Code and above, a single OSA can have span of control across all LCSSs.

You can use the OSA/SF REXX command interface or the OSA/SF GUI interface to access OSAs that are defined to an image. Only one instance, or copy, of OSA/SF can run on an z/OS, VM, or VSE system image. However, that instance of OSA/SF can be used to customize, or configure, the modes of operation on all the OSAs defined in the system hardware I/O configuration data set (IOCDs) or I/O definition file that the copy of OSA/SF can view.

Introducing OSA-Express

For an instance of OSA/SF to recognize an OSA, you must associate one device number with the OSA channel path that is defined in the same image as the system image on which OSA/SF is running. Furthermore, this device number must be specified as device type = OSAD with unit address = X'FE'. Because of these requirements, this device number is called either the OSAD device or FE device. See “Configuring an OSA using HCD” on page 39.

From the OSA/SF GUI on one workstation, you can attach to multiple hosts, but you must start a separate OSA/SF GUI logon session to each host through the GUI host window.

Figure 9 shows three different OSA/SF GUI host sessions set up on a single workstation. You can access each image by opening a different Host Open window and specifying the name of the image:

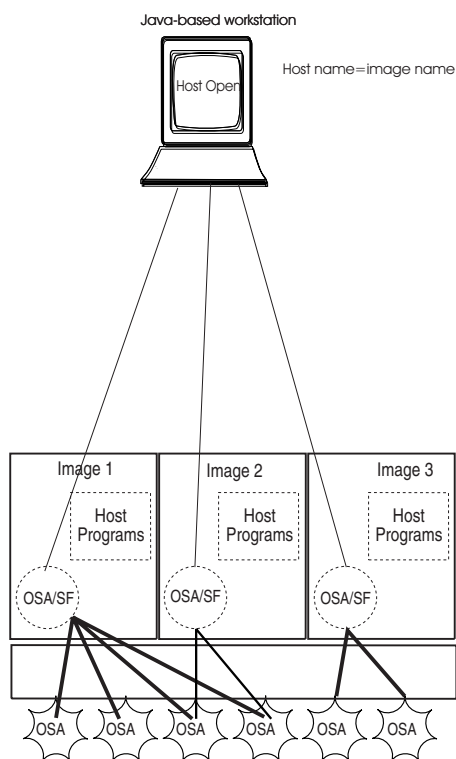


Figure 9. Multiple OSA/SF GUI sessions to access images on the z990

OSA/SF Management of an OSA

There may be multiple images on the system running OSA/SF. The number of the image that is currently managing the OSA is stored on the OSA and this image number may be queried by the other images.

In order to start managing an OSA:

- The OSA CHPID must be online to the image that wishes to manage it.
- The OSAD device (unit address FE) must be online to the image.

An image that meets these criteria can request to become the managing image by issuing a **Start Managing** command. If no other image is managing the CHPID the requesting image becomes the managing image. If another image is already

managing the CHPID the request will fail. Management can be obtained by issuing the **Start Managing** command with the **Force** option or by having the other image **Stop Managing** the OSA.

When OSA/SF starts up, if it is eligible to manage the OSA (the OSA and OSAD are both on-line to the image), it will automatically attempt to start managing all of the OSAs that are not already managed by another image.

You can issue the **Stop Managing** command to the image that is managing an OSA to give up management and have the OSA considered to be not managed.

Because the managing partition image number is stored on the OSA CHPID, it is possible that a CHPID could be managed by an OSA/SF image that is no longer running. In this case you must issue a **Start Managing** with **Force** to take over the management by the current image.

When an OSA is not managed, the OSA will then be managed by the first image that requests management (either by the **Start Managing** command or during OSA/SF initialization.)

If another instance of OSA/SF is started, it automatically starts managing all of the unmanaged OSAs that have been assigned to its image.

Chapter 2. OSA-Express Hardware Configuration

In order to bring your OSA-Express features online, you must ensure that they are defined to the I/O configuration:

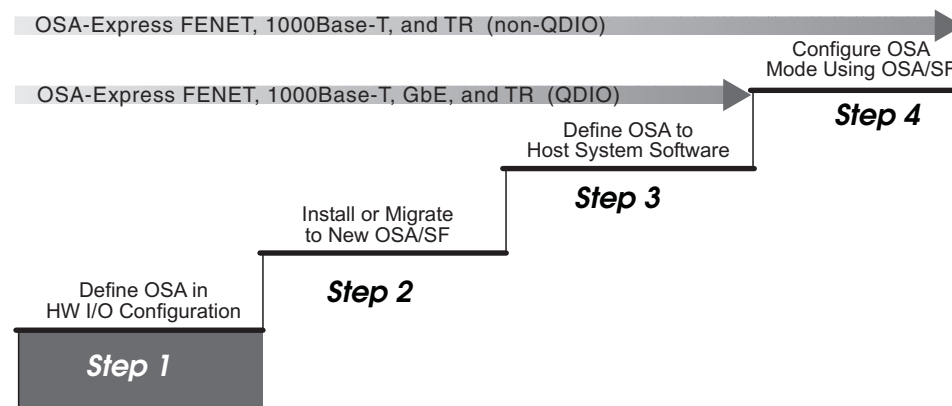


Figure 10. Step One in a Four-Step Process

The procedure in this chapter is for z/OS.

To configure the hardware I/O for z/VM see “VM Hardware I/O Configuration” on page 52.

To configure the hardware I/O for VSE/ESA, go to “VSE/ESA Hardware Configuration” on page 53.

You can also use the hardware management console to configure OSAs for any environment. See “Using the Hardware Management Consoles (HMC or SE)” on page 130.

Using HCD for Hardware I/O Configuration

This procedure shows you how to define an OSA-Express channel, *or port*, to the channel subsystem. The HCD data provides the basis for the TCP/IP or SNA definitions and OSA address table data that complete the port definition in Chapter 7, “Host Program Setup,” on page 101 and Chapter 8, “Configuring OSA-Express Modes,” on page 111.

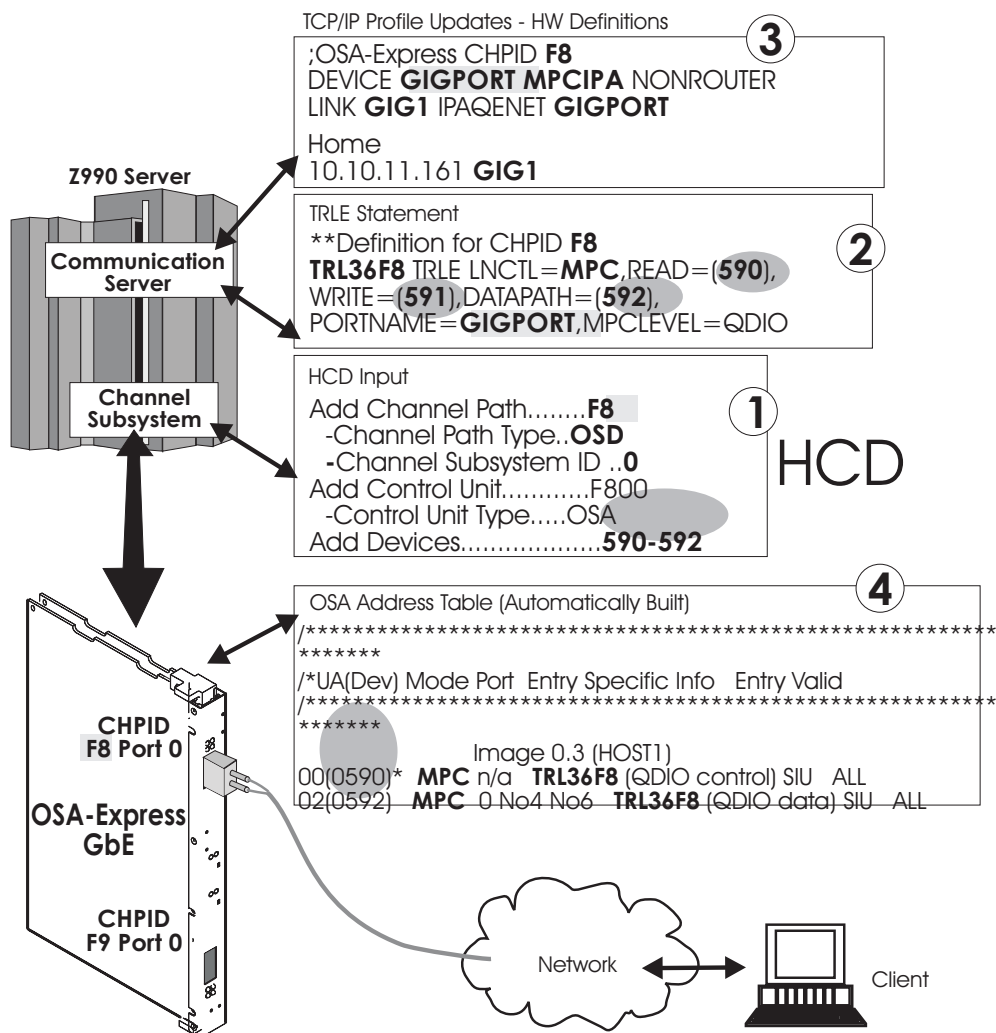


Figure 11. Defining an OSA-Express Port Connection

Figure 11 shows a high-level diagram for defining device addresses for a QDIO CHPID (OSD channel) in HCD, including how HCD input relates to definitions for TCP/IP and the OSA Address Table (OAT). For information about HCD and IODF, see the references cited at the end of this topic:

1. HCD identifies CHPID F8 and assigns device addresses 590 through 592. A minimum of three device addresses is required for QDIO (OSD channel), one each for READ and WRITE, and one DATAPATH per TCP/IP stack. OSE channels (non-QDIO) require only two devices: a READ and a WRITE device. These devices, either for OSE or OSD are mapped to subchannel numbers. It is the subchannel numbers that are counted, not the device numbers. In the example above, these same three device addresses (590-592) can be used by all LPARs. The number of subchannel numbers used depends on the number of LPARs specified.

Implementation Note: If the optional OSAD device is specified for use with OSA/SF, it does not subtract from the available subchannels for the OSA.

2. For a QDIO CHPID (OSD channel), the VTAM TRLE statement associates portname GIGPORT with device addresses 590–592 and enables the connection for TCP/IP and VTAM. For OSE or OSD channels, the portname is also used for communication with the Communications Server SNMP TCP/IP

subagent. For z/OS, it is the port name that is used to link the hardware to TCP/IP. For more information about port name restrictions, see "Port name relief" on page 19.

3. In the Figure 11 on page 38 example, the TCP/IP profile defines GIGPORT as device type MPCIPA with link type IPAQENET.
4. For a QDIO CHPID (OSD channel), the OSA Address Table (OAT) is automatically generated from HCD and software (TCP/IP and VTAM) definitions. For a non-QDIO CHPID (OSE channel), data for the OAT must be entered as described in Chapter 8, "Configuring OSA-Express Modes," on page 111.

Note: OSD (QDIO) devices added or modified dynamically with the "activate" option of HCD do not require a configure off/on of the OSA CHPID. The only changes needed are updates to Communication Server (TCP/IP profile and VTAM TRLE).

If you need more information for HCD or the hardware configuration definitions, refer to the one of these publications:

- *zSeries IOCP User's Guide*, SB10-7037
- *z/OS Hardware Management Console Guide*, SC28-6805
- *OS/390 HCD User's Guide*, SC28-1848

Configuring an OSA using HCD

Although the following HCD samples show data entered for an OSA-Express Gigabit Ethernet feature, the panels are the same for 10 Gigabit Ethernet, TR, FENET, or 1000Base-T. Required parameter values that differ are noted.

Preliminary Information that You Need: When an OSA-Express feature is installed, either in a new server or as an MES for an existing server, the ordering system that your IBM representative uses automatically specifies where the OSA-Express is to be plugged. This number is the physical channel ID (PCHID) number, which appears in a **PCHID Report** that your IBM representative provides. The CHPID number is any available CHPID number that you select. The CHPID number is used in the OSA-Express configuration and setup tasks.

Device Definitions - Summary:

- When you define an OSA device, a unit address from X'00' through X'FD' must be specified.
- For all OSAs, specify X'FE' as the unit address for the OSAD device, which is used for OSA/SF communications between OSA and the host.
- For a QDIO CHPID (OSD) you must define the OSAD device on logical control unit X'00' when multiple control units are defined or OSA/SF will not recognize the OSAD device.
- For non-QDIO CHPID (OSE channel) OSA-Express FENET, 1000Base-T, or TR, when using the default OAT, you must associate X'00' and X'01' as the unit address pair to the device pair for data transfer across port 0.

Defining Devices for z/OS

Three device numbers are required for the first TCP/IP stack defined on a z/OS image for QDIO: two control devices (one for READ, one for WRITE) and one DATAPATH device. Each subsequent stack defined on the z/OS image will share control devices but requires its own DATAPATH device. For example, if 8 stacks are defined on a single z/OS image for QDIO CHPID 3, then 10 devices are used, 8 DATAPATH devices, 1 READ device, and 1 WRITE device.

Defining Devices for Linux

Three devices (subchannels/unit addresses) are needed for each Linux TCP/IP interface that is defined for a QDIO CHPID: two control devices (one for READ, one for WRITE) and one DATAPATH device.

Defining Devices for both z/OS and Linux

Since z/OS and Linux allocate devices differently, the maximum number of TCP/IP interface that can be defined depends on the distribution of z/OS and Linux images where the CHPID will be defined.

Table 4. Device (subchannel) count table

OSA Type	First stack (one LPAR)	1+n stacks (one LPAR)	Example 1: 3 stacks / 1 LPAR	Example 2: 3 stacks / 5 LPARs
OSD - z/OS	3 devices	+1 device per stack	5 total device addresses, 5 subchannels	5 device addresses, 25 subchannels
OSD - Linux, VSE/ESA, z/VM	3 devices	+3 devices per stack	9 total device addresses, 9 subchannels	9 device addresses, 45 subchannels
OSE - all OS	2 devices	+2 devices per stack	6 total device addresses, 6 subchannels	6 device addresses, 30 subchannels

Examples 1 and 2 in Table 4 and the following examples illustrate how stacks and devices might be distributed in a mixed environment.

Example 3: An OSD CHPID is used to define three TCP/IP stacks on five z/OS LPARs (15 stacks). This requires 25 subchannels/unit addresses: a READ, a WRITE and 3 DATAPATH addresses per LPAR times 5 LPARs. Using a QDIO OSA-Express as an example, this leaves $480-25=455$ (on a z990 or above) subchannel addresses available for Linux. These 455 subchannels can be distributed among the remaining LPARs with one restriction that the maximum subchannel address per LPAR is 254. As Linux uses 3 subchannels/devices per stack, it would appear that 151 Linux stacks could be used. This would violate the 160 stack restriction, however, as z/OS has used 15 of the 160 stacks. Therefore, only 145 Linux stacks can be added even though there would appear to be enough subchannels for more stacks.

Example 4: A QDIO OSA-Express2 CHPID has been defined with 1920 subchannel/unit address (See how to do this in the next section and in the section "Define the Channel Path" on page 43). The z10 system has 30 LPARs defined, 29 LPARs running z/OS and one LPAR running z/VM with a large number of Linux guests. Assume each z/OS image has one (the recommended) TCP/IP stack. For HCD simplicity, all z/OS images use the same three device addresses: xx00-xx02. This consumes 87 subchannels across the 29 LPARs. Assume z/VM is running a TCP/IP stack of its own: 3 more subchannels. That leaves 1830 subchannels free. There is a 640 stack restriction on an OSA-Express2 or OSA-Express3 defined with 1920 devices. Unlike Example 1 in Table 4 on page 40, z/OS is only using 3 subchannels/device addresses per stack. Therefore, all 1830 subchannels can be used by Linux guests, and thus, 610 Linux TCP/IP stacks can be defined for z/VM Linux guests.

QDIO Stack Implementations

Table 5. QDIO Stack Implementations

OSA Type	Portname	Device Number	Stacks per LPAR
OSD – z/OS	Must match all stacks in all LPARs	Must match in all LPARs for all stacks	8 maximum
OSD – VSE/ESA, TPF	Must match all stacks in all LPARs	May be unique or same in each LPAR	
OSD - z/VM	Ignored (z/VM 4.3 with APAR PQ73878 and above)	May be unique or same in each LPAR	
OSD – Linux	- V2.4 kernel June 2003 stream and above - V2.6 kernel April 2004 stream and above	Must be different for each stack in an LPAR	OSA Limit

QDIO Stack and Device Guidelines on the z890 and z990 or Higher

The following QDIO stack and device guidelines apply to OSA-Express, OSA-Express2, and OSA-Express3.

- OSA unit addresses can be distributed across all LPARs or dedicated to one LPAR
- OSA unit addresses can be assigned to the same or different device addresses in LPARs
- The total number of unit addresses (subchannels) is a function of OSA type
- The first stack initialized establishes the PORTNAME on the OSA, unless the first stack is a Linux or z/VM stack, which does not set the portname. For more information about port name restrictions, see “Port name relief” on page 19
- All z/OS, VSE/ESA, and TPF stacks must use the same PORTNAME when sharing an OSA
- The maximum number of TCP/IP stacks that can be defined on z/OS is 8 per image

QDIO One Control Unit – 480 Unit Address Support

All OSA QDIO channels support 480 unit addresses (subchannels). While the 480 subchannels can be distributed across many LPARs, only 254 unit addresses can be assigned to one LPAR. This is because only one control unit is defined on the OSA channel. One control unit can only accommodate 256 devices per LPAR. (One device is reserved for the OSAD X'FE' unit address, and a second device is reserved to hardware, the X'FF' unit address.)

OSA QDIO Multiple Control Unit Support – z890 and z990 or Higher

When specific software levels are met (see “Multiple Control Unit Support” on page 20), OSA QDIO (OSD channels) support up to 16 control units. (OSE CHPIDs still have a limit of one control unit). Multiple control units permit one LPAR to have all 480 OSD subchannel addresses assigned to the one LPAR. Multiple control units can also be defined across multiple LPARs. The 480 subchannels can be defined and distributed any way the user chooses. Control unit X'00' only supports 254 subchannels, while subsequent control units can support 256 subchannels. Control unit X'00' uses one unit address for the OSAD X'FE' device and one unit address for the hardware X'FF' device.

OSA-Express Hardware Configuration

A good application of a large number of unit addresses (assigned to device addresses) in one LPAR is to support many Linux guests under one z/VM LPAR. Up to 160 Linux TCP/IP stacks can be defined under one z/VM LPAR (480 unit address / devices divided by 3 devices per Linux TCP/IP stack).

Implementation Note: If multiple control units are defined, the OSAD (X'FE') must be defined on Logical Address 00 (same as CUADD=00). The first control unit must be Logical Address 00.

640 TCP/IP Stacks (1920 Devices) Support – OSA-Express2 and OSA-Express3

When specific software levels are met (see “640 TCP/IP Stacks” on page 20), it is possible to specify more than 160 TCP/IP stacks per QDIO (OSD) OSA-Express2 and OSA-Express3 CHPID (OSA-Express does not support more than 160 stacks). This support disables OSA priority queuing and provides 1920 unit addresses for device number assignment. The support is enabled (turned "on") through the CHPID definition in HCD or IODF. For an example of how to enable this support, see “Define the Channel Path” on page 43.

A good use of this support is for more than 160 Linux TCP/IP stacks in one z/VM LPAR. Up to 640 Linux stacks can be defined (1920 subchannels divided by 3 devices/subchannels per Linux TCP/IP stack). Note that to define all 1920 devices in one LPAR, multiple control units will have to be used.

Implementation Note: PTFs have been added to HCD to permit z/OS V1R4 and z/OS V1R5 to build an IOCDS to support other LPAR (z/VM or Linux Native) use of 640 TCP/IP Stack Support. z/OS does not recognize the support until z/OS V1R6.

Stack and Device Maximums

Table 6. Stack and device maximums for OSD and OSE - OSA-Express

	z800/z900	z890/z990	z890/z990 or higher - Multiple Control Unit Support (MCU)	z890/z990 or higher - MCU plus greater than 160 Stack Support
LPARs that can share an OSA	1 - 15	1 to maximum allowable	1 to maximum allowable	1 to maximum allowable
OSE - Devices	240	240	Not Supported	Not Supported
OSE - Stacks	120	120	Not Supported	Not Supported
OSD - Devices	240	480 (across multiple LPARs)	480 in one or across multiple LPARs	Not Supported
OSD – Stacks	80	160	160	Not Supported

Table 7. Stack and device maximums for OSD and OSE - OSA-Express2

	z890/z990	z890/z990 or higher - Multiple Control Unit Support (MCU)	z890/z990 or higher - MCU plus greater than 160 Stack Support
LPARs that can share an OSA	1 to maximum allowable	1 to maximum allowable	1 to maximum allowable
OSE - Devices	240	Not Supported	Not Supported
OSE - Stacks	120	Not Supported	Not Supported
OSD - Devices	480 (across multiple LPARs)	480 in one or across multiple LPARs	1920 in one or across multiple LPARs
OSD - Stacks	160	160	Up to 640

Table 8. Stack and device maximums for OSD and OSE - OSA-Express3

	z10 or higher
LPARs that can share an OSA	1 to maximum allowable
OSE - Devices	240
OSE - Stacks	120
OSD - Devices	1920 in one or across multiple LPARs
OSD - Stacks	Up to 640

Table 9. Device maximums for OSN

OSN	Maximum Number of 3745 Devices	Maximum Number of OSN Devices
	180	480

Define the Channel Path

Using HCD, do the following to define the **Channel Path**.

- ___ 1. From the **Define, Modify, or View Configuration Data** (main panel), select **3. Processors**.
- ___ 2. Select the required processor from the **Processor List** panel, then, to display the **Channel Subsystem List**, select **Work with channel subsystems . . . (XMP)**.
- ___ 3. From **Channel Subsystem List**, select the appropriate channel subsystem, then from the context menu, select the **Work with attached channel path** action. HCD displays the **Channel Path List** showing all channel paths defined for the selected processor/channel subsystem.
- ___ 4. Press F11 on the keyboard to add a new channel path. The **Add Channel Path** panel is displayed.

```

Goto  Filter  Backup  Query  Help

                                Add Channel Path

Specify or revise the following values.

Processor ID . . . . : ZOS1
Configuration mode . : LPAR
Channel Subsystem ID : 0          CSS 0 for ZOS01

Channel path ID . . . . F8  +          PCHID . . . 370_
Number of CHPIDs . . . . 1
Channel path type . . . OSD  +
Operation mode . . . . . SHR  +
Managed . . . . . No    (Yes or No)  I/O Cluster _____ +
Description . . . . . _____

Specify the following values only if connected to a switch:
Dynamic entry switch ID ____ + (00 - FF)
Entry switch ID . . . . ____ +
Entry port . . . . . ____ +

F1=Help    F2=Split    F3=Exit    F4=Prompt    F5=Reset    F9=Swap    F12=Cancel

```

Figure 12. Add Channel Path

- ___ 5. Enter the required information using the following guidelines:
 - Channel path ID is the OSA-Express, OSA-Express2, or OSA-Express3 (CHPID) number.
 - **PCHID** is the physical channel identifier (PCHID) to the channel path identifier (CHPID) and is required for defining configurations on the z990 processor. The CHPID Mapping Tool (CMT) can be used to make the mapping between CHPIDs and PCHIDs easier. For complete information on HCD and defining channel paths, see *z/OS HCD User's Guide*.
 - Channel path type must be either **OSD** for QDIO, **OSE** for non-QDIO, or **OSN** for OSA NCP. The OSA-Express Gigabit Ethernet feature must be defined as channel path type **OSD** and runs in QDIO mode. The FENET, 1000Base-T Ethernet, and TR features can be defined as **OSD** to run in QDIO mode or as **OSE** to run IP Passthru and SNA modes. The TR feature can be defined as **OSD** or **OSE** for IP traffic but only as **OSE** for SNA.
 - Operation mode is either **DED** (dedicated), **SHR** (shared), **REC** (reconfigurable), or **SPAN** (spanned). The SPAN option is only available on z890, z990 and Danu with z/OS V1.5 or z/VM R5.1 or later.
 - Enter a description of **OSA-Express (feature type)** for future reference.
 - The other fields for switches are not applicable.
- ___ 6. When complete press Enter. If running z/OS V1R6 or later, z990, and the channel type is OSD, the **Allow for more than 160 TCP/IP stacks** panel will pop-up asking if more than 160 TCP/IP stacks will be defined: Yes or No. This window will not appear if the channel type is OSE.

Allow for more than 160 TCP/IP stacks

Specify Yes to allow more than 160 TCP/IP stacks, otherwise specify No.

Will greater than 160 TCP/IP stacks be required for this channel? . . . No

F1=Help

F2=Split

F3=Exit

F5=Reset

F9=Swap

F12=Cancel

Figure 13. Allow for more than 160 TCP/IP stacks panel

If "NO" is specified, 480 subchannel addresses will be generated for the CHPID and priority queuing will be supported on this CHPID. If coding an IODF flat-file, code parameter CHPARM=00 on the CHPID macro or do not code it at all: CHPARM=00 is the default.

If "YES" is specified, 1920 subchannel addresses will be generated for the CHPID and priority queuing will not be supported on this CHPID. If coding an IODF flat-file, code parameter CHPARM=02 on the CHPID macro.

Note: A reply of "YES" is only valid on QDIO OSA-Express2 and OSA-Express3 CHPIDs. If "YES" is specified for a QDIO OSA-Express CHPID, a "definition error" will appear on the CHPID icon on the SE/HMC after the IODF is loaded.

7. The **Define Access List panel** is displayed. For the z990 processor, the **Define Access List** shows the partitions defined for all channel subsystems (identified as CSS x in the description field, where x is the channel subsystem identifier):

Define Access List

Row 1 of 4

Select one or more partitions for inclusion in the access list.

Channel subsystem ID: 0

CS 0

Channel path ID F8

Channel path type .. OSD

Operation mode SHR

Number of CHPIDs ... 1

/CSS ID	Partition Name	Number	Usage	Description
/ 0	PROD1	1	OS	Used for Gigabit Ethernet of CSS 0
/ 0	PROD2	2	OS	Second production partition of CSS 0
/ 0	TEST1	3	OS	First test system of CSS 0
/ 0	TEST2	4	OS	Second test system of CSS 0

F1=Help

F2=Split

F3=Exit

F4=Prompt

F5=Reset

F9=Swap

Figure 14. Define Access List

8. Specify those images which will have initial access to this OSA-Express (CHPID) and press Enter. You receive the **Define Candidate List**. From this list you can select images that can be brought online after IPL. If you use OSA/SF, include all the images that run OSA/SF. If you want a logical partition to access a dedicated, reconfigurable, or shared OSA-Express channel path when you initially activate the logical partition, place that logical partition in the channel path access list. For shared channel paths, you can place more than one partition in the access list.

```

Define Candidate List                               Row 1 of 4

Select one or more partitions for inclusion in the candidate list.

Channel subsystem ID: 0                             CS 0
Channel path ID ..:: F8                             Channel path type :: OSD
Operation mode ..:: SHR                             Number of CHPIDs ... 1

/CSS ID Partition Name Number Usage Description
/ 0 PROD3 5 OS Third production image of CSS 0
/ 0 PROD4 6 OS Fourth production image of CSS 0
/ 0 PROD5 7 OS Fifth production image of CSS 0
F1=Help F2=Split F3=Exit F4=Prompt F5=Reset F9=Swap

```

Figure 15. Define Candidate List

- ___ 9. Press Enter to return to the **Channel Path List panel**.

Note: In this example we have given the OSD CHPID potential access to a total of 7 images.

Define a Control Unit

- ___ 1. From the **Channel Path List** panel, enter **s** next to the CHPID (OSD, OSE or OSN) you previously defined.
- ___ 2. From the Control Unit List panel, press F11 to add a control unit for the channel path.

```

Add Control Unit

Specify or revise the following values.

Control unit number      ....F800 +
Control unit type        .....OSA _____+

Serial number ....._____
Description ..... OSA connection to zOS1

Connected to switches ..._ _ _ _ _ _ _ _ _ _+
Ports .....          _ _ _ _ _ _ _ _ _ _+

If connected to a switch:

Define more than eight ports ..2 1.Yes
                               2.No

Propose CHPID/link addresses and
unit addresses .....2 1.Yes
                               2.No

```

Figure 16. Add Control Unit (1 of 2 panels)

- 3. Specify the control unit number and a **Control unit type** of **OSA**. For OSA NCP, the **Control unit type** is **OSN**. Space is provided for a description. The other fields are not applicable.
- 4. Press the Enter key and the **Select Processor / Control Unit** panel will be displayed. Select the channel subsystem (CSS ID).
- 5. Type **s** to choose the processor in which this OSA feature is installed. (If you have a large number of processors defined, scroll forward to show the required processor entry, depending on how you came to this panel). The OSA control unit can be shared between the images within the same

processor, so do not assign this OSA CU number to more than one processor or more than one channel sub-system in this HCD IODF unless the device number is the same.

- ___ 6. Press Enter and the next ***ADD Control Unit (second panel)*** panel will be displayed.

```

Add Control Unit

Specify or revise the following values.

Control unit number  .: F800      Type .....: OSA
Processor ID .....  : Z0S1      Raised floor production
Channel Subsystem ID .: 0

Channel path IDs .... F8  ___  *   *   *   ___  ___  ___  +
Link address .....  ___  ___  ___  ___  ___  ___  ___  +

Unit address .....   00  ___  ___  ___  ___  ___  ___  +
Number of units .... 255  ___  ___  ___  ___  ___  ___  ___

Logical address ....  ___  + (same as CUADD)

Protocol ..... ..  ___  + (D,SorS4)
I/O concurrency level. 2  + (1,2 or 3)

```

Figure 17. Add Control Unit (2 of 2 panels)

- ___ 7. Enter the remaining control unit definitions using the following guidelines.
- The CHPID number entry is provided if you are using the HCD hierarchical definition method to define this OSA CU (Processor to CHPID to CU to I/O device).
 - The OSA control unit requires 00 as the starting unit address and 255 as the number of units (although only 240 devices can be used on an OSE).
 - If multiple control units are to be specified, specify a hexadecimal number between 0 – F in the Logical Address field. If multiple control units are not to be specified, leave this field blank. If coding an IODF flat-file, code the CUADD parameter. If the OSAD ("FE") device is defined, it must be specified on Logical Address 00 (same as CUADD=00).
 - Define an OSA control unit I/O concurrency level of 2. I/O concurrency level 2 specifies that multiple I/O operations may be sent between the channel subsystem and the OSA control unit and will be managed by the OSA-Express feature.

Define OSA Devices

For information on defining OSA NCP devices, see “Define OSN and 3745 Devices” on page 50.

For information on defining the OSAD device for OSA/SF, see “Define the OSAD Device for OSA/SF” on page 52.

1. From the **Control Unit List panel** enter **s** next to the control unit that you just defined. The **I/O Device List** panel is displayed.
2. Press F11 to add devices. The **Add Device** panel is displayed.

```

Add Device

Specify or revise the following values.

Device number ..... 590
Number of devices .....3
Device type ..... OSA      +

Serial number .....
Description .....

Volume serial number... (for DASD)

Connected to CUs.....F800

F1=Help F2=Split F3=Exit F4=Prompt F5=Reset F9=Swap

```

Figure 18. Define Device

- ___ 3. Enter the OSA-Express device definitions and use the following guidelines:
 - For **Number of devices**:
 - Any OSD channel (FENET, 1000Base-T, TR, Gigabit Ethernet, or 10 Gigabit Ethernet)**
Requires three devices (READ, WRITE, and DATAPATH).
 - TR (OSE) IP Traffic**
Requires two devices for each READ/WRITE, even/odd device pair for the physical port to run in TCP/IP Passthru mode.
 - TR (OSE) SNA Traffic**
Requires one device number for each physical port to run in SNA mode and the OSAD device to permit CHPID configuration.
 - FENET and the 1000Base-T (OSE) IP Traffic**
Requires two devices for each READ/WRITE, even/odd device pair for the physical port to run in TCP/IP Passthru mode.
 - FENET and the 1000Base-T (OSE) SNA Traffic**
Requires one device number for each physical port to run in SNA mode and the OSAD device to permit CHPID configuration.
 - Enter **OSA** as the **Device type** and any appropriate description.
 - When complete, press Enter: either the **Update Serial Number and Description** panel or the **Device/Processor Definition** panel is displayed. Make any changes to the device description in the **Update Serial Number and Description** panel. The following is an example of the **Device/Processor Definition** panel:

```

Device / Processor Definition

Select processors to change device/processor definitions.

Device number ..... 590      Number of devices .....3
Device type ..... OSA      +

/Proc.CSSID      UA + Time-Out      Preferred      Explicit Device
PROC.0          00 No               STADET        CHPID +      Candidate List
                                   No               _____ No

F1=Help F2=Split F3=Exit F4=Prompt F5=Reset F9=Swap

```

Figure 19. Device / Processor Definition

- On the **Device/Processor Definition** panel, select the processor to change the device/processor definitions and press Enter. On the next panel, you need to specify the starting unit address. It is recommended that you specify **00** as the starting unit address. **You must specify 00 for the OSA-Express FENET, the 1000Base-T, or TR feature to run TCP/IP Passthru using the default OAT.** For **Explicit Device candidate list**, enter **YES** to define the list. You can use the explicit device candidate list to distribute device unit addresses that are associated with the device addresses among the processor images. If you want each image that you select to have access to the addresses of all devices in the list, enter **NO** for the option.
- Accept the default values for the other panel fields.
- When defining devices for OSD CHPIDs, it is important to remember that prior to z/OS V1.6 and z/VM V5.1 on OSA-Express or OSA-Express2, there is a maximum of 480 device unit addresses per OSD CHPID (for z890 and z990) and a maximum of 160 TCP/IP stacks per OSD CHPID. The limits have been extended with OSA-Express2 and OSA-Express3 for z/OS V1.6, z/VM V5.1, and Linux kernel 2.4. See “QDIO Stack and Device Guidelines on the z890 and z990 or Higher” on page 41 for more information.

Note: In this example we did not specify a device candidate list so the OSD CHPID may be accessed by 7 images. We did define 3 devices, therefore, each image has access to the 3 devices. So, we have used (7×3=21) devices.

```

Device / Processor Definition
Define Device / Processor

Specify or revise the following values.

Device number ..... 590      Number of devices .....3
Device type ..... OSA      +
Processor id
Channel subsystem id: 0

Unit Address .....00 + (Only necessary when different from
                        the last 2 digits of device number)

Time-Out.....No (Yes or No)
Stadet.....No (Yes or No)

Preferred CHPID....._ +
Explicit device candidate list . No (Yes or No)+

F1=Help F2=Split F3=Exit F4=Prompt F5=Reset F9=Swap

```

Figure 20. Device / Processor Definition — Define Device / Processor

- If you specified **Yes** for the **Explicit device candidate list** option and press Enter, the **Define Device Candidate List** panel is displayed.
- If you defined the CHPID as dedicated (DED) or reconfigurable (REC), there is no device candidate list. Continue with the next step. Otherwise, complete the **Define Device Candidate List** panel by selecting the image that needs access to these OSA devices.
- Define the devices to the Operation System Configurations. Use HCD action code **s** to select the relevant software configurations, and the press Enter.

- Enter the following in the **Define Device Parameters/Features** panel.
 - OFFLINE=NO (default), for these devices to be available online upon IPL.
 - Specify DYNAMIC=YES (default).

Define OSN and 3745 Devices

Follow these guidelines only if you want to define OSN and 3745 devices.

1. From the **Control Unit List panel** enter **s** next to the control unit that you just defined. The **I/O Device List.** panel is displayed.
2. Press F11 to add devices. The **Add Device** panel is displayed.

Add Device

Specify or revise the following values.

Device number 5201 (0000-FFFF)

Number of devices1

Device type 3745 +

Serial number _____

Description _____

Volume serial number..._____ (for DASD)

Connected to CUs.....5200

F1=Help F2=Split F3=Exit F4=Prompt F5=Reset F9=Swap

Figure 21. Define 3745 Device

3. Enter the OSA-Express device definitions and use the following guidelines:
 - For **Number of devices**:
 - Any OSN channel (OSA-Express2 1000Base-T or OSA-Express2 Gigabit Ethernet)**
 - Requires a minimum of three OSN devices (READ, WRITE, and DATAPATH).
 - Requires a minimum of one 3745 device
 - Enter **3745** as the **Device type** and any appropriate description.
 - When complete, press Enter: either the **Update Serial Number and Description** panel or the **Device/Processor Definition** panel is displayed. Make any changes to the device description in the **Update Serial Number and Description** panel. The following is an example of the **Device/Processor Definition** panel:

```

Device / Processor Definition

Select processors to change device/processor definitions.

Device number ..... 5201      Number of devices .....1
Device type ..... 3745      +

/Proc.CSSID      UA  + Time-Out      STADet      Preferred  Device Candidate List
/T76.0           ___ No              No          ___      Explicit      Null
/T76.3           ___ No              No          ___      No              ___

F1=Help F2=Split F3=Exit F4=Prompt F5=Reset F9=Swap

```

Figure 22. Device / Processor 3745 Definition

- On the **Device/Processor Definition** panel, select the processor to change the device/processor definitions and press Enter. On the next panel, you need to specify the starting unit address. For **Explicit Device candidate list**, enter **YES** to define the list. You can use the explicit device candidate list to distribute device unit addresses that are associated with the device addresses among the processor images. If you want each image that you select to have access to the addresses of all devices in the list, enter **NO** for the option.
- Accept the default values for the other panel fields.

```

Device / Processor Definition
Define Device / Processor

Specify or revise the following values.

Device number . : 5210      Number of devices .....3
Device type . . : OSN
Processor id . . . : T76
Channel subsystem id : 0      CS(0)

Unit Address .....10 + (Only necessary when different from
                        the last 2 digits of device number)

Time-Out.....No (Yes or No)
Stadet.....No (Yes or No)

Preferred CHPID....._ +
Explicit device candidate list . Yes (Yes or No)+

F1=Help F2=Split F3=Exit F4=Prompt F5=Reset F9=Swap

```

Figure 23. Define OSN Device / Processor Definition

- If you specified **Yes** for the **Explicit device candidate list** option and press Enter, the **Define Device Candidate List** panel is displayed.
- If you defined the CHPID as dedicated (DED) or reconfigurable (REC), there is no device candidate list. Continue with the next step. Otherwise, complete the **Define Device Candidate List** panel by selecting the image that needs access to these OSA devices.
- Define the devices to the Operation System Configurations.
Use HCD action code **s** to select the relevant software configurations, and the press Enter.
- Enter the following in the **Define Device Parameters/Features** panel.
 - OFFLINE=NO (default), for these devices to be available online upon IPL.

- Specify DYNAMIC=YES (default).

Define the OSAD Device for OSA/SF

Follow these guidelines only if you are using OSA/SF.

There is only one OSAD device per CHPID. This device is used to communicate between the adapter and the operating system running OSA/SF. For all OSA channel types, define the OSAD device on logical control unit X'00'.

Perform the same steps listed in “Define OSA Devices” on page 47, but use these guidelines.

- Specify **OSAD** for the **Device type**.
- Define one device number with a unit address of X'FE'. Hint: As a suggestion, specify the OSAD device address in the first 16 device addresses for z/OS. For example if the first device address is X'1200', the second X'1201', and so on, make the OSAD X'120F'. This will permit the ONLINE/OFFLINE status (D U,,,1200) to show the OSAD device.
- Accept the default **No** for the device explicit candidate list to allow the OSAD device to be shared among multiple images.
- Define this device with the following Operating System Configuration parameter values:
 - OFFLINE=NO (default), for these devices to be available online upon IPL.
 - DYNAMIC=YES (default), for the device to be dynamic

Notes:

1. OSAD device definitions do not count against the limit of device unit addresses per CHPID.
2. If multiple control units are defined to the CHPID, the OSAD device must be defined on Logical Address 00 (same as CUADD=00).

VM Hardware I/O Configuration

For z/VM, define an OSA channel path with its connected, or attached, control unit plus the devices that are required by the OSA mode or modes in which the OSA is being run.

Beginning with z/VM 4.4 HCM/HCD is available to you. See “Using HCD for Hardware I/O Configuration” on page 37 as a guide.

If you define an OSA to z/VM dynamically, you can use the dynamic I/O configuration commands, but the data is put in the HSA and will not be kept after the system is shut down. To keep data across IPLs, you must also define the OSA in the system hardware I/O configuration using IOCP statements. Shown below are the VM dynamic I/O configuration statements for an OSA-Express OSE CHPID identified as X'20'.

```
CP DEFINE CHPID 20 TYPE OSE SHARED ACC LPLEFT1 LPRIGHT1 INIT LPLEFT1 INIT LPRIGHT1
CP DEFINE CU F00 TYPE OSA CHPID 20
CP DEFINE DEVICE F00-F03 UNIT_A 00 CU F00 PAR LPLEFT1 LPRIGHT1
CP DEFINE DEVICE 1FE UNIT_A FE CU F00 PAR LPLEFT1 LPRIGHT1
```

For more information on the user input required, see the descriptions that start on page 37. For information on the VM statements, see *Planning and Administration* and *z/VM I/O Configuration* in the z/VM library, listed in the bibliography.

VSE/ESA Hardware Configuration

There are two ways to add device numbers to a VSE/ESA system image.

- Select **Fastpath 241** to get to the *Configure Hardware* dialog and add the device numbers to VSE/ESA that way.

You must have the highest authority level, which is usually reserved for the system programmer under user ID **SYSA**.

- Alternatively, you can code the device numbers for VSE/ESA manually for each image in the VSE/ESA \$IPLESA.PROC member in the IJSYSRS.SYSLIB library. Note, however, that these definitions are lost once you use the *Configure Hardware* dialog.

For information on defining devices to VSE/ESA, see the VSE/ESA books listed in the bibliography. Note that VSE/ESA views an OSA device as a telecommunications device.

Keep in mind that:

- For OSE (non-QDIO) the device type is OSA
- For OSD (QDIO) the device type is OSAX
- For the OSAD device the device type is OSAD
- For OSN the device type is 3745

IOCP

You can use IOCP natively to perform I/O configuration. The example below shows IOCP statements equivalent to the HCD panel definitions described earlier in this chapter.

```
.
      CHPID PATH=(CSS(0),F8),PCHID=370,      *
      PART=((PROD1,PROD2,TEST1,TEST2),      *
            (PROD3,PROD4,PROD5)),TYPE=OSD,SHARED
      CNTRLUNIT CUNUMBR=F800,PATH=(CSS(0),F8), *
      UNIT=OSA
      IODEVICE CUNUMBR=F800,ADDRESS=(590,3), *
      UNIT=OSA,UNITADD=00
```

For more information on the user input required, see the descriptions that start on page 37.

Chapter 3. Setting Up OSA/SF on z/OS

Before you can configure and manage a non-QDIO OSA (channel type OSE), you must set up OSA/SF and a user interface of your choice (OSA/SF REXX command interface or OSA/SF GUI). This chapter provides instructions for setting up OSA/SF on z/OS.

For information about setting up and using the REXX command interface (IOACMD EXEC) and the GUI for OSA/SF, see Chapter 6, “Setting up and Using the OSA/SF Interfaces,” on page 85.

If you are running OSA/SF in a VM environment, see Chapter 4, “Setting Up OSA/SF on z/VM,” on page 69.

If you are running OSA/SF in a VSE environment, see Chapter 5, “Setting Up OSA/SF on VSE/ESA,” on page 79.

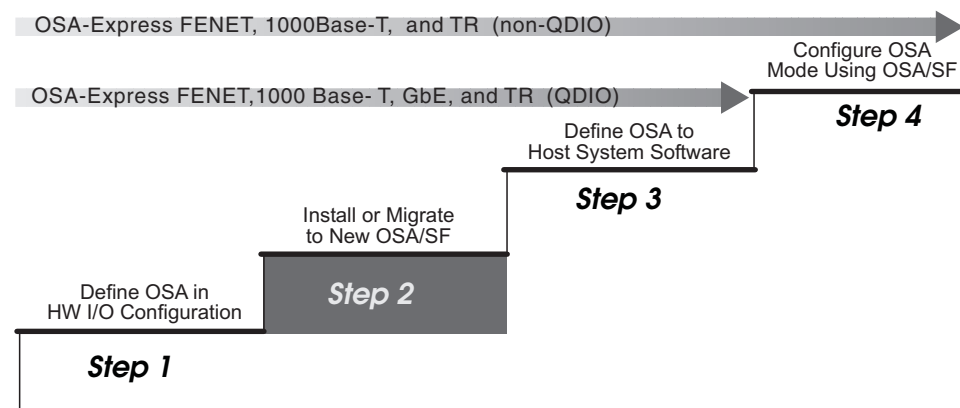


Figure 24. Step Two (z/OS) in a Four-Step Process

Choosing the OSA Modes

Determine which OSA modes (non-QDIO or QDIO) to use for each OSA. This decision underlies all of the remaining setup tasks and whether you need to use OSA/SF:

- TCP/IP Passthru that uses the default OAT for a non-QDIO OSA-Express feature (OSE channel) does not require OSA/SF.
- Any other non-QDIO OSA-Express feature (OSE channel) requires OSA/SF to configure the OSA.
- Any QDIO OSA-Express feature (OSD channel) does not require OSA/SF.
- The OSA-Direct Express (OSD) SNMP subagent, does not require OSA/SF, but it **is required** for SNMP support that uses the Communications Server SNMP TCP/IP SNMP subagent. See “Support for Simple Network Management Protocol (SNMP)” on page 31 for more information.

OSA/SF and the z/OS Environment

Ensure the system pre- and co-requisites are met for hardware and software in a z/OS environment.

Instructions: Use these instructions after you have installed OSA/SF according to the Program Directory. Once OSA/SF is installed, do the following steps:

1. “Set up the Started Procedure Task” (Required)
2. “Define the Startup Profile” on page 57 (Required)
3. “Setting up z/OS to run as a guest of VM” on page 60 (for VM guest systems only)
4. “Set up the Configuration and Master Index Files” on page 60 (Required)
5. “Set up APPC/MVS and VTAM for OSA/SF” on page 61 (optional)
6. “Set up the Communications Server SNMP TCP/IP subagent” on page 64 (optional)

Set up the Started Procedure Task

Do the following to set up an OSA/SF Started Procedure (task) for z/OS

- ___ 1. Copy the sample procedure from the **IOA.SIOASAMP** library member **IOAOSASF** into SYS1.PROCLIB or another system procedure library.
- ___ 2. Edit the sample procedure you just copied. See Figure 25.

OSASF1 is the name of the EXEC used in the sample, but you can change the name.

OSA/SF Started Procedure Name _____

Note: OSA/SF must be APF-authorized or it will not function. You must have SIOALMOD in either the PROGxx or IEAAPFxx member in your SYS1.PARMLIB data set. Depending on your library structure, there may be other ways to authorize OSA/SF. See *z/OS MVS Initialization and Tuning Reference* for more information.

```

/*  START OSA SUPPORT FACILITY
/*
//OSASF1  EXEC PGM=IOAMAIN,TIME=1440,REGION=6000K,DYNAMNBR=5,
//        PARM='HEAP(8M,4M,,FREE)/'
//STEPLIB DD DSN=CEE.SCEERUN,DISP=SHR
//        DD DSN=SYS1.SIOALMOD,DISP=SHR
//IOALIB  DD DSN=SYS1.SIOALMOD,DISP=SHR
//IOAPROF DD DSN=IOA.STARTUP.PROFILE,DISP=SHR
//SYSPRINT DD SYSOUT=A,DCB=(RECFM=FBA,LRECL=121,BLKSIZE=121)
//SYSUDUMP DD SYSOUT=H

```

Figure 25. Sample Started Procedure (IOA.SIOASAMP Member IOAOSASF)

- ___ 3. Ensure that the data set names in the **STEPLIB** and **IOALIB** statements match the names used for the C runtime libraries and the OSA/SF code loadlib of your z/OS system. The Program Directory provides instructions for including the SIOALMOD data set in the link list. The LE/370 runtime libraries must be in an APF library.
- ___ 4. Change the IOAPROF DD statement, **STARTUP.PROFILE**, to a name that you want to use for the Startup Profile. You will copy the sample Startup Profile into this data set in the next step.

If there will be multiple OSA/SF images on the system, you can use the same Startup Profile.

Attention

If you use dynamic allocation for SYSPRINT or SYSUDUMP, you will not be warned when an existing copy of OSA/SF is already running.

Define the Startup Profile

Do the following to set up an OSA/SF Startup Profile as shown in Figure 26 on page 58:

```

* See the OSA-Express Customer's Guide and Reference for additional
* information on setting up the Startup Profile.
*
* The SET NAME statements that follow are used to define datasets
* that are needed by OSA/SF. You can have variable names in these
* definitions using the reserved keywords CECNAME and/or SYSNAME.
* Usage of these keywords are shown in the examples that follow.
*
* You must specify the values these keywords will have using the
* SET ALIAS command before any of the SET NAME statements occur.
* The SET ALIAS CECNAME statement is required even if you do
* not use it in any of the SET NAME statements.
* The SET ALIAS SYSNAME statement is optional.
*
SET ALIAS CECNAME CEC1
SET ALIAS SYSNAME SYSTEM1
*
* IOACFG defines the OSA configuration file that is used by OSA/SF.
*
SET NAME IOACFG
  DATASET 'IOA.&CECNAME.OSAS.CONFIG;'
  UNIT 3390
  VOLSER 339008
*
* IOAINX defines the OSA master index file that is used by OSA/SF.
*
SET NAME IOAINX
  DATASET 'IOA.&CECNAME.MASTER.INDEX;'
  UNIT 3390
  VOLSER 339005
*
* IOAMSG defines the OSA message log file that is used by OSA/SF.
* The OSA/SF started task will add '.Ixy' to the dataset name you
* specify, where x is the Logical Channel Subsystem and y is the
* Image number that OSA/SF is running on.
*
* Versions of OSA/SF lower than H0GI400 will add '.LPnn' to the
* dataset name you specify, where 'nn' is the LP number that OSA/SF
* is running on.
*
SET NAME IOAMSG
  DATASET 'IOA.&CECNAME.MESSAGE.LOG;'
  UNIT 3390
  VOLSER 33900C
*
* IOADSN defines the high level qualifier OSA/SF will use when
* creating datasets for its own use.
*
SET NAME IOADSN
  DATASET 'IOA.&CECNAME.OSASF;'
  UNIT 3390
  VOLSER 33900C
*
* The following SET APPC statement is used to specify the LU
* name that OSA/SF should use. If you omit this, the default
* is set to IOASERV.
*
SET APPC NAME IOASERV
*
* The SET SYSINFO statements may be used to remap existing CHPID
* numbers. See the OSA-Express Customer's Guide and Reference for
* details.

```

Figure 26. Sample Startup Profile (IOA.SIOASAMP Member IOASPROF)

- 1. Allocate a data set for the Startup Profile name you selected. Request primary quantity (space) of 2 tracks, secondary quantity of 2 tracks, and sequential directory blocks=0. The attributes of this data set should be RECFM=FB, LRECL=80, and BLKSIZE=5120.

- ___ 2. Copy the sample Startup Profile from the **IOA.SIOASAMP** library member **IOASPROF** into the Startup Profile data set you just allocated.

OSA/SF Startup Profile Name _____

- ___ 3. Edit the sample Startup Profile you just copied, using the instructions within the profile and the Startup Profile Guidelines on page 59.

- ___ a. As indicated in the header of the profile, the SET ALIAS CECNAME statement is required. Record the name you specify. The SET ALIAS SYSNAME is optional. If you use it, also record the name for later use.

SET ALIAS CECNAME = _____ (required)

SET ALIAS SYSNAME = _____ (optional)

- ___ b. Change the VOLSER and UNIT to identify the disk pack you want the files on. If you do not want to specify a unit type for each data set, replace UNIT 3390 with UNIT SYSALLDA. If VOLSER is specified, you must specify UNIT.
- ___ c. If you do not want to use the default **IOASERV** for the APPC LU name, include the statement **SET APPC NAME *luname***, replacing ***luname*** with an eight-character name that starts with an alpha character. If the statement is not included in the profile, the LU name defaults to IOASERV.

LU name for APPC = _____

Note: This APPC LU name must agree with the LU name specified for MVS and VTAM in step 2 on page 61.

Startup Profile Guidelines

- The SET ALIAS statements must occur before the SET NAME statements. SET ALIAS CECNAME is required. Specify a name with a maximum of eight characters. The SET ALIAS SYSNAME is optional. You can provide the name of the image or remove the statement.
- The SET command defines the data set names for: IOACFG, IOAINX, IOAMSG, and IOADSN.
- Data set names must be unique and contained within single quotes.
- Data set names for IOACFG and IOAINX can contain a maximum of 44 characters. IOAMSG can contain a maximum of 30 characters, and IOADSN can contain a maximum of 26 characters.
 - Periods are counted as part of the allowed number of characters.
 - Qualifiers cannot exceed eight characters.
 - The first character of all qualifiers must be a letter.
- If &CECNAME or &SYSNAME are used as variables in the data set names, they must be
 - Followed immediately by a period when used as the first item in the data set name
 - Preceded immediately by a period when used as the last item in the data set name.
- The SET APPC NAME command defines the LU name for APPC. If the command is not included, the LU name defaults to IOASERV.
- VOLSER can have a maximum of six characters and UNIT a maximum of eight characters. When VOLSER is used, there must be a UNIT specified.

- No blank lines.
- Comment lines are indicated with the first non-blank character set to an asterisk `"**"`. Everything after the asterisk is omitted until the next line in the data set.
- Comments between the SET command and the other keywords (DATASET, VOLSER, and UNIT) can be used within the command.
- Data must be in columns 1 to 70.
- No wrapping is supported.
- File is not case sensitive, as all characters are translated to upper case.

Set up the Configuration and Master Index Files

The configuration and master index files are described as follows:

- **IOACFG** is the OSA configuration file used internally by OSA/SF. It defines what should be installed for each OSA. Since the same OSA CHPID can be shared by multiple systems (images), it should be defined as shared between the host images. *You do not have to do anything with this file.*
- **IOAINX** is the master index file that defines all the available OSA mode code for OSA-2 only. OSA/SF requires this data set to be defined.
- **IOAMSG** is used by OSA/SF to store messages and status. The OSA/SF started task will add `'.lxy'` to the data set name you specify, where `'xy'` is the logical channel subsystem. For customers without logical channel support, `'x'` will be 0 and `'y'` is the number the OSA/SF is running on. IOAMSG is not shared between images.. OSA/SF will allocate and use the data set as needed. *You do not have to do anything with this file.*
- **LOADSN** is the starting high level qualifier for all data sets that are created for use by OSA/SF. These data sets have two main purposes:
 1. To store user input for configuration in a compact format until needed upon activation
 2. To store data pertaining to each OSA CHPID in files built and updated dynamically by OSA/SF

In order to allow instances of OSA/SF running on different images to get to the same data, or perform activation on previously defined configurations, these data sets should be defined as shared across all images. The files that use this high-level qualifier will be allocated by OSA/SF as needed.

If you are not defining a guest system to run on VM, continue with “Checklist for the OSA Configuration and Master File Index” on page 61.

Setting up z/OS to run as a guest of VM

Continue with this section **only if** z/OS is running as a guest of VM **and** you have a need to identify virtual CHPID numbers and device numbers. In the Startup Profile, you can associate a virtual number with a real number for CHPIDs and device numbers. Otherwise, proceed to “Checklist for the OSA Configuration and Master File Index” on page 61.

Attention

When the system is running as a VM guest, consider the following:

- You must define the OSA to the VM host system image.
- For information about using the RMCHINFO option in the OPTION Directory Control statement, see “Decide whether to Specify RMCHINFO” on page 74.

Specifying real and virtual CHPID numbers allows the use of CHPIDs by z/OS when running as a guest of VM.

Include the SET SYSINFO command in the Startup Profile as shown below. Specify the real and virtual CHPID numbers that you want to associate:

SET SYSINFO CHPID (REAL xx VIRTUAL yy)

- The maximum length of the command string is 70 characters.
- The command is not case sensitive.
- Replace the variables with hexadecimal numbers.
- All command parameters must be separated by spaces.
- If you include more than one SYSINFO statement, they do not have to be next to each other.
- Do not include this command if z/OS is not running as a guest of VM.

This information will not be shared between multiple images on the same system and will not be saved between invocations of OSA/SF. It must be present in the STARTUP.PROFILE on each invocation of OSA/SF for which the remapping is required.

Starting in H0GI400, the device key word on SET SYSINFO is no longer supported.

Checklist for the OSA Configuration and Master File Index

Allocate the following two new sequential data sets and then copy the members shown in Figure 26 on page 58 **IOA.SIOASAMP** into the new data sets. Replace **&CECNAME** with the name used in step 3a on page 59.

Members in IOA.SIOASAMP	New Sequential Data Set Names
IOACFG	IOA.&CECNAME.OSAS.CONFIG
IOAINX	IOA.&CECNAME.MASTER.INDEX

Complete the following:

1. Set the initial allocation of IOACFG to request primary space of 1 track, secondary space of 2 tracks, and the attributes of RECFM=FB, LRECL=80, and BLKSIZE=5120.
2. Set the initial allocation of IOAINX to request primary space of 2 tracks, secondary space of 2 tracks, and the attributes of RECFM=FB, LRECL=80, and BLKSIZE=5120.
3. Edit the IOAINX file that you just copied and update the server destination names that start in column 1 to match your specific environment. The names in the file must all start in column 1.

Set up APPC/MVS and VTAM for OSA/SF

APPC: Set up APPC/MVS for OSA/SF. If APPC/MVS is not already set up on the server, see *z/OS MVS Planning: APPC/MVS Management*. After APPC/MVS is set up on the server, do the following for OSA/SF to define the APPC local LU, no scheduling, and provide the TPDATA cataloged data set name. (OSA/SF is an APPC server and there is no dependency on the APPC scheduler for OSA/SF.)

1. Determine which APPCPM member you are using for initialization.
2. Edit member APPCPMxx in SYS1.PARMLIB and add the following statements:

```
LUADD ACBNAME(1uname)
NOSCHED,
TPDATA(SYS1.APPCTP)
```

Notes:

- a. Change luname to the same name defined in the Startup Profile (see step 3c on page 59). If SET APPC NAME is not included in the profile, luname defaults to IOASERV. In that case replace luname in the APPCPMxx member with IOASERV. At least one LU name must be specified here.
 - b. The data set name specified by SYS1.APPCTP may be the same as an existing TP data set.
3. Implement changes with SET command as follows:
SET APPC=xx

If APPC/MVS must be stopped and restarted to include the changes, use the following commands and for **APPC** in the examples substitute the APPC procedure name for your installation:

Enter: **C APPC** to stop APPC/MVS

Enter: **S APPC,SUB=MSTR** to start APPC/MVS

If the required APPC parm is not hard-coded in the APPC procedure or it doesn't default to 00, start APPC as follows:

Enter: **S APPC,SUB=MSTR,APPC=xx**

To determine if APPC is running:

Enter: **D A,L** or **D A,APPC**

To determine if OSA/SF APPC LU is active:

Enter: **D APPC,LU,ALL**

VTAM: Set up VTAM for OSA/SF:

- 1. Define the VTAM APPL statement for OSA/SF by copying Copy member **IOAAPPL** (Figure 27 on page 63) from **IOA.SIOASAMP** into SYS1.VTAMLST, renaming it from IOAAPPL to APPCOSA. Make sure SECACPT=ALREADYV.

```

*****
*
**** MEMBER NAME: IOAAPPL
*
**** DESCRIPTIVE NAME: SAMPLE VTAM APPL STATEMENT FOR OSA/SF
*
**** FUNCTION: This APPL statement identifies OSA/SF as a VTAM
*               application, with one ACB defined for LU IOASERV.
*
**** SETUP: Copy and rename this sample to APPCOSA or select
*            another name.
*            Use one of the following 3 methods to activate the
*            definition:
*            1.- Add the selected name to your VTAM APPL List
*            2.- Add the selected name to your VTAM ATCCONxx member
*            3.- Activate the definition manually before you start
*               OSA/SF.
*            For example:
*               V NET,ACT,ID=APPCOSA
*
*            To verify that this worked:
*               D NET,ID=APPCOSA,E
*
**** SUGGESTED MODIFICATIONS:
*
*   - SECURITY: This APPL statement is set at a security level
*     of "conversation" (see keyword SECACPT=CONV below.)
*     Set SECACPT to the security level for your installation.
*
*   - This sample uses the IBM VTAM default values for
*     DLOGMOD and MODETAB. You may want to specify your own
*     installation values.
*
*   - if not OS/390 then use:
*       SECACPT=CONV
*   - if OS/390 then use:
*       SECACPT=ALREADYV
*
*****
*
IOASERV APPL  ACBNAME=IOASERV,
              APPC=YES,
              AUTOSSES=0,
              DDRAINL=NALLOW,
              DMINWNL=5,
              DMINWNR=5,
              DRESPL=NALLOW,
              DSESLIM=10,
              LMDENT=19,
              PARSESS=YES,
              SECACPT=ALREADYV,
              SRBEXIT=YES,
              VPACING=1
*
***** OPTIONAL
*
MODETAB=
DLOGMOD=

```

Figure 27. Member IOAAPPL from IOA.SIOASAMP

- ___ 2. Place the new APPL member name (APPCOSA) in the APPLxx member list or in the ATCCONxx member.
 - SYS1.VTAMLST member APPLXX (include the APPCOSA name)
 - SYS1.VTAMLST member ATCCONxx (include the APPCOSA name)
- ___ 3. Vary active the new OSA/SF application to VTAM.
 - Enter: **V NET,ID=APPCOSA,ACT**
- ___ 4. Build a logmodes file and place it in the system VTAMLIB data set. You can use the sample job in SYS1.SAMPLIB member ATBLJOB to build the

LOGMODES file and place in the VTAMLIB. There is also a sample LOGMODES source input file in SYS1.SAMPLIB member ATBLMODE.

SYS1.SAMPLIB member ATBLJOB (example logmodes job)

SYS1.SAMPLIB member ATBLMODE (example logmode source)

SYS1.VTAMLIB member LOGMODES (logmode assembled program)

Set up the Communications Server SNMP TCP/IP subagent

In order for an SNMP management application to receive OSA-Express MIB data, the Communications Server SNMP TCP/IP subagent must first connect to OSA/SF. For this connection to be established, two OSA/SF components must be started:

IOAOSASF

A sample JCL procedure that can be used to start the main OSA/SF address space. The sample, shown in Figure 25 on page 56, has a jobname of OSASF1.

IOASNMP

A sample JCL procedure, shown in Figure 28, that starts the OSA/SF-provided OS/390 UNIX transport application that interconnects a subagent with OSASF1.

If you are setting up SNMP for OSE CHPIDs, ensure that the portname in the configuration file (Chapter 8, “Configuring OSA-Express Modes,” on page 111) matches the name you define in the TCP/IP profile DEVICE and LINK statements (Chapter 7, “Host Program Setup,” on page 101).

```
//*  
/* START OSA SUPPORT FACILITY SNMP COMMUNICATION FACILITY  
/*  
//IOASNMP EXEC PGM=IOANMAIN,TIME=1440,REGION=0K,DYNAMNBR=5  
//STEPLIB DD DSN=SYS1.SIOALMOD,DISP=SHR  
//SYSPRINT DD SYSOUT=*  
//SYSUDUMP DD SYSOUT=*
```

Figure 28. Sample Started Procedure (IOA.SIOASAMP Member IOASNMP)

You must also provide RACF CONTROL authority for IOA.CONNECT.FILE, which is an internal command used by OSA/SF to respond to SNMP data queries.

For more about SNMP, see *z/OS Communications Server: IP Configuration Guide*.

Controlling Access to OSA/SF

OSA/SF uses the System Authorization Facility (SAF) interface to allow you to control user access to its commands through an optional security product such as RACF. The following discussion assumes that RACF is installed but any security product using the SAF interface can be substituted. Note, however, that any such product that is installed **must be set up and activated** for the OSA/SF GUI and REXX command interfaces to function correctly.

You must give the OSA/SF job ALTER authority to the data sets (IOACFG, IOAINX, and so forth) that are used for set up.

OSA/SF supports these RACF levels of authority:

- **None**, which prevents a user ID from entering any OSA/SF command.

- **Read**, which allows a user ID to view the OSA address table (OAT) and debug information, get configuration data, and query mode information about OSA features.
- **Update**, which allows a user ID to enter all OSA/SF commands except Set Parameters, Clear Debug, Install, Start Managing with Force, and those that use Get File and Put File.
- **Control**, which allows a user ID to enter all OSA/SF commands with all the options.

The OSA/SF commands are listed in the following table. For details of each command see the appendix.

If you protect data sets, follow the same procedures that you use for other system data sets.

OSA/SF runs as a started task. So give OSA/SF access to the data sets which it uses and which are listed in the OSA/SF startup profile.

OSA/SF Tasks and Commands

We suggest you provide RACF authority for all the OSA/SF commands shown in the table. The **Configure OSA** command, which is not included in this list, uses many of the commands listed to accomplish its tasks. Although **Configure OSA** does not require RACF authority itself, many of the commands it uses do. Providing authority for all the commands in the table will assist with any problem determination in the future.

Configure OSA uses the **Query**, **Get File**, **Put File**, **Start Managing** and **Install** commands.

Command	Task	RACF Facility	Level
Clear Debug	Clears the OSA/SF message log.	IOA.CLEAR.DEBUG	Control
N/A	Internal command to allow data to be passed in response to SNMP query.	IOA.CONNECT.FILE	Control
Get Config	Gets configuration data for any OSA-Express feature	IOA.GET.CONFIG	Read
Get Debug	Gets the OSA/SF message log, OSA/SF trace table, and other OSA debug data.	IOA.GET.DEBUG	Read
N/A	Internal command to get a file.	IOA.GET.FILE	Control
Put Table with Force	Update and store an OSA-2 OAT disregarding whether an entry is in use. This command can be issued only through IOACMD.	IOA.PUT.TABLE	Control
Put Table without Force	Update and store an OSA-2 OAT only if an entry is not in use. This command can be issued only through IOACMD.	IOA.PUT.TABLE	Update
Get OAT	Gets the OSA Address Table for a specified CHPID.	IOA.GET.OAT	Read
Install	Install and activate an OSA mode configuration already set up by OSA/SF.	IOA.INSTALL	Control
N/A	Internal command to put a File.	IOA.PUT.FILE	Control
Query	Get data about an OSA, OSA/SF, and/or active OSA modes on an OSA.	IOA.QUERY	Read

Command	Task	RACF Facility	Level
Set Parameters	Set the OSA LAN port parameters that are settable with OSA/SF.	IOA.SET.PARAMETERS	Control
Start Managing with Force	Start managing an OSA by this instance of OSA/SF even if that forces another instance of OSA/SF to stop management.	IOA.START.MANAGING	Control
Start Managing without Force	Start managing the specified OSA by this instance of OSA/SF without forcing another instance of OSA/SF to stop managing the same OSA.	IOA.START.MANAGING	Update
Stop Managing	Stop managing an OSA.	IOA.STOP.MANAGING	Update

Some Examples of RACF Profile Definitions

When defining a RACF profile generically or for an individual OSA/SF command, use the RACF RDEFINE command with a class of FACILITY. Enter the fully-qualified facility name, starting with the characters IOA and using periods as separators, as shown in the following examples. For more information on the RACF commands, see *z/OS Security Server RACF Command Language Reference*.

- To define a profile for an individual OSA/SF command, for example, the Get Table command to read an OAT, enter:

```
RDEF FACILITY IOA.GET.TABLE
```

- To define a profile to allow user IDs to enter this command, enter:

```
RDEF FACILITY IOA.GET.TABLE UACC(READ)
```

- To allow the use of generics for a class of service facility, enter:

```
SETROPTS GENERIC FACILITY
```

- To prevent unauthorized use of OSA/SF commands, enter:

```
RDEF FACILITY IOA.* UACC(NONE).
```

If you have already prohibited all user IDs from using OSA/SF commands, you must explicitly assign RACF authorization to allow designated user IDs to enter an OSA/SF command.

Some Examples of RACF Authorization Assignments

Enter the RACF PERMIT command and its parameters. The profile parameter, for example, IOA.GET.TABLE or *, determines the authorization level of the user ID identified in the ID parameter. (The Access parameter identifies the authorization given. You can use an asterisk to designate a generic class on the PERMIT parameters.)

- To allow all users to send all commands that require the Read authority, enter:

```
PERMIT IOA.* ACCESS(READ) CLASS(FACILITY) ID(*)
```

- To assign authorization by Access level, for example, to authorize user ID RPAUL to access the Control level, enter:

```
PERMIT IOA.* ACCESS(CONTROL) CLASS(FACILITY) ID(RPAUL)
```

- To authorize another user (GLASER) to enter all commands that require the update authorization, enter:

```
PERMIT IOA.* ACCESS(UPDATE) CLASS(FACILITY) ID(GLASER)
```

- To assign authorization by specific OSA/SF commands, for example, to authorize all user IDs to enter the Get Table command, enter:

```
PERMIT IOA.GET.TABLE ACCESS(READ) CLASS(FACILITY) ID(*)
```

- To authorize ID PINGCHAN to enter any command requiring the Update control option, enter:

```
PERMIT IOA.* ACCESS(UPDATE) CLASS(FACILITY) ID(PINGCHAN)
```

- To authorize a specific profile name, for example, to authorize user ID JGOLDMAN to enter the Put Table command with or without the Force option, enter:

```
PERMIT IOA.PUT.TABLE ACCESS(CONTROL) CLASS(FACILITY) ID(JGOLDMAN)
```

Starting OSA/SF

From the system console, enter the OSA/SF Started Procedure name that you selected in step 2 on page 56. **OSASF1** was the default name.

```
S <procedure name>
```

For an example, see “OSA/SF Message Log” on page 137.

Verifying That OSA/SF Started

To verify that OSA/SF has been started on the primary server, enter the following:

```
D A,<procedure name>
```

The Started *procedure name* was established in step 2 on page 56.

Deciding which OSA/SF Interface to Use

If you prefer line commands, use the OSA/SF REXX command interface to enter commands that allow you to manage an OSA. Complete the setup information for the REXX command interface in “Setting Up the REXX Command Interface” on page 85.

If you prefer a workstation interface, use the OSA/SF GUI. Complete the setup information for the OSA/SF GUI, including TCP/IP setup in “Setting up an OSA/SF GUI” on page 89.

Stopping OSA/SF

Enter the following to stop OSA/SF:

```
P <procedure name>
```

The Started *procedure name* was established in step 2 on page 56 to stop OSA/SF.

Notes:

1. If a step name was given with the start command, then the step name must be used with the stop command.
2. You can also use the MVS Cancel command (**C** *procedure name*) to stop OSA/SF.

Chapter 4. Setting Up OSA/SF on z/VM

Before you can configure and manage a non-QDIO OSA (channel type OSE), you must set up OSA/SF and a user interface of your choice (OSA/SF REXX command interface or OSA/SF GUI). This chapter provides instructions for setting up OSA/SF on VM.

For information about setting up and using the REXX command interface (IOACMD EXEC) and the GUI for OSA/SF, see Chapter 6, “Setting up and Using the OSA/SF Interfaces,” on page 85.

If you are running OSA/SF in a z/OS environment, see Chapter 3, “Setting Up OSA/SF on z/OS,” on page 55.

If you are running OSA/SF in a VSE environment, see Chapter 5, “Setting Up OSA/SF on VSE/ESA,” on page 79.

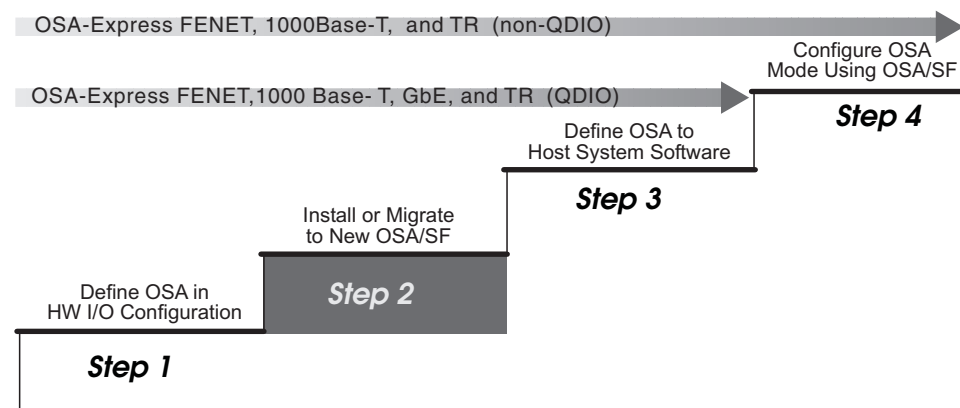


Figure 29. Step Two (VM) in a Four-Step Process

Choosing the OSA Modes

Determine which OSA modes (non-QDIO or QDIO) to use for each OSA. This decision underlies all of the remaining setup tasks and whether you need to use OSA/SF:

- TCP/IP Passthru that uses the default OAT for a non-QDIO OSA-Express feature (OSE channel) does not require OSA/SF.
- Any other non-QDIO OSA-Express feature (OSE channel) requires OSA/SF to configure the OSA.
- Any QDIO OSA-Express feature (OSD channel) does not require OSA/SF.

OSA/SF and the z/VM Environment

Ensure the system pre- and co-requisites are met for hardware and software in a z/VM environment.

z/VM characteristics: OSA/SF for z/VM runs in its own OSA/SF server virtual machine with the following characteristics:

- OSA/SF on z/VM runs automatically unless it is shut down with the OSA/SF Shutdown command (page 174).

VM Setup

- OSA/SF is logged on when it receives an OSA/SF command. The server remains logged on in a disconnected state awaiting further commands. CMS user IDs that have been set up to communicate with the OSA/SF server virtual machine ID (OSASF) can enter OSA/SF commands, or OSA/SF can be accessed through the OSA/SF GUI that makes use of windows.
- If the OSA channel path is not defined as shared, only the managing OSA/SF with a read/write path to the OSA's minidisk can receive a Stop Managing command for that OSA.
- If the OSA channel path is defined as shared or spanned, the OSA minidisk is secure only if you use CSE XLINK. The OSA/SF that gains control is the first OSA/SF that recognizes the OSA and receives a **Start Managing** command.
- Before another OSA/SF can gain control, the managing OSA/SF must receive a **Stop Managing** command. If that is not possible, the OSASF user ID should be logged off. If the system image cannot receive that command, the CSE XLINK Reset command will release the read/write path to the OSA's minidisk.

Instructions: Use these instructions for installing OSA/SF in a z/VM environment:

1. "Install OSA/SF" (required)
2. "Define OSA/SF to a z/VM Guest Environment" on page 71 (required for a guest environment)
3. "Set Up APPC" on page 71 (required)
4. "Set Up OSA/SF" on page 72 (required).
5. "Decide whether to Specify RMCHINFO" on page 74

Install OSA/SF

OSA/SF is pre-installed, using VMSES/E, on the **z/VM** System DDRs. It is optionally installable for these releases at initial z/VM DDR install time. If you have installed OSA/SF for z/VM during VM installation, do the following:

- Allocate resources for OSA/SF and update the PROFILE EXEC and NAMES files. Follow the procedures in "Set Up APPC" on page 71 and "Set Up OSA/SF" on page 72.
- Optionally, set up the OSA/SF GUI. See "Setting up an OSA/SF GUI" on page 89.

If you want to install OSA/SF for z/VM at initial VM DDR install time, follow the Post Installation instructions in the Appendix of the *z/VM Installation Guide*. This procedure includes performing the following:

- Prepare the USER DIRECT file for the new items to be loaded
- Run the INSTALL EXEC.
- Follow the procedures in "Set Up APPC" on page 71 and "Set Up OSA/SF" on page 72.
- Optionally, set up the OSA/SF GUI. See "Setting up an OSA/SF GUI" on page 89.

OSA/SF installation creates five user ID entries in the z/VM CP system directory:

OSASF

The OSA/SF server ID, supporting the OSA/SF console.

OSAMAIN

Collects debug data. Traces and dumps are sent to this ID.

OSADMIN1 through OSADMIN3

User IDs allowing communication with OSA/SF server for REXX commands.

Define OSA/SF to a z/VM Guest Environment

OSA/SF can run on a z/VM, z/OS, or VSE guest system of a z/VM host. Figure 30 shows OSA/SF defined to a z/VM host and a z/VM guest system set up with an OSA/SF REXX command interface and an OSA/SF GUI interface:

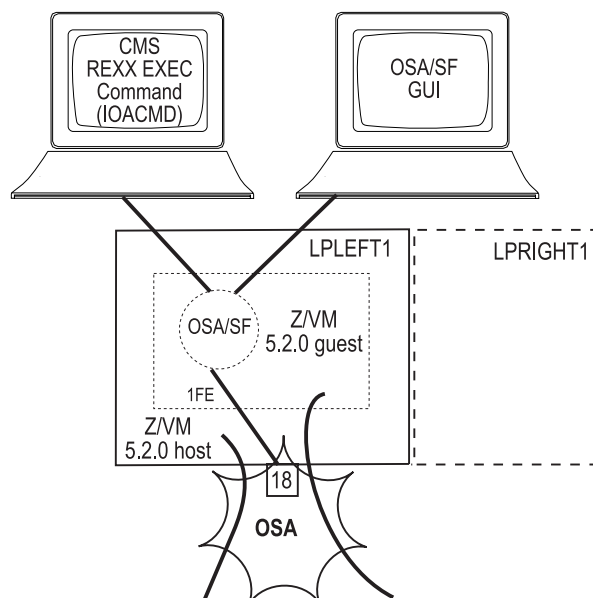


Figure 30. OSA/SF on a z/VM guest system in a z/VM Environment

When OSA/SF is running on a z/VM guest system image, you must define the OSA to the host z/VM system image as follows:

- Specify the same unit address for the guest and host systems for each device number that is required for the mode.
- Specify the same device number for OSA/SF in the guest and in the host. By definition, this must have X'FE' as its unit address. For a VSE guest, 3-digit addresses are supported.

An exception to these rules occurs if a z/OS system image is the guest. In that case, you can remap the channel path and device definitions.

Set Up APPC

APPC is used to pass commands from the requestor virtual machine (OSADMINx userid) to the server virtual (OSA/SF) machine and to send the results back.

The requestor ID and the server ID must be in the same z/VM system (or image).

Do the following to set up the APPC communications:

1. Verify the following directory entry for the server virtual machine (OSA/SF):
IUCV ALLOW - See *Planning and Administration Guide* in z/VM library.
2. Verify the following entries for the PROFILE EXEC file of the server virtual machine (OSA/SF):
SET SERVER ON

VM Setup

SET FULLSCREEN OFF

SET AUTOREAD OFF

3. Verify the following in the global search order during the LOAD/GENMOD phase.
 - DMSSVM5
 - VMLIB
 - CMSSAA
 - COMMTXT - only if using TCP/IP
 - SCEELKED
 - SCEERUN
4. For the server virtual machine (OSA/SF), create a names file called **\$SERVER\$ NAMES** and add the following entries:

```
:nick.IOASERV :list.OSADMIN1
                        OSADMIN2
                        OSADMIN3
                        :module.IOACMAIN
```
5. For the requestor virtual machines, OSADMIN1 through OSADMIN3, update a names file called **UCOMDIR NAMES** and add the following entries:

```
:nick.IOASERV :luname.*USERID OSASF
               :tpn.IOASERV
```

Attention: ***USERID** is a keyword; type it in exactly as shown. Do not substitute a userid in its place. OSASF is a variable. You can change it to something other than OSASF.

Set Up OSA/SF

Figure 31 on page 73 describes the steps to set up the OSA/SF on a z/VM system:

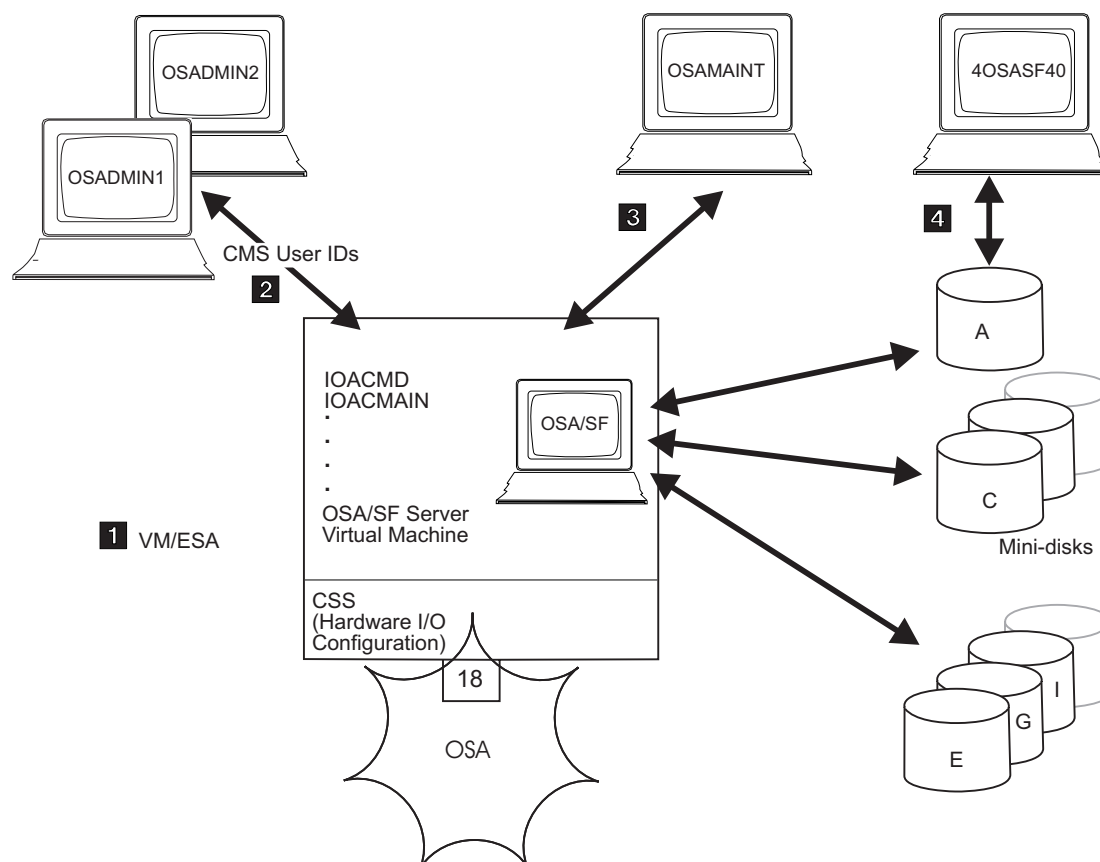


Figure 31. Setup Tasks for OSA/SF in the VM Environment

- 1** In a VM environment, assign the OSASF user ID to run the OSA/SF server virtual machine. OSA/SF for VM is shipped with a sample \$SERVER\$ NAMES file that contains this default user ID.

Note: In an ISFC environment where different OSA devices are installed on individual member systems, the OSASF server for each real system should be identified with a unique user ID. This requires changing the OSASF user ID in the CP directory and updating the UCOMDIR NAMES file on each OSADMINx ID to reflect the new ID in the .luname field.

If an OSA-Express is running in SNA mode and you want to ensure that alerts are always recorded on OSASF, make sure the following steps are taken.

- The OSASF server machine is added to the autolog list of VMs brought up during system IPL.
- The PROFILE EXEC on OSASF must have the following two lines edited in:

```
'LOADMOD IOACMAIN'
'START'
```

- Make the OSASF virtual machine exempt from inactivity forcing in a manner similar to PVM and RSCS.

- 2** To set up a CMS user ID that can access OSA/SF, you must set up the server machine in the CMS user ID's UCOMDIR NAMES file. You must also add the CMS user ID in the OSASF \$SERVER\$ NAMES file. An example is shown below. For more information, see the VM books listed in the bibliography.

- To set up the UCOMDIR NAMES file of CMS user ID **OSADMIN1** to contain the nickname of the OSA/SF service machine:

```
:nick.IOASERV :luname.*userid OSASF  
:tpn.IOASERV
```

- Conversely, to add the CMS user ID **OSADMIN1** in the OSA/SF \$SERVER\$ NAMES file:

```
:nick.IOASERV :list.OSADMIN1  
:module.IOACMAIN
```

For information about setting up IOACMD EXEC for the OSA/SF REXX command interface, see “Setting up the REXX Command Interface for z/VM” on page 86.

- 3** Ensure that the TCP/IP communications protocol is established with the platform on which OSA/SF GUI is to run, and download the OSA/SF GUI files. See “Setting up an OSA/SF GUI” on page 89.

For information on how to establish a communications protocol using an OSA in the SNA mode, refer to *VM/ESA: Open Systems Adapter Support Facility*, which is listed in the bibliography.

- 4** Assign OSAMAIN as the CMS user ID to which OSA/SF for VM sends its dumps and trace records. Do not change this ID.

- 5** At installation, establish a user ID to download data, including PTFs, to the disks that OSA/SF for VM uses. The default ID is **40SASF40**.

- C** Allocate 1 minidisk to represent each OSA that is defined to the CPC where OSA/SF for VM will run.

- Allocate 5 cylinders (any model 3390 DASD) for each minidisk, and define it as **70cc**, replacing *cc* with the OSA-Express CHPID. Get the OSA CHPID from the *Placement Report* or *CHPID Report* produced by the IBM Configuration (CFSYSTEM) or the *Systems Assurance Product Review*, which may be available from your OSA marketing representative.
- If the OSA-Express channel path is defined as being shared among logical partitions, define the minidisks on Cross System Extensions (CSE) DASD.
- If an error has occurred in allocating the OSA minidisk, OSA/SF places an error message in the OSASF error log, which can be handled in accordance with general OSA/SF procedures.

A E G I

Allocate additional space for, for example, the (A) OSASF's A disk, (B) OSA/SF production files, (G) cross-partition files, and (I) OSA/SF images. Refer to the OSA/SF for VM program directory for the number of cylinders needed.

Decide whether to Specify RMCHINFO

You can use the RMCHINFO in the OPTION Directory Control statement to authorize the host virtual machine. Consider the following conditions to determine whether to specify the option:

- If you are running on a VM system, specify RMCHINFO.
- If you are running as a guest system on z/VM, do not specify RMCHINFO. You see only those devices that are attached to the guest system. Use the z/VM ATTACH command on the guest system.

Controlling Access to OSA/SF for z/VM

OSA/SF uses the System Authorization Facility (SAF) interface to let you optionally control user access to its commands. In the following OSA-specific planning information, RACF is assumed but any security product that uses the RACROUTE interface can be used. (If the security product is installed, OSA/SF assumes it is active.) For more information on RACF, refer to the manuals listed in the bibliography.

If no security product is present, the RPIUCMS INIT line in the OSASF userid PROFILE EXEC should be commented out.

If OSA/SF for z/VM is being used, authorize OSA/SF (OSASF user ID) to issue RACROUTE requirements as indicated in the following list.

1. Update the CP directory entry for the OSASF user ID to include an inter-user communication vehicle (IUCV) line that allows communications with the RACF service machine. Use either ANY or the name of the RACF z/VM server machine.

IUCV *any* or *racf_server_machine* PRIORITY MSGLIMIT 255

2. If not already defined, define a profile with the name ICHCONN in the class Facility:

RAC RDEFINE FACILITY ICHCONN UACC(NONE)

3. Authorize OSA/SF to issue RACROUTE requests:

RAC PERMIT ICHCONN CLASS(FACILITY) ID(OSASF) ACCESS(UPDATE)

4. If the Facility class is not active, activate it:

RAC SETROPTS CLASSACT(FACILITY)

OSA/SF supports the None, Read, Update, and Control RACF levels of authority. The minimum authority level that is required for each command is listed in the next table. The **Configure OSA** command, not listed below, uses the **Query**, **Get File**, **Put File**, **Start Managing** and **Install** commands. Although CONFIGURE OSA does not require RACF authority, many of the commands it uses do. Providing authority for all the commands in the table will assist with any problem determination in the future.

Table 10. Level of Authority Required for OSA/SF Commands on z/VM

Command	Task	RACF Facility	Level
Clear Debug	Clear the OSA/SF message log.	IOA.CLEAR.DEBUG	Control
Get Config	Get the configuration data for any OSA-Express feature . This command can only be issued through IOACMD at the CMS command line.	IOA.GET.CONFIG	Read
Get Debug	Get the OSA/SF log of IOA messages and OSA/SF trace table. From the OSA CHPID, get a memory dump, SNA traces, and SNA message log.	IOA.GET.DEBUG	Read
N/A	Internal command to get a file.	IOA.GET.FILE	Control

VM Setup

Table 10. Level of Authority Required for OSA/SF Commands on z/VM (continued)

Command	Task	RACF Facility	Level
Get Table	Get the entries of an OSA Address Table (OAT). This command can be issued only through IOACMD at the CMS command line.	IOA.GET.TABLE	Read
Install	Install, activate an OSA mode configuration already set up by OSA/SF.	IOA.INSTALL	Control
N/A	Internal command to get a file.	IOA.GET.FILE	Control
Put Table with Force	Update and store an OSA-2 OAT disregarding whether an entry is in use. This command can be issued only through IOACMD at the CMS command line.	IOA.PUT.TABLE	Control
Put Table without Force	Update and store an OSA-2 OAT only if an entry is not in use. This command can be issued only through IOACMD at the CMS command line.	IOA.PUT.TABLE	Update
Query	Get data about an OSA, OSA/SF, and/or active OSA modes on an OSA.	IOA.QUERY	Read
Set Parameters	Set the OSA LAN port parameters that are settable with OSA/SF.	IOA.SET.PARAMETERS	Control
Shutdown	Shuts the OSA/SF virtual server machine down, releases all OSA/SF resources, and logs the OSA/SF server virtual machine off. The OSA/SF server virtual machine is automatically restarted by any subsequent OSA/SF command. This command can only be issued through IOACMD at the CMS command line.	IOA.SHUTDOWN	Control
Start Managing	Start managing an OSA.	IOA.START.MANAGING	Update
Stop Managing	Stop managing an OSA	IOA.STOP.MANAGING	Update

Some Examples of RACF Profile Definitions

When defining a RACF profile generically or for an individual OSA/SF command, use the RACF RDEF command with a class of FACILITY. Enter the fully qualified facility name, starting with the characters IOA and using periods as separators, as shown in the following examples.

- To define a profile for an individual OSA/SF command, for example, the Get Table command to read an OAT, enter: **RDEF FACILITY IOA.GET.TABLE**
- To define a profile to allow user IDs to enter this command, enter:
RDEF FACILITY IOA.GET.TABLE UACC(READ)
- To allow the use of generics for a class of service facility, enter: **SETROPTS GENERIC FACILITY**
- To prevent unauthorized use of OSA/SF commands, enter: **RDEF FACILITY IOA.* UACC(NONE)** If you have already prohibited all user IDs from using OSA/SF commands, you must explicitly assign RACF authorization to allow designated user IDs to enter an OSA/SF command.

Some Examples of RACF Authorization Assignments

Enter the RACF PERMIT command and its parameters. The profile parameter, for example, IOA.GET.TABLE or *, determines the authorization level of the user ID

identified in the ID parameter. (The Access parameter identifies the authorization given. You can use an asterisk to designate a generic class on the PERMIT parameters.)

- To allow all users to send all commands that require the Read authority, enter:

```
PERMIT IOA.* ACCESS(READ) CLASS(FACILITY) ID(*)
```

- To assign authorization by Access level, for example, to authorize user ID NAMEROW to access the Control level, enter:

```
PERMIT IOA.* ACCESS(CONTROL) CLASS(FACILITY) ID(NAMEROW)
```

And, to authorize another user (SALLY) to enter all commands that require the update authorization, enter:

```
PERMIT IOA.* ACCESS(UPDATE) CLASS(FACILITY) ID(SALLY)
```

- To assign authorization by specific OSA/SF commands, for example, to authorize all user IDs to enter the Get Table command, enter:

```
PERMIT IOA.GET.TABLE ACCESS(READ) CLASS(FACILITY) ID(*)
```

- To authorize ID TESTER to enter any command requiring the Update control option, enter:

```
PERMIT IOA.* ACCESS(UPDATE) CLASS(FACILITY) ID(TESTER)
```

- To authorize a specific profile name, for example, to authorize user ID TEST to enter the Put Table command with or without the Force option, enter:

```
PERMIT IOA.PUT.TABLE ACCESS(CONTROL) CLASS(FACILITY) ID(TEST)
```

Notes on Handling Problems with OSA/SF

Handling problems with OSA/SF follows the system procedures generally used for a z/VM facility. However, OSA/SF can also display OSA-related data, such as messages and dumps that are specific to OSA/SF operations. It sends this data to the OSAMAIN ID that you have set up.

- If a problem seems to have occurred, make sure the managing OSA/SF is identified (page 69).

If OSA/SF GUI is being used, this can be done by clicking on the OSA/SF host icon and having the statistics notebook page displayed. A CMS user ID can issue the Query command.

- In an ISFC environment where different OSA devices are installed on individual member systems, the OSASF server for each real system should be identified with a unique user ID. This requires changing the OSASF user ID in the CP directory and updating the UCOMDIR NAMES file on each OSADMINx ID to reflect the new ID in the .luname field.
- Check for OSA/SF messages, which are in the format of IOAxxyyz, where x denotes the OSA/SF component, yyy is the sequence number and z signifies the severity of the condition.

These messages are stored in the OSA/SF message log together with the OSA/SF commands and responses that have been issued. You can get the IOA messages with the OSA/SF Get Debug command.

- Tracing is a default operation for OSA/SF. You can, therefore, get the trace log by using the Get Debug command and specifying Trace log.
- Dumps are automatically executed when abends occur. After the dump completes, the OSA/SF server logs off. The next OSA/SF command results in an autolog and restart by the OSA/SF server.

Deciding which OSA/SF Interface to Use

If you prefer line commands, use the OSA/SF REXX command interface to enter commands that allow you to manage an OSA. Complete the setup information for the REXX command interface in “Setting Up the REXX Command Interface” on page 85.

If you prefer a workstation interface, use the OSA/SF GUI. Complete the setup information for the OSA/SF GUI, including TCP/IP setup in “Setting up an OSA/SF GUI” on page 89.

Chapter 5. Setting Up OSA/SF on VSE/ESA

OSA/SF for VSE/ESA Version 2 Release 6 or later is required for this setup procedure.

Before you can configure and manage a non-QDIO OSA (cannel type OSE), you must set up OSA/SF and a user interface of your choice. This chapter provides instructions for:

- Setting up OSA/SF on the server (VSE)
- Setting up a command interface (REXX EXEC - IOACMD)
- Installing and setting up a Java-based graphical user interface (Windows or Linux)

For information about setting up and using the command interface (REXX EXEC - IOACMD) and the GUI for OSA/SF, see Chapter 6, “Setting up and Using the OSA/SF Interfaces,” on page 85.

If you are running OSA/SF in a z/OS environment, see Chapter 3, “Setting Up OSA/SF on z/OS,” on page 55.

If you are running OSA/SF in a VM environment, see Chapter 4, “Setting Up OSA/SF on z/VM,” on page 69.

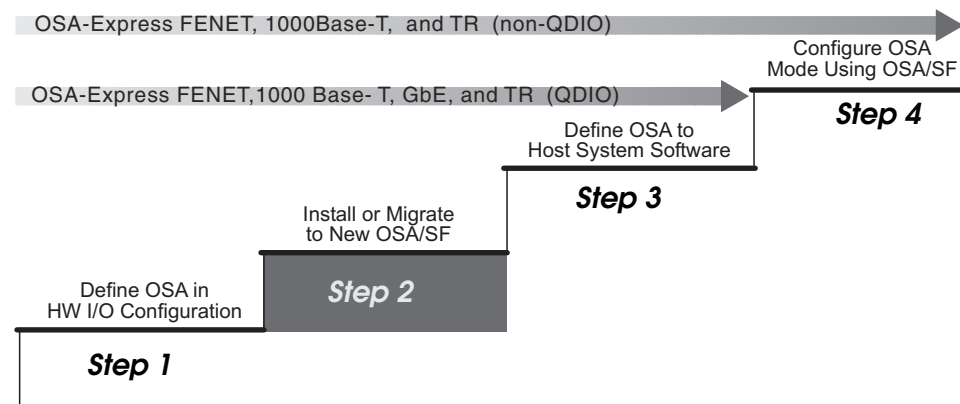


Figure 32. Step Two (VSE) in a Four-Step Process

Determine the OSA Modes

Determine which OSA modes (non-QDIO or QDIO) are in use on each OSA CHPID. This information underlies all of the remaining setup tasks and whether you need to use OSA/SF:

- TCP/IP Passthru that uses the default OAT for a non-QDIO OSA-Express feature (OSE channel) does not require OSA/SF.
- Any other non-QDIO OSA-Express feature (OSE channel) requires OSA/SF to configure the OSA.
- Any QDIO OSA-Express feature (OSD channel) does not require OSA/SF.

OSA/SF and the VSE Environment

Ensure the system pre- and co-requisites are met for hardware and software in a VSE environment.

These are the high level tasks to set up OSA/SF. The detailed instructions follow the list.

1. Define the partitions for the three OSA/SF jobs.
2. Create a working sublibrary (PRD2.OSASF for example) for OSA/SF.
3. Submit the following jobs in this order: IOAINX, IOAMAIN, IOACMD.

Note: If you are running VSE/ESA as a guest system on z/VM, do not specify the RMCHINFO option in the VM OPTION Directory Control statement. You see only those devices that are attached to the guest system. Use the z/VM ATTACH command on the guest system.

Define the Partition for OSA/SF Jobs

The following three OSA/SF jobs will run in either a static or dynamic VSE/ESA partition.

1. Use the following as a guideline to define the partition for each job. Write down the partition for use later.
 - IOAMAIN Partition _____
 - IOACMD Partition _____
 - IOAXTSRV Partition_____

The minimum sizes of the partitions are as follows:

OSA/SF Job	(VSE/ESA Partition) Allocate Size		Comments
IOAMAIN	9.0MB	600KB	Depends on the number of OSAs installed. 9M should support a max configuration
IOACMD	8.5MB	1.1MB	Command EXEC
IOAXTSRV	1.0MB	250KB	Consider using a dynamic partition.

Figure 33. OSA/SF Jobs

Create the Working Sublibrary (PRD2.OSASF) for OSA/SF

Use the following sample job to create the PRD2.OSASF sublibrary. PRD2.OSASF is used as an example and is not required as the sublibrary name. You can use any sublibrary for the working sublibrary.

```
* $$ JOB JNM=DEFINE,CLASS=0,DISP=D
// JOB DEFINE IBM SUGGESTED OSA/SF WORKING SUBLIBRARY
// EXEC LIBR
  DEFINE S=PRD2.OSASF REUSE=IMMEDIATE
/*
/&
* $$ EOJ
```

Figure 34. Job to Create PRD2.OSASF

Copy the Skeleton Job for the Master Index (IOAINX)

1. Copy member **IOAINX** from ICCF library 59 into a private ICCF library.

Note: A permanent copy of this member is stored in the installation library as member IOAINX.Z. The permanent copy is not an exact copy of the ICCF member and it cannot be used without modification. To use it, change all the statements that start with two periods as shown in the following example:

These changes are done for you during installation for the library 59 members.

```
..$$ Change To $$
../*      "      "  /*
../&      "      "  /&
```

2. If required, update the host sublibrary names that start in column 1 to match your specific environment. The names in the member must all start in column one. All the IOA_XXX must be in column 56.

```
* $$ JOB JNM=IOAINX,CLASS=0,DISP=D
// JOB IOAINX
* This JOB catalogs the OSA/SF Master Index into the OSA/SF Data
* library (PRD2.OSASF is assumed to be the OSA/SF Data library).
// EXEC LIBR
ACC S=PRD2.OSASF
CATALOG xxxxxx.IOAINX      EOD=/H      REPLACE=YES
*****
* <-- Start entries in columns 1 and 56... -->      *
*****
*      PRODUCT(00:TCP/IP Passthru VIRIM0)
*****
DD:PRD1.BASE(IOBNUL2.0)      IOA_NULL_IMAGE1
*****
*      PRODUCT(50:SNA VIRIM0)
*****
DD:PRD1.BASE(IOBSNA2.0)      IOA_SNA_IMAGE1
DD:PRD1.BASE(IOBSNAFE.0)     IOA_SNA_IMAGEF
/*
/&
*$$ E0J
```

Figure 35. Master Index

3. Store the member in PRD2.OSASF.xxxxxx.IOAINX, replacing xxxxx with the member name you plan to specify in the next step.

Copy the Skeleton Job for IOAMAIN

1. Copy member **IOAMAIN** from ICCF library 59 into a private ICCF library.

```
* $$ JOB JNM=IOAMAIN,CLASS=x,DISP=L
// JOB IOAMAIN
* THIS JOB SAMPLE ASSUMES: OSA/SF CODE LIBRARY.. PRD1.BASE
*                          OSA/SF DATA LIBRARY.. PRD2.OSASF
*                          C-RUNTIME LIBRARY.... PRD2.SCEEBASE
*                          Netview..... PRD1.BASE
* If this does not match your environment, please change the
* statements below accordingly.
// SETPFIX LIMIT=100K,PERM
// LIBDEF *,SEARCH=(PRD1.BASE,PRD2.SCEEBASE)
// EXEC PGM=IOAMAIN,SIZE=IOAMAIN,PARM='PRD2.OSASF(xxxxx)'
/*
/&
* $$ E0J
```

Figure 36. IOAMAIN Job

2. Modify the JCL according to the comments in the job.

The EXEC statement must be modified to replace the **XXXXXX** with a member name for the OSA/SF data sets. One choice for member name might be the image name OSA/SF is running on. The member name you specify will become the prefix for members used by OSA/SF. Some of the members OSA/SF uses are the following:

- XXXXX.IOAINX - Master Index (See Figure 35 on page 81)
- XXXXX.IOACFG
- XXXXX.IOAMSGXX

Note: IOACFG and IOAMSGXX are set up and used by OSA/SF. You do not have to do anything with these members.

Use the working sublibrary you created in “Create the Working Sublibrary (PRD2.OSASF) for OSA/SF” on page 80. **PRD2.OSASF** will be used as an example in the remainder of these instructions. Write down the member name you choose as the prefix for OSA/SF members.

PRD2.OSASF._____ **member type**

3. Submit the job to the VSE/POWER RDR queue. Do not release the job yet.

Copy the Skeleton Job for IOACMD

Job IOACMD is used to enter OSA/SF commands from JCL. If you plan to only use OSA/SF GUI, continue at “Move the Jobs into the Power RDR Queue.”

1. Copy member **IOACMD** from ICCF library 59 into a private ICCF library.

We recommend you set up the job as it is shown in the figure. Only one EXEC REXX=IOACMD line should be included. The other two lines that start with an asterisk are shown as an example of other ways to use the EXEC. Submitting the job as shown in the figure will always show you a list of OSA/SF commands and prompt you to enter one. This is the preferred method.

This example will also store the IOACMD debug files into sublibrary PRD2.OSASF. The first parameter must specify a library and sublibrary for the debug files. If you choose to use a different location, write it down for future reference and change the JCL accordingly.

Sublibrary for IOACMD Debug Data _____

```
// JOB IOACMD
// OPTION NODUMP
// LIBDEF *,SEARCH=(OSA.JMF,PRD1.BASE,PRD2.SCEEBASE)
// EXEC PROC=LIBDEF
* LIBLIST PHASE,* ,list where members are that its finding
// EXEC REXX=IOACMD,PARM='OSA.JMF' SIZE=1000K
* EXEC REXX=IOACMD,PARM='OSA.JMF GET_OAT 78 osa.vse.joel.oat'
* EXEC REXX=IOACMD,PARM='OSA.JMF GET_OAT FC JHF.OAT.CHP78 C
OSA.JMF.OAT.CHPFC'
* Continuation chars MUST start in column 16
// EXEC LISTLOG
/*
/8
```

Figure 37. IOACMD Job

2. Submit the job to the VSE/POWER reader queue. Do not release the job yet.

Move the Jobs into the Power RDR Queue

Run the jobs to set up and start OSA/SF. Release job IOAINX and then release job IOAMAIN. If you are not using the OSA/SF GUI, you will need to release job IOACMD as required.

What To Do Next

If you are going to use the OSA/SF GUI, continue at “Setting up an OSA/SF GUI” on page 89.

If you are not going to use the GUI, continue at “Using the REXX Command Interface to Configure OSA-Express CHPIDs” on page 112.

VSE/ESA Running as a Guest of VM

If VSE/ESA is running under VM and only the current image has the OSA online, the support element (SE) functions of the hardware management console (HMC) are not required to reset the OSA. Use the following vary commands:

```
VARY OFFLINE CHPID nn FORCE
VARY ONLINE CHPID nn
```

Consider the following precautions:

1. Stop all VTAM nets (XCA and SWNET) that pertain to the OSA if any are active.
2. Then **OFFLINE *cua*** for each device on the OSA (CHPID) from VSE/ESA.
3. Either **DET *cua*** from the guest for each device on the OSA (CHPID) or use the FORCE on the VM VARY OFFLINE command.
4. VARY OFFLINE CHPID nn FORCE
5. VARY ONLINE CHPID nn (WAIT for devices to come online to VM.)
6. ATT *cua* TO vse_guest for each CUA (or ATT *cua1-cuan* to vse_guest)
7. Then **ONLINE *cua*** each and every *cua* from VSE/ESA
8. Restart VTAM nets.

Stopping OSA/SF

Issue the following command from the VSE/ESA operator command line to stop OSA/SF:

```
CANCEL xx,NODUMP
```

Where xx is the VSE/ESA partition where OSASF (job IOAMAIN) is running.

Chapter 6. Setting up and Using the OSA/SF Interfaces

You can use two interfaces to configure and manage OSA-Express features:

- REXX command interface (IOACMD EXEC). See “Setting Up the REXX Command Interface” and “Using the IOACMD EXEC Interface” on page 87.
- OSA/SF Graphical User Interface (GUI) (Java-based application). See “Setting up an OSA/SF GUI” on page 89 and “Using the OSA/SF GUI” on page 96.

The REXX command interface (IOACMD EXEC) allows you to enter commands from the host system to manage an OSA. For information about the commands, including parameter descriptions and examples, see Chapter 13, “OSA/SF Commands for REXX,” on page 157.

The OSA/SF GUI offers the advantages of a graphical application that runs on a Windows or Linux platform. It provides interactive function panels with pull-down menus and online help panels. You can set up and start multiple OSA/SF GUI sessions on the workstation, but you must log on to each image through the GUI host window.

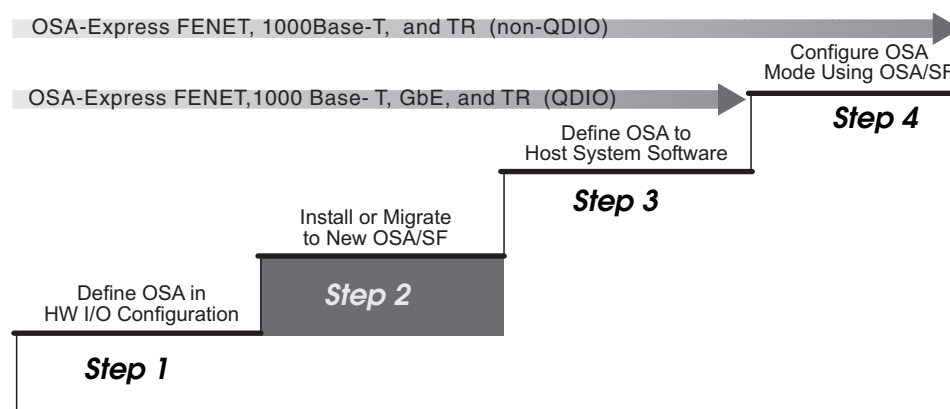


Figure 38. Step Two (for all operating systems) in a Four-Step Process

Setting Up the REXX Command Interface

Use the following instructions to set up the REXX command interface (IOACMD EXEC) for OSA/SF:

- “Setting up the REXX Command Interface for z/OS” on page 86
- “Setting up the REXX Command Interface for z/VM” on page 86
- “Setting up the REXX Command Interface for VSE” on page 86

If you plan to use the OSA/SF GUI, see “Setting up an OSA/SF GUI” on page 89.

Setting up the REXX Command Interface for z/OS

Before Starting

- You can copy the EXEC into a local CLIST or EXEC data set that is allocated to //SYSPROC DD of a TSO logon proc.
- During installation of OSA/SF, the program directory gave the installer the option of making the OSA/SF program library accessible either by the LNKLISTxx, or by including the OSA/SF program library (SIOALMOD) in a STEPLIB of the OSA/SF startup proc. If the SIOALMOD library was not put in LNKLISTxx and a STEPLIB was used instead, you must also place the SIOALMOD library in a STEPLIB within the users TSO logon proc in order for the TSO user to have access to the OSA/SF code.

Do the following to set up the REXX command interface (IOACMD EXEC) that you can use from TSO or the Ready prompt to enter OSA/SF commands.

1. Allocate a data set for the IOACMD.EXEC, requesting primary space of 350 blocks with secondary space of 35 blocks. The attributes of this data set should be: RECFM=FB, LRECL=80, and BLKSIZE=5120.

Fully-qualified data set name for IOACMD.EXEC

2. Copy the EXEC from **IOA.SIOASAMP** library member **IOACMD**.
IOACMD is used to enter OSA/SF commands from TSO or a Ready prompt. Two data sets are written each time the command is entered, one for input, the other for output. These data sets are used for problem determination by IBM. The data sets are cataloged using the userid that issued the command as the high-level qualifier. If you wish to use a different high level qualifier, a note at the beginning of the EXEC contains information for changing the high-level qualifier of the data sets. This is just for your awareness. You do not have to do anything with these data sets.

Setting up the REXX Command Interface for z/VM

The IOACMD is shipped on the 7F00 disk owned by OSAMAIN. All OSADMINx IDs have access to this disk through their CP directory setup and PROFILE EXEC.

Setting up the REXX Command Interface for VSE

Copy the Skeleton Job for IOACMD. Job IOACMD is used to enter OSA/SF commands from JCL.

1. Copy member **IOACMD** from ICCF library 59 into a private ICCF library.
Set up the job as it is shown in the figure. Only one EXEC REXX=IOACMD line should be included. The other two lines that start with an asterisk are shown as an example of other ways to use the EXEC. Submitting the job as shown in the figure will always show you a list of OSA/SF commands and prompt you to enter one. This is the preferred method.
This example will also store the IOACMD debug files into sublibrary PRD2.OSASF. The first parameter must specify a library and sublibrary for the debug files. If you choose to use a different location, write it down for future reference and change the JCL accordingly.

```
// JOB IOACMD
// OPTION NODUMP
// LIBDEF *,SEARCH=(PRD2.OSASF,PRD1.BASE,PRD2.SCEEBASE)
// EXEC PROC=LIBDEF
* LIBLIST PHASE,* ,list where members are that its finding
* EXEC REXX=IOACMD,PARM='PRD2.OSASF' SIZE=1000K
* EXEC REXX=IOACMD,PARM='PRD2.OSASF GET_OAT 78 osa.vse.joel.oat'
// EXEC REXX=IOACMD,PARM='PRD2.OSASF GET_OAT FC C
OSA.JMF.OAT.CHPFC'
* Continuation chars MUST start in column 16
// EXEC LISTLOG
/*
/ &
```

Figure 39. IOACMD Job

2. Submit the job to the VSE/POWER reader queue.
3. Ensure that you have released jobs IOAINX and IOMAIN. For information, see “Move the Jobs into the Power RDR Queue” on page 82. Release job IOCMD.

Using the IOACMD EXEC Interface

When you have set up the IOACMD EXEC command line interface to OSA/SF, you can use the interface with any operating system OSA/SF supports.

There are four ways to use the EXEC:

- Full prompting
- Command prompting by the IOACMD EXEC
- Entering parameters without prompting
- Starting the IOACMD EXEC and asking for help

Full Prompting

If you enter the following, the EXEC will show you a list of the OSA/SF commands and prompt you for the command and parameters.

In z/OS:

```
EX 'IOACMD.EXEC' EXEC
```

In VM:

```
IOACMD
```

In VSE:

```
// EXEC REXX=IOACMD PARM='PRD2.OSASF',SIZE=1100K
```

Command Prompting by the IOACMD EXEC

Enter the name of the EXEC and the OSA/SF command with no parameters. The EXEC then prompts for all the parameters needed. Help messages, when available for some of the parameters, are displayed.

After you enter the parameters, the EXEC processes the command and parameters. The data is used to generate the proper input needed by OSA/SF. The results are then put in the specified file or data set, and in some cases, displayed.

In z/OS:

```
EX 'IOACMD.EXEC' 'GET_OSA_ADDRESS_TABLE' EXEC
```

OSA/SF Interfaces

In VM:

```
IOACMD GET_OSA_ADDRESS_TABLE
```

In VSE:

```
// EXEC REXX=IOACMD PARM='PRD2.OSASF GET_OSA_ADDRESS_TABLE',SIZE=1100K
```

In this example you are requesting the OAT from an OSA. You are prompted for the CHPID and data set or filename.

Entering Parameters without Prompting

Enter the name of the exec followed by the OSA/SF command and parameters. Some commands require a data set name or filename to be specified. The results are put in the specified data set or file, and, for some commands, displayed.

In z/OS:

```
EX 'IOACMD.EXEC' 'GET_OSA_ADDRESS_TABLE 4b userid.getaddr' EXEC
```

In VM:

```
IOACMD GET_OSA_ADDRESS_TABLE 4b userid getaddr
```

In VSE:

```
// EXEC REXX=IOACMD PARM='PRD2.OSASF GET_OSA_ADDRESS_TABLE 4b PRD2.OSASF.userid.getaddr',SIZE=1100K
```

where:

- **GET_OSA_ADDRESS_TABLE** is the command.
- **4b** is the CHPID parameter **userid.getaddr** is the data set name parameter for z/OS and VSE.
- **userid getaddr** is the filename filetype parameter for VM.

Starting the IOACMD EXEC and Asking for Help

Enter the name of the EXEC followed by **HELP**. This displays a list of all the OSA/SF commands. You can then enter the name of the EXEC with the command name and the EXEC will prompt you for parameters.

You can also get help for a specific command by entering the command name.

In z/OS:

```
EX 'IOACMD.EXEC' 'HELP QUERY' EXEC
```

In VM:

```
IOACMD HELP QUERY
```

In VSE:

```
// EXEC REXX=IOACMD PARM='PRD2.OSASF HELP QUERY', SIZE=1100K
```

This example shows you the parameters for the Query command.

For More on IOACMD

To see how to change MAC addresses using IOACMD, see page 130.

For syntax and usage information on all IOACMD parameters, see Chapter 13, “OSA/SF Commands for REXX,” on page 157.

Setting up an OSA/SF GUI

Perform the steps described in these topics:

- “Customize a TCP/IP Connection”
- “Download and Install the Java Runtime and JavaHelp™ Files” on page 92
- “Download the IOAJAVA GUI Code and Define the CLASSPATH Environment Variable” on page 92
- “Starting the OSA/SF GUI” on page 96

Customize a TCP/IP Connection

If you plan to use the OSA/SF GUI, use the following section to set up the connection from the workstation to the server running OSA/SF. The OSA/SF GUI uses TCP/IP to connect to OSA/SF. To enable the connection, you must start an OSA/SF TCP/IP server (IOASRV). Information for the appropriate host system is provided as follows:

- “Customize a TCP/IP Connection for z/OS”
- “Customize a TCP/IP Connection for z/VM” on page 91
- “Customize a TCP/IP Connection for VSE” on page 92

Customize a TCP/IP Connection for z/OS

If you plan to use the OSA/SF GUI, use the following section to set up the connection from the workstation to the server running OSA/SF. The OSA/SF GUI uses TCP/IP to connect to OSA/SF. To enable the connection, you must start an OSA/SF TCP/IP server (IOASRV). Although the user does not directly log on to a TSO/E user ID, access to a valid system user ID and password is required for this connection. The TCP/IP server uses the user ID and password to verify that the user has authorization to access the OS/390 OSA/SF server resources.

Starting with APAR OA23232, IOASRV supports the MVS "Stop" command from the system console.

Starting with the following APARs, the OSA/SF GUI must be run on Java 6 or higher. The previous minimum Java level of 4 is no longer valid:

- z/OS APAR OA31645
- VM APAR OA32646
- VSE APAR PK97277

Assumptions

- TCP/IP is installed on z/OS.
- Workstation-to-server connection is available

Note: Either do not use the Open Systems Adapter for this connection, or have at least one connection through two different OSA cards for redundancy purposes.

- You know the server TCP/IP Name or IP address.

1. Create IOASRV procedure member in SYS1.PROCLIB(IOASRV). IOASRV is the TCP/IP server (daemon) that TCP/IP starts and allows the workstation to communicate with the OSA/SF server program. A sample IOASRV.PROC can be found in IOA.SIOASAMP. (In Figure 40 on page 90, PARM=*nnnn*, where *nnnn* is a port number from 1-65535.)

Note: Some Cisco firewalls may use port 2000 for their use. Make sure you pick a port number not in use on your system by any other products.

```

/*
/**   Sample TCP/IP Server Proc
/**
//SERVER   PROC
//SERVER   EXEC  PGM=IOAXTSRV,PARM=2000,REGION=2M,TIME=1440
//IOALIB   DD   DSN=SYS1.SIOALMOD,DISP=SHR
//STEPLIB  DD   DSN=SYS1.SIOALMOD,DISP=SHR
//         DD   DSN=CEE.SCEERUN,DISP=SHR
//SYSPRINT DD   SYSOUT=*,DCB=(RECFM=FBA,LRECL=121,BLKSIZE=121)
//SYSUDUMP DD   SYSOUT=H

```

Figure 40. OSA/SF IOASRV Startup Procedure

___ 2. Update the TCP/IP profile.

Add IOASRV (the started procedure created in the last step) to the AUTOLOG section of the TCP/IP profile. This causes the IOASRV server (daemon) to be started whenever TCP/IP is started. Create a TCP/IP configuration file for the TCP/IP address.

```

AUTOLOG
      IOASRV          ;OSA/SF Server
ENDAUTOLOG

```

Figure 41. AUTOLOG Section of the TCP/IP Profile

___ 3. Use the TCP/IP port number in the IOASRV started procedure to define the port number used by the OSA/SF GUI. The socket number is used to connect the GUI to TCP/IP on the server. This TCP/IP port number must also be specified at the GUI workstation as a parameter when communications are started with TCP/IP. In this example, port number 2000 is used in the IOASRV started procedure, but you can use any unused port number.

```

PORT
      2000 TCP IOASRV    ; OSA/SF Server
ENDPORT

```

Figure 42. TCP/IP Port Number

___ 4. Use a file, for example, *yourprefix*.TCPIP.DATA, to specify the configuration information required by the TCP/IP client programs.

- To specify the TCP server name of this system, use the HOSTNAME statement or let the name default to the node name specified in the IEFSSNxx PARMLIB member.
 HOSTNAME OSASF
- Use the TCPIPJOBNAME statement to specify the member name (JOBNAME) of the procedure used to start the TCP/IP address space. If you do not specify the name and if your TCP/IP started procedure name (JOBNAME) is not the default name of TCPIP, clients will fail at startup with an irrecoverable interaddress communication error.
 TCPIPJOBNAME TCPIPSF
- Specify the DATASETPREFIX statement in *yourprefix*.TCPIP.DATA data set. The parameter in this statement, which can be up to 26 characters and must *not* end with a period, takes precedence over either the distributed or the modified data set prefix name as changed by the EZAPPRFX installation job. If this statement is used in a profile or

configuration data set that is allocated to a client or server, that client or server dynamically allocates additionally required data sets using the statement's parameter value as the data set name prefix.

DATASETPREFIX TCIPSF

- ___ 5. If more than one TCP/IP image is running on the server, you must distinguish which TCP/IP image is controlling the IOASRV program. To do this, take the following steps.

- a. Uniquely identify the TCP/IP configuration profile data set with the following PROFILE statement:

```
//PROFILE DD DSN=yourprefix.PROFILE.TCPIP
```

in the TCP/IP startup JCL. During initialization of the TCP/IP address space, system operation and configuration parameters are read from the configuration profile data set. (See "Specify Configuration Statements in PROFILE.TCPIP" in *z/OS Communications Server: IP Configuration Guide*)

- b. Place the '//SYSTCPD DD' statement in the TSO logon procedure and in the JCL of any client or server executed as a background procedure. The SYSTCPD statement identifies the data set to be used to obtain the parameters defined by TCPIP.DATA.

```
//SYSTCPD DD DISP=SHR,DSN=yourprefix.TCPIP.DATA
```

- c. Ensure the IOASRV member you copied from the IOA.SIOSAMP library into SYS1.PROCLIB has the '//SYSTCPD DD' line in it to associate IOASRV to the specific TCP/IP image.

```
//SYSTCPD DD DSN=yourprefix.TCPIP.DATA,DISP=SHR
```

Continue at "Download and Install the Java Runtime and JavaHelp[™] Files" on page 92

Customize a TCP/IP Connection for z/VM

If you plan to use the OSA/SF GUI, use these instructions and examples to set up communications between a workstation running the OSA/SF GUI and OSA/SF on the z/VM host. The connection is from the OSA/SF GUI that uses an *authorized* VM ID and then to the OSA/SF server virtual machine.

Setting Up TCP/IP: The OSA/SF GUI makes use of the TCP/IP as its communication interface method. Use these instructions to set up the TCP/IP communications between the OSA/SF GUI and OSA/SF on the host.

1. Select a user ID that will be used to run the OSA/SF server and provide CP privilege class B authority for that ID (normally OSADMINx). Class B is required because the server issues Diagnose X'84' to validate passwords when an external security manager, such as RACF/VM, is not used, and because the server uses the CP ATTACH command.
2. Verify that TCPMAINT 592 is accessed as the "H" disk.
3. Have the authorized user call IOAXTSRV *nnnn* (where *nnnn* is a port number from 1-65535) at the end of the PROFILE EXEC. This automatically starts the OSA/SF server and causes it to listen to the specified port every time this user ID is logged on. You can specify any unused port number.
4. Add the authorized user id to PROFILE TCPIP
 - a. If you want TCP/IP to start the service automatically, add the user to the AUTOLOG list.

OSA/SF Interfaces

```
AUTOLOG
      OSADMIN1 0      ; OSA/SF GUI server
ENDAUTOLOG
```

- b. Reserve the port number from step 3 for the user (this example uses port 2000)

```
PORT
      2000 TCP OSADMIN1 ; OSA/SF GUI server
ENDPORT
```

To manually start the GUI server, issue CP XAUTOLOG OSADMIN1 (for example).

To verify the connection between the host and workstation, use the NETSTAT and PING commands.

For information about the OSA/SF **Host Open Window**, see “OSA/SF Host Open Window” on page 96

For information about defining TCP/IP stacks for z/VM, see *TCP/IP Planning and Customization*

Continue at “Download and Install the Java Runtime and JavaHelp™ Files”

Customize a TCP/IP Connection for VSE

Assumptions

- TCP/IP is installed and running on the VSE Server. To enable the TCP/IP connection for VSE, you must start an OSA/SF TCP/IP Server (IOAXTSRV). A valid VSE userid is required for the TCP/IP connection.
- Workstation-to-server connection is available.
- You know the VSE Server TCP/IP Name or IP Address.

1. Copy member IOAXTSRV from ICCF library 59 into a private ICCF library. This sample specifies port number 2000, but you can use any unused port number. This port number must be used at the GUI workstation as a parameter when communications are started with OSA/SF on VSE.
2. Submit the job to the VSE/POWER RDR queue and release it from there.
3. When this job has started successfully, the VSE System is ready to receive input from the OSA/SF GUI. To verify the base TCP/IP connection between your workstation and the VSE system, use the ping command.

Download and Install the Java Runtime and JavaHelp™ Files

Follow your installation's instructions for downloading the latest Java runtime files (Java 1.4 or higher) and JavaHelp files (JavaHelp 1.1.2 or higher) from the Internet.

Download the IOAJAVA GUI Code and Define the CLASSPATH Environment Variable

When to Use These Instructions

Use these instructions after you have:

- Installed OSA/SF using the Program Directory
- Set up OSA/SF

Creating a Directory for ioajava.jar

Create a directory on your windows workstation where you can place the code for the GUI (ioajava.jar). For example, you might create the following directory:

```
osajavagui
```

For Linux, you can define a subdirectory off of the usr directory:

```
mkdir /usr/osajavagui
```

Download the GUI Code

The following instructions assume that you have 3270 emulator support from Personal Communications Manager/3270 on your workstation. If you do not have 3270 emulator support, you can use FTP to transfer the OSA/SF GUI data set from your operating system to your workstation and store the files. See “Using FTP to Download the GUI Code” on page 94.

- ___ 1. Close the current OSA/SF GUI on your workstation.
- ___ 2. Establish a 3270 emulator session on the workstation. You might have to start Personal Communications/3270 if no server (host) sessions are started. To install the emulator on Linux, download the RPM file from the following website:

www.rpmfind.net

then use the following command to install the RPM:

```
rpm -ivh x3270-3.2.19-1mdk.i586.rpm
```

- ___ 3. For z/OS, log on to a TSO/E User ID that can access the member **IOAJAVA**. This member contains the OSA/SF file in the partitioned data set (PDS) HLQ.SIOJAVA where HLQ is the high-level qualifier of the data set.
For z/VM, log on to userid osadmin1 and download the file ioajava bin e.
For VSE, logon to a userid that can access IOAJAVA. The file is IOAJAVA.W and can be found in PRD1.BASE.

Note: IBM supplies this PDS for z/OS; if your server personnel change the name, you need to obtain the new name and use it in place of HLQ.SIOJAVA in the following instructions.

- ___ 4. For **z/OS**, position your TSO session at the READY prompt, or select **COMMAND** from the ISPF Primary Option Menu.
For **VM**, be at the READY prompt.
For **VSE**, from the VSE/ESA FUNCTION SELECTION panel, press F6 (Escape(U)). The format of the command to download IOAJAVA from a DOS window is:

Enter the following as a single continuous command. It is broken into multiple lines here in order to fit the printed page.

```
receive PC_path/IOAJAVA.JAR Host_Session_id:Filename Filetype  
(File=LIB L=Library_name S=sublibrary_name ASCII)
```

where:

PC_path is the path where you want to receive the file.
Host_Session_id is the id of the host session from which the file is being downloaded.

The following steps do not apply to **VSE**. For **VSE** continue at “Using FTP to Download the GUI Code” on page 94.

- ___ 5. On the menu bar of the emulator screen, select **Actions** or **Transfer**. (This might vary depending on the level of software you are using.) From the pull down, select **Receive Files from Host**. You get a transfer screen.

___ 6. Ensure that the following fields are set:

- For **host file name**:
`'hlq.sioajava(ioajava)'`
- Specify the following names depending on whether you are downloading to Windows or Linux.

Windows: For PC file name:

`c:\osajavagui\ioajava.jar`

In this example the directory is called `osajavagui`, but you can specify your own name for the directory where the GUI code is to reside.

Linux: For PC file name:

`/usr/osajavagui/ioajava.jar`

In this example the directory is called `usr/osajavagui`, but you can specify your own name for the directory where the GUI code is to reside.

- For **transfer type**:

`binary`

___ 7. Click **Receive** to transfer the file to the workstation or Linux system.

Using FTP to Download the GUI Code

If you are not using Personal Communications Manager/3270 on a workstation, you can use FTP to download the GUI code.

1. Ensure that TCP/IP is started on the host system.
2. For z/OS, ensure that the FTP daemon is active.
3. If you are running z/VM, make sure the FTP server (daemon) is running.
4. From the Linux shell or Windows prompt, issue the following command:

```
ftp IP_address
```

where *IP_address* is the IP address of the system.

5. Logon with a valid user ID for the host system and issue the following commands. In this example for Linux, the directory is called `usr/osajavagui`, but you can specify your own name:

```
lcd /usr/osajavagui
cd 'hlq..SIOAJAVA'
bin
get ioajava ioajava.jar
bye
```

Defining the CLASSPATH environment variable

After you have downloaded the GUI code, define the CLASSPATH environment variable for Windows or Linux.

For Windows 2000 or Windows NT, use one of the following procedures to obtain the **Environment variables** window:

- Go to the **Control Panel**. Double click on **System** icon, then click **Advanced** tab → **Environment Variables**. See “To define the CLASSPATH environment variable for Windows 2000, Windows NT, or Windows XP” on page 95.
- From a DOS command prompt, type SYSEDIT. See “Using DOS to define the CLASSPATH environment variable” on page 95.

For Windows XP, use one of the following procedures to obtain the **Environment variables** window:

- Go to the **Control Panel**. Double click on **Performance and Maintenance**, then click **System** → **Advanced Page** → **Environment Variables**. See “To define the CLASSPATH environment variable for Windows 2000, Windows NT, or Windows XP.”
- From a DOS command prompt, type SYSEDIT. See “Using DOS to define the CLASSPATH environment variable.”

For **Linux**, see “To define the CLASSPATH environment variable for Linux”

To define the CLASSPATH environment variable for Windows 2000, Windows NT, or Windows XP: Do the following from the **Environment variables** window:

1. On the **System variables** window, select the following variable and click **Edit**:
CLASSPATH

If you do not find CLASSPATH listed, click **New** to create it.

2. For CLASSPATH **Variable Value**, specify the directories where you have stored the Java help files and the OSA/SF GUI code that you transferred. For example, you might have the following CLASSPATH definitions for **Variable Value**:

C:\Program Files\Java\jh1.1.3\java\help\lib\jh.jar;C:\osajavagui\ioajava.jar

If you are creating CLASSPATH for the first time, you need to specify the name for **Variable Name** in the window.

Click OK on each open window to save the data and exit.

Note: Java runtime libraries may need to be specified in the Windows PATH system environment variable or through the SET PATH command from a DOS window.

Using DOS to define the CLASSPATH environment variable: For Microsoft Windows NT, Windows 2000, or Windows XP: From a DOS command prompt, type SYSEDIT to display a window that includes CONFIG.SYS. Set the variable as follows in CONFIG.SYS:

CLASSPATH=*directory_path*

where *directory_path* is the location of the JavaHelp files and the ioajava.jar files. For the runtime Java files, ensure that you have defined the location as follows:

PATH=*directory_path*

where *directory_path* is the location of the Java runtime files.

You can also set CLASSPATH and PATH variables through the following DOS commands:

```
SET CLASSPATH=directory_path
SET PATH=directory_path
```

where *directory_path* is the location of the appropriate Java files. You can define or append directories to an existing string.

To define the CLASSPATH environment variable for Linux:

1. Issue an export command for CLASSPATH and specify the directories where you have stored the Java runtime libraries (from the PATH statement), the Java help files, and the OSA/SF GUI code that you transferred. For example, you might issue the following command with these definitions:

```
export CLASSPATH=/usr/osajavagui/ioajava.jar:/usr/java/jh1.1.3/java\help\lib\jh.jar
```

2. To verify if the variable is set correctly, issue the following command:

```
echo $CLASSPATH
```

You can update the `.bash_profile` so that you do not need to retype the `export CLASSPATH` command each time that you log on. You update the file depending on how you log on:

- If you log on as `root`, update the file in `/root`:
`/root/.bash_profile`
- If you log on as a user, update the file in the `/home/userid` directory, where `userid` is the id of the user. Edit the file and add the `export` command to the bottom of the file. You might need to create the `/home/userid` directory and the `.bash_profile` file if they do not exist. Update the attributes to make the file executable:

```
chmod +x.bash_profile
```

Starting the OSA/SF GUI

Although you can start the OSA/SF GUI on any platform that supports graphics and a Java 1.4 environment, this document describes how to start the GUI only on Windows and Linux system platforms. For both Windows and Linux, ensure the following actions have been completed before you try to start the GUI:

- OSA/SF GUI TCP/IP connection is set up for your workstation. See “Customize a TCP/IP Connection” on page 89.
- OSA/SF IOASRV or IOXTSRV task is started on the host system.

To start the OSA/SF GUI on Windows: Open a new Command Prompt (DOS) window, change to the directory where the `ioajava` code resides, and enter the following command from the `C:\>` command prompt:

```
java ioajava
```

To start the OSA/SF GUI on Linux: Specify the directory where the `ioajava` code resides and issue the command to run the GUI on the Linux terminal session. Note that the command text is case sensitive:

```
/usr/java/j2re1.4.0_02/bin/java ioajava
```

If any errors occur when starting the OSA/SF GUI see “Debugging the OSA/SF GUI startup” on page 98.

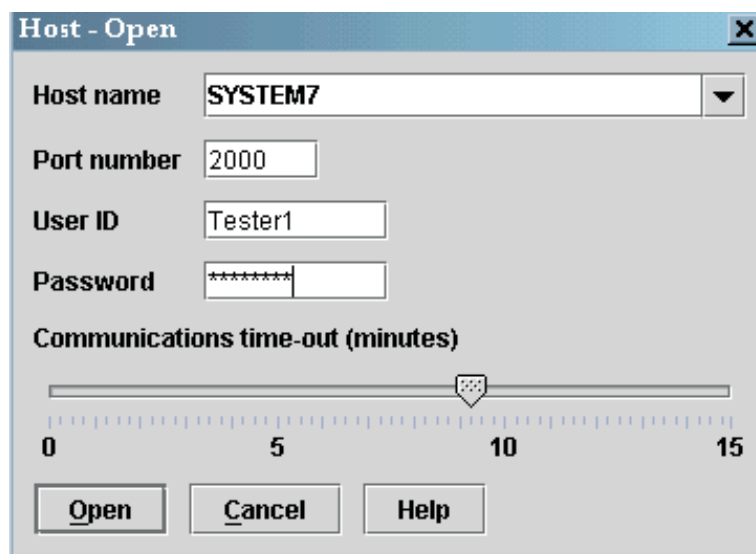
Using the OSA/SF GUI

After you have completed the steps for setting up the OSA/SF GUI, you can use the command windows to configure an OSA. The help panels that are part of the GUI interface provide information for each window.

OSA/SF Host Open Window

The **Host-open** window allows you to connect to the OSA/SF host. When you start the OSA/SF GUI, you enter the name of the OSA/SF host system. Although the window only allows access to a single host system, you can have multiple windows open on your workstation for other host systems. See “Using the OSA/SF GUI with Different OSA/SF Hosts” on page 97.

Figure 43 on page 97 is an example of the OSA/SF Host Open window to access the OSA/SF GUI:



The image shows a Windows-style dialog box titled "Host - Open". It contains the following fields and controls:

- Host name:** A dropdown menu with "SYSTEM7" selected.
- Port number:** A text input field containing "2000".
- User ID:** A text input field containing "Tester1".
- Password:** A text input field with masked characters "*****".
- Communications time-out (minutes):** A horizontal slider bar ranging from 0 to 15. The slider is positioned at approximately 8 minutes.
- Buttons:** "Open", "Cancel", and "Help" buttons are located at the bottom.

Figure 43. OSA/SF Host Open Logon

Enter the following information:

- Name, Uniform Resource Locator (URL), or IP address of the host system. You may also enter comments in this field following the URL or IP address. All text after the first space will be ignored by OSA/SF processing. The fifty (50) most recent successful entries in this field are retained and may be accessed by clicking the pulldown and selecting the one you want to use.
- Port (specified in IOASRV)
- User ID for the system
- User password

OSA/SF Commands

When you enter the required information and press **Open** on the window, the OSA/SF GUI displays the **OSA/SF Commands** window and **Command Output Window**. The **Command Output** window shows all commands issued. You can launch all OSA/SF GUI tasks from the **OSA/SF Commands** window. For a description of each command option, see the help for the window.

CHPID View Window to display Channel Information

The option **CHPID View** on the **OSA/SF Commands** window shows a list of each CHPID that is defined in the channel subsystem on which OSA/SF is running. From this window, you can review all of the CHPID numbers and ports for the OSA features and perform tasks such as the following:

- Display, modify, or install CHPID configurations
- Display settings for a CHPID or port
- Display OSA devices and OATs

Using the OSA/SF GUI with Different OSA/SF Hosts

Your installation might have more than one host with OSAs that you need to manage. For example, you might have one of the following OSA configurations:

- A second OSA/SF image for backup
- Different physical processors

- Nonshared images and OSAs for security reasons

Regardless of the number of host systems, one OSA/SF GUI attaches to one system. You can start multiple OSA/SF GUI sessions, then specify the host name or IP address on the open-host window to access a different host.

Problems starting the OSA/SF GUI

For error messages and corrective actions to take when you try to start the OSA/SF GUI, see “Debugging the OSA/SF GUI startup.”

Debugging the OSA/SF GUI startup

The following Java and OSA/SF error messages might occur when you start the OSA/SF GUI. Corrective actions for each error message are listed.

Notes:

1. These messages are not enabled for LookAt.
2. This is not a comprehensive list of all GUI messages

Note:

The name specified is not recognized as an internal or external command, operable program or batch file.

Java is not installed on the user's system, or the PATH environment variable is not properly set. Ensure that the correct level of Java is installed or that the PATH variable specifies the correct Java runtime files.

Exception in thread "main" java.lang.UnsupportedClassVersionError: ioajava (Unsupported major.minor version xx.x)

Java has encountered a Java version error (java.lang.UnsupportedClassVersionError). Either you have the wrong version of Java installed, or you have more than one version of Java installed and the wrong version is the first version that is specified in the system PATH statement. From a DOS prompt, enter the following command to determine the version of Java that is on the system:

```
java -fullversion
```

The following messages display the version of Java returned when you enter the command. The first two messages indicate Java versions that are at levels lower than Java 1.4, which is required to run the OSA/SF GUI:

```
java full version "J2RE 1.2.2 IBM build cn122-20001026"
```

```
java full version "J2RE 1.3.0 IBM build cn130-20010609"
```

```
java full version "1.4.1-b21"
```

Exception in thread "main" java.lang.NoClassDefFoundError: ioajava

The user's CLASSPATH environment variable is not set for ioajava.jar that the OSA/SF GUI requires. Ensure that you have defined ioajava.jar for CLASSPATH. Specify the correct CLASSPATH environment variable for ioajava.jar. See “Defining the CLASSPATH environment variable” on page 94.

IOAG001E Graphics are not available on this system. OSA/SF interface is ending.

OSA/SF is not able to create a graphic window on the user's system. Either

the system does not support graphics or the user is connected to the system in a way that does not support graphics (for example, through a TELNET to a Linux system). Ensure that the user system supports Java-based graphics at the appropriate Java version.

IOAG002E Could not load JH.JAR. The JavaHelp system may not be properly installed. OSA/SF interface is ending.

The user's CLASSPATH environment variable is not set for the JavaHelp file `jh.jar` that the OSA/SF GUI requires. Specify the correct CLASSPATH environment variable for `jh.jar`. See “Defining the CLASSPATH environment variable” on page 94.

IOAX021E Connection refused. Most likely causes are that you either specified the wrong port number, IOAXTSRV is no longer running on the host, or the loss of network connectivity.

The IP address is not correct or does not exist. Use `ping` to verify the host system connection. If `ping` returns a valid address, check that IOAXTSRV is actually running on the host port that is specified:

1. TELNET to the host using port `nnnn`. If TELNET fails, IOAXTSRV is not listening to port `nnnn`.
2. If TELNET succeeds, stop IOAXTSRV at the host and retry TELNET.
3. If TELNET succeeds again, IOAXTSRV is not on port `nnnn`, and you must specify the correct port number on the **Host-Open** window.
4. If TELNET does not succeed, restart IOAXTSRV to determine if the connection is working.

IOAX024E Password identification check has failed. Verify that value specified is correct.

The password that is specified on the **Host-Open** window is not recognized. Specify a valid password.

IOAX025E User identification check has failed. Verify that the user identification value is correct.

The user ID that is specified on the **Host-Open** window is not recognized. Specify a valid user ID.

IOAX027E The local system could not resolve hostname/IP Address value. Verify that TCP/IP has been started at this workstation, and that your hostname/IP Address values are correct.

The user has specified an incorrect hostname or IP address on the **Host-Open** window, or the user cannot connect to the DNS server to translate the host name. Use `ping` to verify the host system connection, and specify the correct hostname or IP address.

IOAX040E The communication attempt has exceeded the specified timeout value. You must end this session to recover.

The timeout value that is specified has expired. Either the timeout value is set too low for the command to finish, or the host is not responding to the command. For a timeout problem, you might be able to continue the session by waiting for the previous command to finish, but for either case, it is recommended that you shut down the interface, specify a higher value than the previous threshold value, and restart the interface.

Chapter 7. Host Program Setup

Each OSA-Express feature must be defined in the system software configuration using Communications Server or any other host program product, such as VTAM, installed on the server. After you complete the QDIO tasks in this section, your OSA-Express features are ready to go. For non-QDIO OSA-Express features, see Chapter 8, “Configuring OSA-Express Modes,” on page 111.

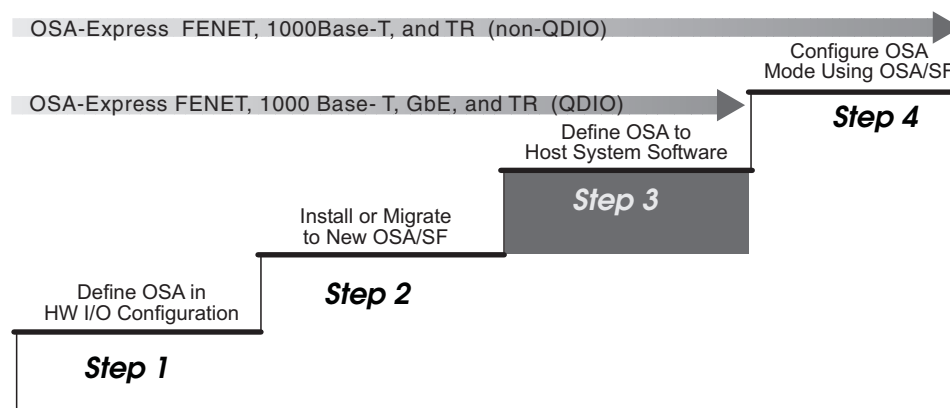


Figure 44. Step Three in a Four-Step Process

Overview

The host definitions required to set up your OSA-Express feature vary depending on the following:

- Operating System
- OSA-Express Feature Type
- OSA-Express Mode

At a minimum you need to update a TCP/IP profile for Passthru mode.

The following topics summarize requirements for each OSA-Express feature by QDIO or non-QDIO mode:

- “z/OS”
- “z/VM” on page 102
- “VSE/ESA” on page 103
- “Linux” on page 103

For z/OS host systems, the table directs you to the appropriate section in this chapter for more information. For the other hosts, reference information is provided.

For TPF, see *Transaction Processing Facility: Transmission Control Protocol/Internet Protocol* or visit the following web site:

www.s390.ibm.com/products/tpf/

z/OS

See Table 11 on page 102 for the host program version and release needed for each OSA feature/mode combination.

Host Program Setup

Table 11. Host Program Definition Summary for z/OS

OSA Feature	Mode	VTAM Defs	TCP/IP DEV Type	TCP/IP LINK (or interface) Type	See Page
GbE	QDIO (IP)	TRL	MPCIPA (IPv4 only)	IPAQENET (IPv4), IPAQENET6 (IPv6)	104
10 GbE	QDIO (IP)	TRL	MPCIPA (IPv4 only)	IPAQENET (IPv4), IPAQENET6 (IPv6)	104
FENET and 1000Base-T	QDIO (IP)	TRL	MPCIPA (IPv4 only)	IPAQENET (IPv4), IPAQENET6 (IPv6)	104
FENET and 1000Base-T	TCP/IP Passthru		LCS	ETHERNet, 802.3, ETHERor802.3	105
FENET and 1000Base-T	SNA	XCA/SWNET			106
TR	QDIO (IP)	TRL	MPCIPA	IPAQTR	104
TR	TCP/IP Passthru		LCS	IBMTR	105
TR	SNA	XCA/SWNET			106

Note: Beginning with z/OS V1R10, the INTERFACE statement is supported for IPv4. It is strongly recommended you use the INTERFACE statement instead of DEVICE/LINK in order to exploit new function on OSAs defined for QDIO mode (OSD).

The following publications from your IBM Communications Server library are useful resources:

z/OS Communications Server: IP Configuration Guide

z/OS Communications Server: IP Configuration Reference

z/OS Communications Server: SNA Resource Definition Reference

z/VM

QDIO and IP Passthru modes require DEVICE and LINK statements in the TCP/IP profile. SNA mode requires that you build an External Communication Adapter (XCA) node for VTAM. See Table 12 for the host program version and release needed for each OSA feature/mode combination.

Table 12. Host Program Definition Summary for z/VM

OSA Feature	Mode	VTAM Defs	TCP/IP DEV Type	TCP/IP LINK Type
GbE	QDIO (IP)		OSD	QDIOETHERNET
10 GbE	QDIO (IP)		OSD	QDIOETHERNET
FENET and 1000Base-T	QDIO (IP)		OSD	QDIOETHERNET
FENET and 1000Base-T	TCP/IP Passthru		LCS	ETHERNET
FENET and 1000Base-T	SNA	XCA		
TR	QDIO (IP)		OSD	QDIOTR
TR	TCP/IP Passthru		LCS	IBMTR
TR	SNA	XCA		

The following publications provide detailed information:

TCP/IP Planning and Customization

TCP/IP User's Guide

and

VTAM V4R2 for MVS/ESA, VM/ESA, VSE/ESA Resource Definition Reference

VSE/ESA

The QDIO and IP Passthru modes require DEVICE and LINK statements in the TCP/IP profile. See Table 13 for the host program version and release needed for each OSA feature/mode combination.

Table 13. Host Program Definition Summary for VSE.

OSA Feature	Mode	VSE ADD Statement	VTAM Defs	TCP/IP DEFINE LINK Statement	TCP/IP DEFINE ADAPTER Statement
GbE	QDIO (IP)	OSAX		TYPE=OSAX	
10 GbE	QDIO (IP)	OSAX		TYPE=OSAX	
FENET and 1000Base-T	QDIO (IP)	OSAX		TYPE=OSAX	
FENET and 1000Base-T	TCP/IP Passthru	OSA		TYPE=OSA	TYPE=ETHERNET
TR	QDIO (IP)	OSAX		TYPE=OSAX	
TR	TCP/IP Passthru	OSA		TYPE=OSA	TYPE=Token_Ring
TR	SNA	XCA			

See the following publications for more information.

TCP/IP for VSE V1R4.0 User's Guide

VTAM V4R2 for MVS/ESA, VM/ESA, VSE/ESA Resource Definition Reference

Linux

The Linux for z/Series network driver supports the following OSA-Express feature/mode combinations:

- FENET, 1000BaseT, Gigabit Ethernet and 10 Gigabit Ethernet features in QDIO mode
- FENET and 1000BaseT features running TCP/IP Passthru (using LCS device type)
- Token Ring feature

Beginning with Linux kernel version 2.4.14, IPv6 is supported for OSA-Express FENET, 1000BaseT, Gigabit Ethernet and 10 Gigabit Ethernet features in QDIO mode.

Table 14. Host Program Definition Summary for Linux

OSA Feature	Mode	Device Driver	Interface Name Prefix
GbE	QDIO (IP)	QETH	ethn
10 GbE	QDIO (IP)	QETH	ethn
FENET and 1000Base-T	QDIO (IP)	QETH	ethn
FENET and 1000Base-T	TCP/IP Passthru	LCS	ethn
TR	TCP/IP Passthru	LCS	trn
TR	QDIO (IP)	QETH	trn

For More Information

For complete information about device driver setup for OSA-Express, see the following:

- <http://www.ibm.com/shop/publications/order>
 - For the Linux 2.6 kernel: *Linux on System z - Device Drivers, Features, and Commands*, (SC33-8289)
 - For the Linux 2.4 kernel: *Linux on zSeries - Device Drivers and Installation Commands*, (SC33-8411)
- For general information on Linux: www.linux.org/docs

QDIO Definitions for Channel Type OSD on z/OS

Use these directions to set up all OSA-Express features running in QDIO mode.

Setting Up a TRLE Statement for QDIO

A Transport Resource List (TRL) is required for OSA-Express features in QDIO mode to transfer data using TCP/IP. For details on the TRLE statement, see *z/OS Communications Server: SNA Resource Definition Reference*.

1. Specify a TRL name of your choice. Observe the following rules to avoid naming conflicts:
 - a. The TRL name **must not match** the VTAMLST member name of the TRLE statement containing this transport resource list major node definition.
 - b. Each TRL defined for a single OSA-Express port must use the same PORTNAME across all images.
 - c. In a given image, each active TRL must have a unique TRL name defined in its TRLE statement.
 - d. In a given image, only one TRL can be activated for a single OSA port.

These restrictions were not completely enforced on early levels of the OSA firmware. Starting with the z990 processor, these restrictions are enforced and customers who have not coded all of the TRLE with the same OSA name will experience problems. Even though all stacks brought up appear to start correctly, the problems usually manifest themselves with only one stack actually working properly.

2. **TRLE** and **LNCTL=MPC** are required.
3. The device numbers specified for READ, WRITE, and DATAPATH must be defined in the hardware configuration.
4. Enter a *PORTNAME* that is unique in your network environment. This port name is required on z/OS for QDIO, and it must match the device name specified for all z/OS TCP/IP stacks using this CHPID. Write the name down because you will use it in the DEVICE and LINK statement of the TCP/IP profile. For more information about port name restrictions, see “Port name relief” on page 19.
5. **MPCLEVEL=QDIO** is a required entry.
6. To exploit multiport support on OSA-Express3 Gigabit Ethernet, **PORTNUM** is required.

What to do next

Continue at “Updating the TCP/IP Profile for QDIO” on page 105 below.

Updating the TCP/IP Profile for QDIO

TCP/IP uses the OSA as a multipath channel (MPC) device. This requires you to define either a `DEVICE` statement, `LINK` statement, and `HOME` statement or, an `INTERFACE` statement, in the TCP/IP profile. For complete details and information about the z/OS TCP/IP profile, see *z/OS Communications Server: IP Configuration Reference*.

Note: MPC devices respond to the `IOS VARY ON` and `IOS VARY OFF` commands regardless of whether these resources are allocated.

Setting Up Priority Queuing

All OSA-Express features operating in QDIO mode (channel type OSD) support priority queuing, which allows the definition of four priority levels based on *service differentiation*: the way in which you define different traffic types to Communications Server. Once you have defined your traffic types, you can assign them priority levels by defining for each a *service level policy*. You define service differentiation and service level policy to the z/OS CS UNIX Policy Agent through a policy configuration file.

When you activate the z/OS CS UNIX Policy Agent, it reads the policy configuration file containing the control statements defining service differentiation and service level policy. Priority queuing can be defined in three control statements:

SetSubnetPrioTosMask statement

Defines as many as eight unique 8-bit Type of Service (TOS) identifiers and assigns each a priority level.

PolicyAction statement

Correlates the TOS identifier and priority with an IP traffic characteristic.

PolicyRule statement

Defines the transmission conditions for each category of IP traffic.

There are additional control statements you can specify in the policy control configuration file that are beyond the scope of this discussion.

See *z/OS Communications Server: IP Configuration Guide* for a detailed description of how to set up the z/OS CS UNIX Policy Agent.

IP Modes for Channel Type OSE (non-QDIO) on z/OS

The following OSA-Express features can be run in TCP/IP Passthru mode exclusively or concurrently with SNA mode:

- FENET
- 1000Base-T
- TR

TCP/IP Definition Requirements for OSE CHPID IP Modes

In this book, only the simplest forms of TCP/IP profile statements are used. The following discussion is meant to put OSA-related parameters into the context of the host server program, but it is beyond the scope of this book to describe TCP/IP statements fully. For more information, see the CS for z/OS books listed in the bibliography (page xi).

Host Program Setup

An OSA running in the TCP/IP Passthru mode is viewed as a LAN channel station (LCS) device by the TCP/IP, which uses the device pair required by the IP duplex protocol to establish the data path to the OSA port. You must therefore define the lower device number of the pair (the READ device) in the IP program's Device statement as the LCS address. And, you must define the OSA port number as the link number in the corresponding Link statement.

To transfer an IP packet across an OSA, two data paths must be defined: one inbound data path for IP packets whose destination is a Home IP address, and one outbound data path for IP packets whose destination is a network IP address. Each data path requires an entry in the OSA address table (OAT). To specify data paths for IP packets through an OSA, Passthru OAT entries are used in the TCP/IP Passthru mode, and MPC entries are used in the Before proceeding to a discussion of these types of OAT entries, consider the following points.

To send an inbound IP packet to an S/390 program, a LAN client first sends an ARP broadcast. If an OSA adapter or the S/390 server has the target IP address in the ARP as one of its HOME addresses, an ARP response is sent back to the sending station. The ARP response contains the MAC address of the OSA port that has the connection to the specified IP address.

To send an outbound IP packet to a network client, the GATEWAY statement must define the IP networks and the corresponding LINK out of which packets destined for these networks should be sent. The DEFAULTNET parameter can also be specified to handle IP traffic destined for any network not explicitly routed.

OSA supports IP unicast and IP broadcast destination addresses in all the modes for OSE CHPIDs in which IP data packets are transferred. (IP broadcast is also supported on OSD CHPIDs beginning with Linux kernel version 2.4.14, z/OS V1R4, and z/VM V4R3.)

OSA supports IP multicast destination addresses on all OSA-Express features. You can use OSA/SF to display the IP multicast addresses of the registered members of the multicast group for a selected OSA.

Notes:

1. A MAC address is significant in TCP/IP Passthru mode to identify the port on a directly-attached LAN.
2. You must also specify the Home IP address of the image associated with an inbound Passthru OAT entry if access to the OSA port is to be shared. You can specify more than one Home IP address to provide redundant pathing.

SNA Modes for Channel Type OSE on z/OS

This section describes the OSA-related VTAM statements for SNA mode. For more information on these VTAM macros, see the VTAM books listed in the bibliography. For information on the Communications Server SNA, also See the books listed in the bibliography.

Notes:

1. Define each OSA port in the XCA mode to provide APPN-to-APPN communications via an OSA.

An OSA port can be used to connect a composite network node or an end node or a network node with any other type of APPN node.

2. Define each OSA port in the XCA mode and each peripheral device in the SWNET node to provide peripheral support.

Peripheral support attaches VTAM to peripheral nodes connected to the directly-attached LAN or emulated LAN (ELAN).

3. Define each OSA port in the XCA mode and each subarea connection in the SWNET to provide subarea support.

Subarea support attaches VTAM to a subarea node that is connected to the LAN or ELAN.

4. Specify the maximum number of stations, or PUs, for each port. A maximum of 4096 PUs can be specified for an OSA-Express CHPID. See page 108 and the SNA mode requirements for each operating system in the earlier chapters.

Note also that once a PU is activated within an XCA for a given OSA port, it cannot become available for another instance of VTAM.

5. For parameter values needed for HPR over XCA support, See the VTAM books listed in the bibliography (page xii).

External Communication Adapter (XCA) Major Node for SNA

Associate one XCA major node for each OSA port that will be used. Define:

1. The node type in the VBUILD Definition statement
2. The OSA port used in the PORT Definition statement
3. The switched peripheral nodes that are attached to the LAN or ELAN through the OSA port in the GROUP, LINE, and PU Definition statements.

If you have both subarea nodes (type 4 and type 5 nodes) and peripheral nodes (type 1, type 2, type 2.1, and subarea nodes that appear as type 2.1 nodes) attached to the LAN or ELAN, you must code two GROUP definition statements in this XCA major node (one for the peripheral devices, and one for the subareas).

VBUILD Definition Statement for SNA

Specify one VBUILD Definition statement for each OSA port, that is, for each connection between VTAM and the LAN, ELAN, or SNA network management service.

name VBUILD TYPE=XCA

name

Specify the unique name for this major node.

PORT Definition Statement for SNA

Specify one PORT Definition statement for each VBUILD statement to define the OSA port number and port type as well as the device address (OSA device number) for VTAM to use.

**name PORT ADAPNO=adapter_number, CUADDR=device_address,
MEDIUM=medium_type, SAPADDR=address, TIMER=timeout_value**

name

Specify the VTAM name you want to associate with the OSA port.

adapter_number

Specify the OSA port number for data transfer (0 or 1).

device_address

Specify the device address to be used by VTAM. This value is the OSA device number. In the device address, the unit address defaults to the last 2 digits of the device number.

Host Program Setup

medium_type

Define the type of LAN (or ELAN) connected to this OSA port. Specify RING for token ring, CSMACD for Ethernet.

SAP address

Specify the service access point (SAP) address for the connection to a LAN attached through an OSA that is defined by this XCA major node. This value must be a multiple of 4 and must be unique for each VTAM that is sharing an OSA port.

timer

Specify a value that exceeds (T1 * 9). For example, if you set the T1 value to 3 seconds, an XCA timeout value of 30 seconds meets this requirement. The T1 value is described on page 117.

GROUP Definition Statement for SNA

Specify a line group for type 2 or 2.1 nodes attached through OSA. You also need to define LINE and PU statements for each switched line and each peripheral node with which VTAM will communicate.

You must set a maximum PU limit for each OSA-Express port.

name GROUP AUTOGEN=(number_of_autogens, line_seed_char, pu_seed_char) DIAL=dial_value

name

Specify the minor node name of the line group.

number_of_autogens

Specify the number of VTAM generated LINE and PU statements.

line_seed_char

Define the first character to be used by VTAM to create a name for the generated LINE statements.

pu_seed_char

Define the first character to be used by VTAM to create a name for the generated PU statements.

LINE and PU Definition Statements for SNA

Either specify them separately or let them be generated automatically with the AUTOGEN parameter on the GROUP definition statement.

Switched Network (SWNET) Major Node for SNA

Define one SWNET major node for the switched connections to the peripheral nodes that are attached to the LAN or ELAN connected to the OSA port.

- Define the node type in the VBUILD Definition statement.
- For each PU, define its associated logical units (LUs).
- Optionally, you define a path in the Path Definition statement.

VBUILD Definition Statement for SNA

Define one SWNET major node for any peripheral devices connected to the LAN defined by the associated XCA major node.

name VBUILD TYPE=SWNET MAXNO=max_number MAXGRP=max_group

name

Specify the name for this major node.

max_number

Specify the number of unique numbers that are defined in the DIALNO operand of all PATH definition statements with the switched major node.

max_group

Specify the number of unique path groups (group names) that are defined in the GRPNM operand of all PATH definition statements within the switched major node.

PU Definition Statement for SNA

Define one PU for each physical unit that is connected to the LAN defined by the associated XCA major node.

name PU ADDR=*link_station_address* CPNAME=*control_point_name*
PUTYPE=*pu_type*

name

Specify the minor node name of the physical unit represented by this definition statement.

link_station_address

Specify the hexadecimal station address for the physical unit.

control_point_name

Specify the control point name of a type 2.1 peripheral node. A type 2.1 node requires the CPNAME of both IDBLK and IDNUM on the PU definition statement.

pu_type

Specify the PU type for this peripheral. Specify 2 for PU type 2 or 2.1.

PATH Definition Statement for SNA

Define a path to a physical unit (PU) in a switched major node.

name PATH DIALNO=*number* GRPNM=*group_number*

name

Specify the name for the Path definition statement.

number

The 1st byte is a placeholder (usually 01). The 2nd byte is the SAP address, and the 3rd through 8th bytes are the MAC address of the peripheral (attached workstation).

If an Ethernet LAN station, or PU, is connected across a LAN bridge to a non-Ethernet LAN, the destination MAC address must be coded differently in the DIALNO. Because the LAN bridge flips the bits in every byte of the MAC address, the MAC address should be coded in the inverted (noncanonical) order in the DIALNO parameter. (See the notes on MAC addresses on page 128.)

group_name

Specify this name as the name of the logical group definition of the associated XCA major node.

LU Definition Statement for SNA

Define one LU for each logical unit associated with a type 1 or 2 PU within a switched major node.

name LU LOCADDR=*loc_address*

Host Program Setup

name

Specify the minor node name of the logical unit represented by this definition statement.

loc_address

Specify the logical unit's local address at the physical unit.

At the Physical Unit (PU)

- Configure the unit to support the SNA protocol.
- Specify the CPNAME or the IDBLK/IDNUM pair. This must match the information specified on the PU definition statement under the switched major node.
- Define the MAC address of the OSA port that should be used to connect to VTAM. An OSA port's MAC address can be set to a local MAC address (page 128) to help you avoid reconfiguring existing units.

Chapter 8. Configuring OSA-Express Modes

Follow the instructions in this chapter to use OSA/SF to configure the OSA-Express features that are defined as OSE channels to run in **non-QDIO** mode (TCP/IP Passthru, SNA, or both modes concurrently):

- FENET
- 1000Base-T
- TR

For OSA-Express features that run in non-QDIO mode (OSE channels), you must configure the physical port and create an OAT to set up the data paths between the OSA and host programs. If any of these non-QDIO mode features uses the default OAT without port sharing, OSA/SF is not required.

OSA-Express features that run in QDIO mode (OSD channels) require only HCD definitions and host program setup. Once you have defined both the hardware and software definitions, the data path between any OSA-Direct Express feature and the host programs are automatically set up in an OSA Address Table (OAT).

You can use the following OSA/SF interfaces to configure an OSA-Express feature to run in non-QDIO mode:

- REXX command interface (IOACMD EXEC) (“Using the REXX Command Interface to Configure OSA-Express CHPIDs” on page 112)
- OSA/SF GUI (“Using the GUI to Configure OSA-Express CHPIDs” on page 115)

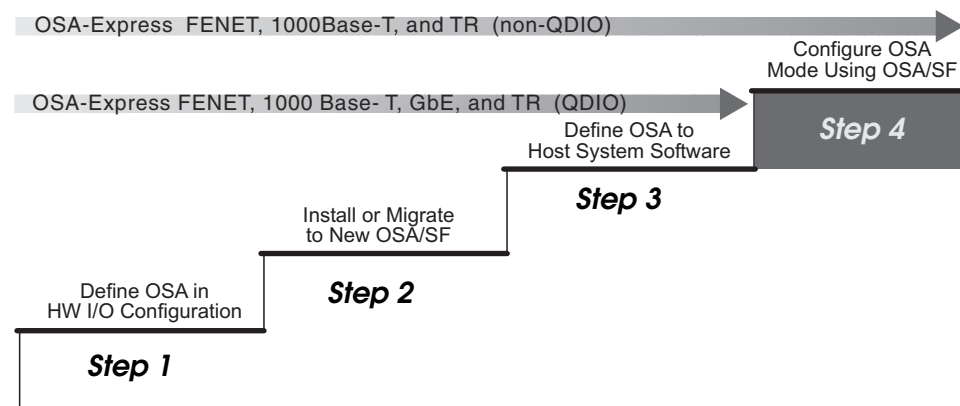


Figure 45. Step Four in a Four-Step Process

Using the REXX Command Interface to Configure OSA-Express CHPIDs

Use these instructions to customize OSA-Express TR, and FENET features, without the use of an OSA/SF GUI. References to more detailed information are included when necessary.

Attention: Before Starting

- ___ 1. If you are not familiar with the OSA address table (OAT) and you need more information than is provided here, see Chapter 12, “About the OSA Address Table (OAT),” on page 151.
- ___ 2. Make sure the hardware configuration (IOCDS) is complete. See Chapter 2, “OSA-Express Hardware Configuration,” on page 37.
- ___ 3. Make sure OSA/SF is running on the server.
- ___ 4. Make sure the OSA (CHPID) is configured online and that the OSAD device is online.

Sample configuration files and OAT templates: Sample configuration files and OAT templates are provided for all OSA-Express features in the following files or data sets:

IOA.SIOASAMP on z/OS
E (200) disk on VM/ESA and z/VM.
PRD1.BASE on VSE/ESA

REXX Command Interface Instructions for Configuring OSA-Express CHPIDs

The REXX command interface instructions include the following tasks:

- “1) Getting and Modifying a Configuration File.”
- “2) Getting an OAT Template” on page 113.
- “3) Modifying the OAT Template” on page 114.
- “4) Activating the Configuration” on page 114.
- “5) Verifying the Configuration” on page 114.

1) Getting and Modifying a Configuration File

A configuration file is required for each OSA-Express CHPID. You can obtain this configuration file in one of two ways:

1. Copy and modify the appropriate member from IOA.SIOASAMP for z/OS, the E (200) minidisk on VM, or PRD1.BASE on VSE (the sample files for VSE may also be in ICCF-Lib 59).
 - For an OSA-Express FENET (including 1000Base-T) feature, copy IOAFENET
 - For an OSA-Express GIGABIT feature, copy IOAGIGA
 - For an OSA-Express TR feature, copy IOATR

These files contain the input parameters and instructions for modification.

Write down the new name of the file that you copied. It will be used as input with IOACMD.

New name of the copied configuration file _____

- Issue the GET_CONFIG command to get the current configuration file located on the OSA. This is preferable to using the samples, because it will show exactly how the OSA is currently configured.

For OSA features that run in QDIO mode (OSD channels), go to “4) Activating the Configuration” on page 114.

2) Getting an OAT Template

There are two ways to get an OAT template for non-QDIO OSA configurations:

- Use the sample templates listed in Table 15.
- For FENET or TR, use the **Get OAT** command to get the OAT that is currently on the OSA. A new OSA ships with a default OAT.

The default OAT contains entries for all images and ports. Because so many entries are included in a default OAT, you might find it easier to use the samples provided. The samples include only a few entries, which you can use as templates for making your own OAT. The instructions that follow show both methods of getting a template.

Using Samples

The following templates are samples. There is not a sample for every situation. Most configurations are shown in IOAOSHRA. Use the instructions in the template to add and delete information as required.

- Copy one of the following templates based on the OSA mode and type of OAT you want to install on the OSA:

New data set or filename
the copied OAT template _____

Table 15. OAT Samples for OSA-Express TR and FENET including 1000Base-T Features

OSA Mode	Name in IOA.SIOASAMP (z/OS), E (200) Disk (VM), or PRD1.BASE (VSE)	Type of Template
TCP/IP Only	IOAOSHRT	Ports Shared Between images
SNA Only	IOAOSHRS	Ports Shared Between images
TCP/IP and SNA	IOAOSHRA	Both Modes With Ports Shared Between images

- Continue at “3) Modifying the OAT Template” on page 114.

Using the Get OAT Command

You can use the **Get OAT** command instead of samples to copy an OAT:

- Enter the following to get a copy of an existing OAT.

For z/OS,

EX 'IOACMD.EXEC' 'GET_OAT' EXEC

For VM,

IOACMD GET_OAT

For VSE:

// EXEC REXX=IOACMD PARM='PRD2.OSASF',SIZE=1100K

When prompted, enter the CHPID (OSA number) and the data set or filename of where you want to store the OAT.

- Continue at “3) Modifying the OAT Template” on page 114.

3) Modifying the OAT Template

The format of the OAT varies according to how you obtain the OAT.

- If you use the samples from IOA.SIOASAMP or the E (200) minidisk, follow the instructions included in the template.
- If you use the **Get OAT** command, see the legend at the bottom of the OAT.

4) Activating the Configuration

Before activating a configuration change that removes devices from the configuration, vary off those devices from the operating system.

1. Enter the following to configure the OSA.

For z/OS:

```
EX 'IOACMD.EXEC' EXEC
```

For VM:

```
IOACMD
```

For VSE:

```
// EXEC REXX=IOACMD PARM='PRD2.OSASF',SIZE=1100K
```

A list of commands will be displayed. Select **CONFIGURE OSA CHPID**.

2. **Follow the prompts.** You will be asked to choose several options and to specify the CHPID number, as well as the names of the configuration file and the OAT. You will be asked to select one of the following:

Activate (with install)

Select this option when you want to activate the OSA at the current time.

Activate (without install)

Select this option if you want to defer the installation until later. At such time you can complete the installation as follows:

Using REXX command interface on z/OS Enter: **EX 'IOACMD.EXEC' 'INSTALL xx EXEC'**

Using REXX command interface on VM Enter: **IOACMD INSTALL xx**

Where **xx** is the OSA number (CHPID).

The activation takes a few minutes; monitor the command output window and the console.

If any configuration change resulted in the removal of devices from the OSA Address Table (OAT), be sure to vary off these devices from the operating system. If any changes added devices to the OAT, vary these devices online. Devices for which an OAT was changed must be varied off, then on again.

When a configuration change results in the removal of a device, and if that device was online, that device may display a status of *Offline and Boxed* (F-BOX) or *Online and Boxed* (O-BOX) until it is redefined in the configuration, or until an IPL of the operating system. "Permanent Error" messages may also appear on the operator console for those devices.

5) Verifying the Configuration

Run the QUERY command to verify your configuration entries. See "QUERY" on page 169.

Using the GUI to Configure OSA-Express CHPIDs

OSA/SF GUI configuration windows make it easy to configure OSA-Express features. Because mode configuration data for all OSA-Express features defined as OSD channels is automatically acquired from HCD and Communications Server definitions, no configuration window entries are required for Gigabit Ethernet, TR, and FENET (including 1000Base-T) features in QDIO mode.

The OSA/SF GUI enables you to define and save configurations by name so that you can change or activate different modes of operation for any TR or FENET (including 1000Base-T) OSA-Express feature.

Start Managing an OSA

To start managing an OSA, log on to the OSA/SF **Host Open** window of the image that is to manage the OSA. You can select **Start Managing** for an OSA in two ways:

1. From **CHPIDs View**: highlight a CHPID or port, then from the menu bar, select **Command** → **Manage Channel** → **Start Managing**.
2. From the OSA/SF **Command Window**: select **Start Managing**. (On the next window, you need to specify the CHPID number.)

You receive the **Start managing** window. (For a description of the FORCE or NO FORCE options, see “START_MANAGING” on page 175.)

Creating or Modifying a CHPID Configuration

After you are logged on, select **CHPID View** from the **Command Window** and perform the following steps:

1. Highlight the CHPID number or the port number for the CHPID that you want to configure.
2. From the menu bar at the top of the window, click **Selected** → **Configurations**.
3. From the pull down, select one of the following options:
 - **Configuration** to review or change settings for the selected CHPID configuration.
 - **Planning configurations** to create a configuration for a new CHPID that is not currently available or to select another CHPID type. Specify a CHPID number and CHPID type and click **OK**.

You receive the configuration settings panel for the CHPID.

Give the configuration a unique name, then click on **File** from the menu bar and select one of the following options:

- **New** to obtain a blank configuration panel for the configuration.
- **Get current configuration** to retrieve the currently active OSA configuration. You can use the values as a model for your changes.
- **Open saved configuration** to retrieve a list of existing OSA configurations that the GUI has saved for the current CHPID type. You can select a configuration and load the values to modify.
- **Save configuration** to save the current OSA configuration that you have open.

What to do next

Unless you want to set local or group MAC addresses, or select a LAN speed, no configuration entries are required for an OSA-Express feature defined in QDIO mode (OSD channel).

If you are configuring an OSA-Express non-QDIO (OSE channel) for FENET or 1000Base-T, go to “FENET and 1000Base-T Configuration Data.”

If you are configuring an OSA-Express non-QDIO (OSE channel) for TR, go to “Token Ring Configuration Data” on page 117.

To activate a configuration using the GUI, see “Activating the Configuration” on page 124.

FENET and 1000Base-T Configuration Data

If the OSA-Express FENET or 1000Base-T feature is set up in QDIO mode (channel type OSD), the configuration window is displayed and no entries are required.

For both QDIO (OSD channels) or non-QDIO (OSE channels), you can specify the following settings:

- **User data:** You can enter up to 32 characters of descriptive information.
- **Local MAC address:** You can specify a locally administered address that is valid for the LAN to which the OSA port is attached.
- **Group MAC addresses:** You can enter multiple addresses of any destination group from which the port is to receive frames.
- **Port name:** For both OSE (non-QDIO) and OSD (QDIO) CHPIDs that use the CS SNMP TCP/IP subagent, this name must match the name in the TCP/IP profile DEVICE and LINK statements. If this subagent is not used on OSE CHPIDs, the field is ignored. For more information about port name restrictions for OSD (QDIO) CHPIDs, see “Port name relief” on page 19.
- **Port speed: Auto-negotiate** is the IBM default. For FENET and 1000Base-T, you can specify 10 or 100 Mb/ps; for 1000Base-T, you can also specify 1000 Mb/ps full duplex only.

For complete information on these fields, see the help panel. For information about Local MAC address, Group MAC addresses, or User data, see “MAC Addresses” on page 128.

For OSD channels, you can save the configuration or define additional configurations.

For OSE channels, continue to define or modify the following modes for the port:

- **TCP/IP** (see “The TCP/IP OAT Entries” on page 117)
- **SNA** (see “SNA Settings” on page 117)

Note: You cannot define MPC OAT entries for FENET or 1000Base-T on the z990 processor.

To activate the configuration, see “Activating the Configuration” on page 124.

Token Ring Configuration Data

If the OSA-Express TR feature is set up in QDIO mode (channel type OSD), the configuration window is displayed and no entries are required.

For both QDIO (OSD channels) or non-QDIO (OSE channels), you can specify the following settings:

- **User data:** You can enter up to 32 characters of descriptive information.
- **Local MAC address:** You can specify a locally administered address that is valid for the LAN to which the OSA port is attached.
- **Group MAC addresses:** You can enter multiple addresses of any destination group from which the port is to receive frames.
- **Port name:** The field is ignored, but you can add additional user data.
- **Port speed:** Auto-sense is the IBM default.
- **Functional address:** The bit mask represents all token ring functional addresses for which the port accepts frames.

For complete information on these fields, see the help panel. To set or change a Local MAC address, Group MAC addresses, or User Data, see “MAC Addresses” on page 128.

For OSD channels, you can now save the configuration or define additional configurations.

For OSE channels, continue to define or modify the following modes for the port:

- **TCP/IP** (see “The TCP/IP OAT Entries”)
- **SNA** (see “SNA Settings”)

To activate the configuration, see “Activating the Configuration” on page 124.

The TCP/IP OAT Entries

Define TCP/IP OAT entries for TR, FENET, or 1000Base-T on the **TCP/IP Passthru OAT Entry Definition** window. You can define the following fields. For complete information, see the help panel:

- **Image number**
- **Even Unit address**
- **Default entry indicator**
- **Home IP address**

For **Image number**, the format is *css.x*, where *css* is the channel subsystem identifier and *x* is the image number id. For sample TCP/IP OAT entries, see “OAT Examples” on page 155.

What Next

Define additional configurations, if desired. For SNA, see “SNA Settings.”

SNA Settings

Specify SNA Timer Values for TR, FENET, or 1000Base-T on the **SNA Management** window.

Inactivity timer (Ti)

For a TR or FENET OSA-Express port, the Ti timer is initialized to be enabled and set to its maximum value of 90 seconds.

- You can disable or enable the Ti timer.
- If the Ti timer is enabled, you can set its timeout value in increments of 0.12 seconds from 0.24 to 90.00 seconds.

An enabled inactivity timer (Ti) periodically tests the viability of the network media. The timer setting applies to all the clients on the target LAN, not to individual clients. The timer interval indicates how quickly a failure of the network media can be detected when the connection is quiescent.

- If the Ti timer times out, a supervisory poll frame is sent over the connection. The T1 response, or reply, timer clocks the supervisory poll.
- If the T1 timer times out, the supervisory poll is retransmitted. OSA can retransmit a supervisory poll up to 8 times.
- If no response is received after the last retransmission, the link is declared inoperative, and the S/390 program issues a message.

If you set the Ti timer, make sure its interval exceeds the T1 timer limit. Consider setting the Ti timer to a value that is at least 5 times greater than the T1 timer.

If you set the Ti timer using the REXX command interface and you do not specify the increment properly, OSA/SF rounds the value up to the nearest increment.

Response timer (T1)

The T1 timer clocks link events that require responses from clients on the network. These link events include SABME / UA exchanges, I-frame link protocol data unit (LPDU) transmissions, and supervisory polls.

If the round-trip transit time is small, consider setting the T1 timer to a relatively low value because recovery will be initiated more quickly when an I frame is dropped. Further, a T1 timer interval that exceeds 2 seconds can result in noticeable delays to those responses that must be retransmitted. However, retransmissions should occur infrequently and only during bursts of peak activity on the network.

Check the timer parameter value that is specified in the XCA Port Definition statement. Make sure the XCA timer is set to a value that is greater than $(N2+1)*T1$. Since $N2=8$ (retransmissions) for OSA, set the timer to a value that is greater than $(9*T1)$. $N2$ = the maximum number of retransmissions.

T1 can be set to a timeout value from 0.20 up to 51.00 seconds in increments of 0.20 seconds. Set the T1 timer to a value not less than the average round-trip transit time from the OSA to the clients and back.

- The recommended value for a large system environment for T1 timer is 10 seconds.
- The recommended value for a small system environment for T1 timer is 2 seconds.

If you set the T1 timer using the REXX command interface and you do not specify a multiple of 0.20 seconds, OSA/SF rounds the value up to the nearest increment of 0.20 seconds to a maximum of 51 seconds.

Acknowledgment timer (T2)

An OSA starts the T2 timer when it receives an I-format LPDU and stops when it sends an acknowledgment. An acknowledgment is sent either when an outgoing I frame is sent, which acts as the acknowledgment, or when $N3$ number of I-format LPDUs has been received. If the T2 timer times out, the OSA must send an acknowledgment.

If the N3 Maximum I frames before ack setting = 1, which means only one I frame can be received before an acknowledgment is sent, the T2 timer is disabled.

If $N3 > 1$, this allows a maximum of N3 I-format link protocol data unit (LPDU) frames to be received before the OSA-Express sends an acknowledgment.

If you set the T2 timer, bear the following in mind.

- Set it to a value from 0.08 seconds up to 20.40 seconds in increments of 0.08 seconds.
 - The recommended value for large system environments is 1.04.
 - The recommended value for small system environments is 0.08.
- Set it to a value that is less than the T1 interval to ensure that the remote link station receives the delayed acknowledgment before the T1 timer expires. A typical value for the T2 timer is 0.08 seconds.
- Set it to a value that depends on the media speed and the maximum latency that can be tolerated to complete a transaction. This latency will be realized when a transaction contains a number of packets that is not divisible by the N3 value.

If you set the T2 timer using the REXX command interface and you do not specify a multiple of 0.08 seconds, OSA/SF rounds the value up to the nearest increment of 0.08 seconds to a maximum of 20.40 seconds.

Maximum I frames before ack (N3)

When determining the maximum I-frames that can be sent before an acknowledgment is sent (N3 count) and the maximum number of outstanding I-format link protocol data units (LPDUs) (TW count), consider the N3 and TW counts that are set at the clients as well.

For a TR or FENET OSA-Express you can set the N3 count as an integer from 1–4.

- The recommended N3 count for large system environments is 4.
- The recommended N3 count for small system environments is 1.

The maximum number of I-format link protocol data units (LPDUs) that can be received by an OSA before it sends an acknowledgment (N3 count) is also called the receive window count.

For a TR or FENET OSA-Express set $N3 > 1$ only if you want to reduce the number of acknowledgment frames sent by the OSA. Bear in mind that $N3 > 1$ can result in increased latency.

Do not set the N3 count to a value that is greater than the TW count set any of the clients. Otherwise, network response can be severely degraded.

Maximum transmit window (TW)

The TW count is initialized to 8. You can set it only for a TR or FENET OSA-Express. Set it as an integer from 1–16.

The maximum number of outstanding I-format link protocol data units (LPDUs) (TW count) is also called the maximum transmit window count or the maximum window out count.

The TW count allows the sender to transmit frames before that sender is forced to halt and wait for an acknowledgment. Therefore, the receiver should be able to absorb that number of frames, either in its service access point (SAP) buffers or within the buffers in workstation memory.

A small TW count reduces the risk that frames will be retransmitted owing to buffer congestion at the receiver.

In Summary:	TR and FENET OSA-Express	Recommended values:
Ti and T1 LLC timers	Settable	Ti = 90, T1 = 10
T2 LLC timer	Settable if N3>1	T2 = 1.04
N3 count	Settable (N3=1–4)	N3 = 1
TW count	Settable (TW=1–16)	TW = 8

Notes:

1. The maximum number of SAPs that can be opened is one for each application in each image.
This number of SAPs excludes the null SAP.
2. For the SNA availability options (page 120), only one SAP can be opened per port (page 123).

Enhanced SNA Availability Options for Token Ring

When configuring an OSA-Express Token Ring feature , several options exist for enhancing the availability of SNA sessions for your TR ports.

Do not open more than one SAP unless you are using the Redundancy option.

Overflow: This option causes the specified port to stop responding to connection requests when it reaches its maximum station count, or PU limit. The maximum PU limit, which is defined for the port to VTAM or the SNA function of Communications Server, defines that port's overflow threshold. Once the OSA port is in an overflow condition, it stops responding to connection requests.

Note that OSA makes no attempt to ensure even distribution of the clients across the participating OSA ports. If more than one port is responding to connection requests, the first response that the client receives typically determines which OSA port is selected for the connection. However, other factors can affect this selection. Therefore, the exact distribution of connections across the OSA ports depends on delays in the network and the implementation of the clients.

For example, assume the following configuration and current state.

Port	Option	Max PU limit	Current session count	Status
A	Overflow	347	347	Online (Note 1)
B	Overflow	300	183	Online (Note 2)
C	Overflow	347	27	Online (Note 2)

Notes:

1. With the current session count equal to the maximum PU limit, port A has reached its overflow threshold and stopped responding to connection requests.
2. Whether port B or port C is selected for a connection is governed by delays in the network.

Overflow and Redundancy: This option, together with the session-delay time that you define for the port, prescribes that the specified port delay its response to a

connection request by that amount of time. This delay allows the port to provide a backup, or redundant, path for a port for which the overflow option is specified.

For example, assume the following configuration and current state.

Port	Option	Session delay	Max PU limit	Current session count	Status
A	Overflow	N/A	347	0	Failed
B	Overflow	N/A	300	300	Online (Note 1)
C	Overflow and Redundancy	0.32 sec	347	5	Online (Note 2)
D	Overflow and Redundancy	0.32 sec	300	62	Online (Note 2)

Notes:

1. With its current session count equal to its maximum PU limit, port B has reached its overflow threshold and stopped responding to connection requests.
2. Ports C and D will respond after their specified session delays, which is 0.32 seconds in this example. Additional connections will be established to ports C and D in an order that depends on delays in the network. The first port that reaches its maximum PU limit will stop responding, and any remaining connection requests will be logged onto the other port.

For instance, suppose there are more connection requests and port D reaches its maximum PU limit first. Now, port C will respond to the remaining connection requests until it reaches its overflow threshold.

In this example, a satisfactory redundant configuration is represented for up to 647 connections assuming that it was intended to accommodate the simultaneous failure of both ports A and B.

Load Balancing: With this option, you allow two or more ports to balance their connection requests. Load balancing is only related to the *number* of connections (PUs); it is not related to either the traffic volume or the workload across those connections.

For example, assume the following configuration and current state.

Port	Option	Load balance factor	Max PU limit	Current session count	Status
A	Load balancing	0.08 sec	256	256	Online (Note 1)
B	Load balancing	0.08 sec	480	256	Online (Note 2)
C	Load balancing	0.08 sec	1024	238	Online (Note 2)

Notes:

1. Port A has a maximum PU limit that is much lower (256) than the limit for ports B (480) and C (1024). Because port A has reached its maximum PU limit, it has stopped responding to connection requests.
2. The current session count for port B is 256 and for port C it is 238 sessions. Both ports will respond to connection requests.

Because the load balancing option has been specified for both of them, the delay for each port is proportional to the number of connections it has before the response to the next connection request is issued.

To calculate the total delay for the next connection request for each port, obtain the multiplier factor from the table on page 123.

- With a current session count of 256 sessions, port B's total delay time = $0.08 * 6 = 0.48$ seconds.
- With a current session count of 238 sessions, port C's total delay time = $0.08 * 5 = 0.40$ seconds.

Port C would therefore respond to a new connection request before port B. Hence, a connection would be established for port C, which would bring its session count up to 239. Although, typically the first response that a client receives determines which OSA port is selected for the connection, note that other factors can affect this selection.

Load Balancing and Redundancy: This option allows you to specify redundant paths for the ports for which you specified the load-balancing option.

For example, assume this configuration and current state.

Port	Option	Load balance factor	Session delay	Max PU limit	Current session count	Status
A	Load balancing	0.08 sec	N/A	1000	324	Online (Note 1)
B	Load balancing	0.08 sec	N/A	1000	362	Online (Note 1)
C	Load balancing and redundancy	0.08 sec	0.80 sec (Note 2)	1000	0	Online
D	Load balancing and redundancy	0.08 sec	0.80 sec (Note 2)	1000	0	Online

Notes:

1. As you can see from the table on page 123, the multiplier factor is 6 for both ports A and B. Since ports C and D have a 0 current session count, it is currently 0 for these ports.
In the current state, the total delay for ports A and B is 0.48 seconds ($0.08 * 6$), so the port that acquires the next connection will be determined by delays in the network. When either port A or port B reaches 384 connections, its delay will be 0.54 seconds ($0.08 * 7$). At that time, the other port will respond 0.08 seconds sooner until its total connection count reaches 384.
2. When deciding on the session delay time for the two redundant ports C and D, look at the maximum delay that can occur for the primary ports, which are ports A and B in this example.
In this example, the maximum delay for the primary load-balancing ports (A and B) cannot exceed 0.72 seconds ($0.08 * 9$), and is reached when 1000 connections are logged onto either of these two ports.
To prevent any traffic from being established on the redundant ports C and D while ports A and B are still responding to connection requests, set the session delay for the redundant ports (C and D) to a value that at least equals the longest potential delay for the primary ports (A and B). Since a connection

request for port A or B can be delayed by 0.72 seconds, 0.80 seconds was chosen for the session delay time for the two redundant ports (C and D).

Redundancy: This option allows you to open more than one SAP for a primary path and a secondary path by disallowing an overflow of connections between the two paths.

This option requires that you specify the Redundancy option for the secondary path and the Disabled option for the primary path. For example, assume the following configuration and current state.

Port	Option	Max PU limit	Session delay	SAPs open	Max connections	Current session count	Status
A	Disabled	1000	N/A	SAP 04 SAP 08 SAP 0C	256 511 324	424	Online: responding
B	Redundancy	1000	0.32 sec	SAP 04 SAP 08 SAP 0C	256 511 324	0	Online

Disabled: When each OSA-Express is shipped, its SNA session availability option is initialized to the Disabled option. In this context, Disabled means that none of the other SNA session availability enhancement options are active for this port.

Session Delay (0.4–15.00 Seconds) for Redundancy: When each OSA-Express is shipped, its session delay is initialized to 0 seconds. For the Redundancy, Load balancing and Redundancy, and Overflow and Redundancy options:

- Specify a nonzero delay time in increments of 0.04 seconds up to 15 seconds.
Base the value on the longest delay time that can be incurred by the non-redundant members of the set for which the port is a backup. For example, you could specify a session delay of 10 seconds.
- To calculate the total delay time for a port if you specify the Load balancing and Redundancy option, add the session delay time to the delay that you calculated for the load balancing option.

Load Balance Factor (0.4-1.00 Seconds): The load balance factor is initialized to 0 seconds. For the two options, Load balancing and Load balancing and Redundancy, specify a nonzero factor in 0.04-second increments up to 1 second.

In general, the load balancing factor should be set to the same value for all the ports configured for load balancing. Although the optimal setting depends on the network configuration, a reasonably high degree of balance can be obtained with a small load balance factor. For most networks, a load balance factor of .08 seconds is suitable. You should set the same load balance factor for all the ports in the set for which you specify this option.

To calculate the total delay time for a session, multiply the load balance factor by a multiplier factor (m). For the Load balancing and Redundancy option, add the session delay time to this result. As the following table shows, m is a function of the number of sessions that are logged on to the port.

Current Session Count	Multiplier factor m	Current Session Count	Multiplier factor m	Current Session Count	Multiplier factor m
0–15	0	256–383	6	2048–2559	12
16–31	1	384–511	7	2560–3071	13
32–47	2	512–767	8	3072–3583	14
48–63	3	768–1023	9	3584–4095	15
64–127	4	1024–1535	10	4096	16
128–255	5	1536–2047	11		

For the Load Balancing option: the total delay is not just the load balance factor. For example, assume that you specified a load balance factor of 0.08 seconds. There is no delay for the first 15 sessions logged on to a port ($0 * 0.08$); the 16th through the 31st sessions are delayed by 0.08 seconds ($1 * 0.08$); the 32nd through 47th session are delayed by 0.16 seconds ($2 * 0.08$), and so on.

For the Load Balancing and Redundancy option: add the session delay time to the delay that you would calculate for load balancing. Continuing with the example, assume that you had specified a session delay of 1.2 seconds in addition to the load balance factor of 0.08 seconds for the redundant ports for which you select the Load balance and redundancy option.

- The total delay for each of the first 15 connections is 0.12 seconds ($0 * 0.08 + 1.2$).
- The delays for connections 16 through 31 is 1.28 seconds by 1.28 seconds ($1 * 0.08 + 1.2$).
- The delays for connections 32 through 47 is 1.36 seconds ($2 * 0.08 + 1.2$), and so on.

Continue with the SNA OAT entries on page 124.

The SNA OAT Entries

SNA OAT Entries are defined for FENET, 1000Base-T, or TR on the **SNA OAT entry Definition** window. You can define the following fields. For complete information, see the help panel:

- **Image number**
- **Unit address**

For **Image number**, the format is `css.x`, where `css` is the channel subsystem identifier and `x` is the image number id. For sample SNA OAT entries, see “OAT Examples” on page 155.

What Next

Define additional configurations, if desired.

Activating the Configuration

To activate the configuration, click on **Activate** from the menu bar and select one of the following options:

- **Activate with install** to activate the configuration immediately
- **Activate without install** to ready a configuration for installation at a later time

Part 2. OSA-Express Reference

Part 2 contains information for setting up the OSA. It also provides information about the normal course of operation, service, problem determination, and command reference.

Chapter 9. OSA Port Management

An OSA port is used to transfer data between the system platform and the network attached to the port. The physical characteristics of the OSA ports are discussed in Chapter 1.

Enabling and Disabling Ports

You can use IOACMD REXX commands or the OSA/SF GUI to enable and disable the LAN traffic state on a port.

Using the GUI

To display the port settings for a port on the OSA/SF GUI, click on the **Command Window**, then **CHPID View**. In the list, find and highlight the port for the CHPID that you want to display and double click the entry. You receive the settings panel for the port.

To change the enabled/disabled traffic state for the port, click on **Settings** on the settings panel. You find one of the following settable fields:

LAN traffic state

For OSA-Express, OSA-Express2, and OSA-Express3 features

Hardware state

For OSA-2 features

Click on **Set**. In the LAN traffic or hardware state window, change the state, and click **OK**.

Using IOACMD

Use the IOACMD SET_PARAMETERS command to specify the enable or disable parameter for the port on a specific type of OSA-Express feature. For example, on z/OS:

```
EX 'IOACMD.EXEC' 'SET_PARMS 54 0 GIGA_ENABLE_lan_traffic_physical_port'
```

This would enable LAN traffic on Gigabit physical port 0 on CHPID 54.

When using the SET_PARMS command, you can substitute a numeric value for the text version of the parameter:

```
EX 'IOACMD.EXEC' 'SET_PARMS 54 0 390'
```

would accomplish the same task.

The VM version of the command is:

```
IOACMD SET_PARMS 54 0 GIGA_ENABLE_lan_traffic_physical_port
```

or

```
IOACMD SET_PARMS 54 0 390
```

To disable the same port, specify the GIGA_DISABLE_lan_traffic_physical_port parameter or 391.

See the SET_PARAMETERS command on page 172 for a complete list of parameters.

Using the Support Element

If you have system programmer authority, you can use the Support Element of the processor to enable and disable ports.

1. Under the **Support Element Workplace**, go to the **CHPIDs Work Area** view that shows all of the PCHID icons for the CHPIDs. To get to this view, double-click on the **Groups** icon and then on the **CPC** icon. Then right click on the processor icon and then left click on **Channels**.
2. Click on the desired PCHID icon to select it.
3. Double Click on **Advanced Facilities** to the right of the PCHID icons. Advanced Facilities is under the Channel operations menu. You can use the arrows at the bottom right-hand corner of the window to circulate through the different menus.
4. Click on the radio button for **Card specific advanced facilities...** and click on **OK**.
5. Highlight **Enable or disable ports...** and click on **OK**.
6. Click on the desired radio buttons and then click on **Apply**.
7. After the command is complete, click on **OK** to close the job completion confirmation window. Then click **Cancel** on each of the subsequent windows (2) to close them if you are finished making changes.
8. If the PCHID icon is still highlighted, click on it to deselect that PCHID.

MAC Addresses

A **media access control (MAC) address** uniquely identifies a port that is physically attached to a LAN. Therefore, each port on any OSA-Express feature is shipped with its unique, or universal, MAC address.

You can set a local MAC address and specify that a port receives frames for a group destination MAC address as discussed in the following sections. Use OSA/SF, the support element (SE), or single object operations through the hardware management console.

Maximum number of media access control (MAC) addresses

Up to 2048 MAC addresses (Layer 2) are supported with CHPID types OSD and OSN. Because, one of these includes the "burnt-in" MAC address of the OSA-Express3 or OSA-Express2 feature, the total number of defined MAC or VMAC addresses is 2047.

The MAC and VMAC addresses are added to the Layer 2 table of the OAT when the TCP/IP stack is started.

Local MAC Address

Set a locally-administered MAC address for an OSA LAN port for the following reasons:

- A local MAC address can be easier to identify by network personnel because it conforms to the network's or site's naming convention.
- A local MAC address does not need to be changed if the OSA is physically replaced. A replaced OSA has its own universal MAC address already with it.

A local MAC address must be unique within the network in which it is used and administered by a local authority. It is therefore a unicast MAC address.

You can set a local MAC address for a port with the **Local MAC address parameter** for any OSA-Express feature. Follow one of the procedures in “Setting MAC Addresses” on page 130. You can also use the support element (SE) or single object operations through the hardware management console to set a local MAC address for a port. For procedural information, see the operator's guide for the hardware platform.

For a local MAC address to take effect, the OSA channel must be configured offline from, and then back online to, all the images to which the OSA feature is defined.

Canonical versus Noncanonical Format

Set a MAC address for an Ethernet connection in the *canonical* format as shown in the following table.

Set a MAC address for a Token Ring connection in the *noncanonical* format as shown in the following table.

The difference between a canonical and noncanonical address is that in non-canonical the bits within each byte are transposed (swapped). In the canonical format of an Ethernet MAC address, bit 6 indicates whether the MAC address is universal (0) or local (1); bit 7 indicates whether the address is an individual (0) or group (1) address. In the noncanonical format of a Token Ring MAC address, bit 0 indicates whether the MAC address is an individual (0) or group (1) address, and bit 1 indicates whether the MAC address is universal (0) or local (1).

For these types of LANs and ports	Specify as shown
For an Ethernet port	- Set bit 6=1 and bit 7=0 - Set bits 0–5 and 8– 47 to the 46-bit local MAC address If an Ethernet LAN station is connected across a bridge to a non-Ethernet LAN, the destination MAC address in the VTAM PATH Definition statement may need to be coded differently (page 109).
For a Token Ring port	- Set bit 0=0 and bit 1=1 - Set bits 2 through 47 to the 46-bit local MAC address

Group MAC Address

A group MAC address allows the port to receive frames with that group's destination MAC address.

You can assign a group MAC address of all zeros, but not an address of all X'FF'. For a nonzero group MAC address:

- Set bit 7 to 1 for an Ethernet LAN connection.
- Set bit 0 to 1 for a token ring LAN connection.

You can view a Local and Group MAC addresses in the OSA-Express Port Setting pages, shown below. You can set these addresses as follows:

Setting MAC Addresses

Using the OSA/SF GUI

To configure a Local MAC Address, Group MAC Addresses, and User Data for an OSA-Express, open a configuration panel for the desired port associated with the CHPID. You can make changes in the fields provided. For information on using the GUI to display and modify existing configurations or define new configurations for an OSA, see “Using the GUI to Configure OSA-Express CHPIDs” on page 115.

After you enter and save the configuration parameters, select **Activate** from the menu bar, then **Activate without install**. When you are ready, restart the applications.

Using the REXX EXEC (IOACMD)

To configure a Local MAC Address and Group MAC Addresses for the OSA-Express using the IOACMD exec, do the following:

1. Edit and customize the configuration file, following the instructions in the header. You can use the samples (**IOAGIGA** and **IOAFENET**) from **IOA.SIOASAMP** on z/OS or the E (200) minidisk on VM. Alternatively, at the command line, enter: **EX 'IOACMD.EXEC' EXEC** (or just **IOACMD** on VM) and then select **Get Configuration File**. If you need assistance using IOACMD, see Chapter 13, “OSA/SF Commands for REXX,” on page 157.
2. At the command line, enter: **EX 'IOACMD.EXEC' (IOACMD on VM)** and then select **Configure OSA CHPID**.

Using the Hardware Management Consoles (HMC or SE)

If you have access to either the Hardware Management Console or the Support Element of the processor, you can use the following instructions to do OSA-specific tasks. If OSA/SF is not installed and you want to use a Local MAC address, do the following.

1. From the HMC or SE, select (double-click) CPC Group from the **Groups Work Area** that shows all of the PCHID icons for the CHPIDs. Double-click on the **Groups** icon and then on the **CPC** icon. Right click on the processor icon and then left click on **Channels**.
2. Click on the desired **PCHID** icon.
3. Scroll to get to Channel Operations. From there double-click on **Advanced Facilities** to the right of the PCHID icons.
4. Select **Standard Channel Advanced Facilities**.

Attention: If you changed the local MAC address and are not using OSA/SF, the associated CHPID must be reset in order for the change to take effect. To do so, first vary all devices offline from *every* image that has the CHPID online. Configure the CHPID offline from *every* image that has the CHPID online. Then configure the CHPID back online to any images that will use it and vary the devices back online.

Querying and Purging the ARP Cache

The Address Resolution Protocol (ARP) cache resides on the OSA-Express feature. When TCP/IP is started in QDIO mode, it downloads all the home IP addresses in the stack and stores them in the ARP cache. When running OSA-Express features in QDIO mode in a z/OS V1R4, z/VM Version 4 Release 4, or Linux environment, you can query and purge the contents of the ARP cache.

Communications Server for z/OS V1R4 adds support for querying and purging the ARP cache using the following commands:

To purge the ARP cache on z/OS

```
VARY TCPIP,,PURGEcache,linkname for example,  
v tcpip,,purgec,link4
```

To query the ARP cache on z/OS

```
DISPLAY TCPIP,,NETSTAT,ARP,ip_addr for example,  
d tcpip,,net,arp,10.11.91.200
```

or

```
TSO NETSTAT command, for example,  
netstat arp all tcp tcpip
```

To query the ARP cache on z/VM

```
NETSTAT command, for example,  
netstat arp *
```

See *z/VM TCPIP Users Guide*.

The **Linux** `qetharp` utility is available to query or purge the contents of the ARP cache, for example:

```
qetharp -q eth0
```

shows all ARP entries for OSA-Express interface eth0, while

```
qetharp -p eth0
```

removes all entries from the ARP cache for OSA-Express port eth0. See *Linux for zSeries: Device Drivers and Installation Commands*, LNUX-1103, for a complete description of this command.

OSA-Express Direct SNMP Support

Query support

The OSA-Express direct SNMP subagent provides access to OSA-Express management information bases (MIBs) without OSA/SF, which is required when accessing OSA SNMP data through the Communications Server TCP/IP subagent. If you are running z/OS V1R4 or Linux, you can access the OSA-Express direct SNMP subagent by following the steps below. The OSA-Express direct SNMP subagent only communicates with OSD (QDIO) CHPIDs. Starting in z/OS V1R6, Direct SNMP supports OSE (non-QDIO) CHPIDs and OSD (QDIO) CHPIDs. For OSA-Express features defined as OSE (non-QDIO) CHPIDs, you can also use the CS TCP/IP SNMP subagent described in “Set up the Communications Server SNMP TCP/IP subagent” on page 64. For earlier releases of z/OS, the CS TCP/IP SNMP subagent provides the only access to OSA-Express MIBs.

The OSA-Express MIB support consists of:

- Channel, Performance, and PE tables for all OSA-Express, OSA-Express2, and OSA-Express3 features
- OSA-Express Ethernet Port table for 1000Base-T and Gigabit Ethernet
- OSA-Express Token Ring Port table for OSA-Express Token Ring

Port Management

- OSA-Express2 10 Gigabit Ethernet Port table for OSA-Express2 10 Gigabit Ethernet
- OSA-Express3 port table for all OSA-Express3 features.

Trap and set support

Beginning with z/OS V1R5 for QDIO and z/OS V1R6 for non-QDIO, Direct SNMP provides support for traps and sets when used on a z9 or higher *or* z890, z990 with OSA May 2004 level of Licensed Internal Code or higher. Traps are used by OSA to indicate to the SNMP master agent that a condition exists on the OSA which requires attention. An example of these conditions is a port going offline. The MIB contains all of the trap notification details.

By using the SNMP **set** request, you can set various OSA parameters. For example, you can use the SNMP **set** request to disable notification for traps. Once this is done the OSA will not attempt to alert the SNMP master agent on the image where notification has been disabled that an unusual condition has occurred. All other images running SNMP that have not disabled trap notification will continue to be notified. The objects supported for SNMP **set** are detailed in the OSA MIB.

set and **trap** requests are enabled by default.

See *z/OS Communications Server: IP Programmer's Guide and Reference* for further information regarding SNMP **set** and **trap** requests.

Requirements

The following requirements apply to implementing direct SNMP support for OSA-Express:

Hardware:

- z800 and z900 for OSA-Direct Express features only
- z890, z990, or z9-109 processors for OSA-Express and OSA-Express2
- System z10 for OSA-Express3
- SNMP Trap and Set support require OSA z890 (and future processors), z990 May 2004 level of Licensed Internal Code, z9, or System z10 or higher

Software: For the latest requirements, see IBM **Resource Link**:

<https://www.ibm.com/servers/resourceLink>

Note that you need to provide DEVICE, LINK, HOME and START statements for any OSA-Express Ethernet adapter for which you want SNMP Ethernet management data.

Setting up OSA-Express Direct SNMP Support for z/OS

Direct SNMP support for z/OS is provided by procedure IOBSNMP. This procedure is included as part of the **z/OS Communications Server** product. IOBSNMP has four optional parameters as shown in the sample JCL in Figure 46 on page 133. You can update the catalogued procedure by copying the sample found in **hlq.SEZAINST(IOBSNMP)** to your system or recognized PROCLIB. Change the dataset names as required to suit your local configuration. The IOBSNMP address space requires access to the IBM C/370 library during execution. IOBSNMP must have RACF authorities set up in order to function properly. See member **hlq.SEZAINST(EZARACF)** for considerations for started tasks. IOBSNMP delivered with z/OS 1.4, must end using the Cancel command. Use of the Stop command

from the z/OS console is not supported. IOBSNMP delivered with z/OS 1.5 or supports using either the Cancel command or the Stop command from the z/OS console.

In order for the SNMP management application to receive OSA-Express MIB data, the Communications Server for z/OS SNMP master agent, OSNMPD, must be running. OSNMPD runs in a separate address space that executes load module EZASNMPD. OSNMPD can be started with or without parameters.

IOBSNMP connects to the SNMP Agent, OSNMPD, via Unix System Services by using an AF_UNIX socket. In order for IOBSNMP to connect successfully one of the following is required:

- It must have superuser authority.

OR

- It must be permitted for read and write access to the z/OS UNIX pathname configured to OSNMPD. See section "OSNMPD parameters" in *z/OS Communications Server: IP Configuration Reference* for information on configuring this pathname and permitting subagents to connect to OSNMPD.

For more information about OSNMPD, including details on optional parameters, see *z/OS Communications Server: IP Configuration Reference*.

Once the SNMP master agent, OSNMPD, is running, you can start the OSA-Express direct SNMP subagent with the IOBSNMP procedure. In addition, you can stop the OSA-Express direct SNMP subagent with either the **Cancel** or **Stop** command (new to z/OS V1R5). IOBSNMP has four optional parameters (starting with z/OS V1R10, there are five parameters) shown in Figure 46, the sample JCL procedure provided.

```
//IOBSNMP PROC P='-s TCPIP'
/*
/*  START OSA direct SNMP subagent
/*
//IOBSNMP EXEC PGM=IOBSNMP,TIME=1440,REGION=4096K,DYNAMNBR=5,
//          PARM='&P.'
/*
//SYSPRINT DD SYSOUT=*
//SYSUDUMP DD SYSOUT=*
/*
/* The options available for the PARMS referenced by P are
/* -d level - turn on specified debugging
/*          0 - no tracing
/*          1 - minimal tracing
/*          2 - maximum tracing
/*          3 - maximum tracing plus SNMP traces
/* -c community - use specified community name
/* -p port number - use specified port number
/* -s stack - send request to specified stack
/* -o OSA-Express - Used for communicating with the OSA-Express feature/*
/* Defaults: -d 0 -c public -p 161 -s Default_stack
```

Figure 46. Sample Procedure (Member IOBSNMP)

The parameters shown in Figure 46 are as follows:

- d Specifies the level of tracing for IOBSNMP. The traces are written to the JES job log. The default level is 0, which means that only important messages and non-terminating errors will be written to the job log. Normally you would not

change the default unless instructed to by IBM service in debugging a problem. Setting the level to anything other than 0 will result in large numbers of traces being written to the job log.

Starting in z/OS V1R11, IOBSNMP supports the MODIFY command. This enables you to change the trace level while IOBSNMP is running. The format is F *jobname*,d=n, where *jobname* is the started procedure name of IOBSNMP and n is the requested debug level.

- c Specifies the community name used by IOBSNMP when connecting to the z/OS Communications Server SNMP agent (OSNMPD). The default name is public. The community name specified must match the one that is configured to the SNMP agent. See *z/OS Communications Server: IP Configuration Reference* for information on configuring community names to the SNMP agent.
- s Specifies the name of the TCP/IP stack to which IOBSNMP should establish affinity. Each instance of IOBSNMP establishes affinity with only one TCP/IP stack. If this parameter is not specified, IOBSNMP uses the default TCP/IP stack name obtained from the TCP/IP resolver. Only one instance of IOBSNMP can run on a stack at a given time.
- p Specifies the port number, in the range 1 - 65535, used by IOBSNMP when connecting to the z/OS Communications Server SNMP agent (OSNMPD). The default is 161. The value must match the value of the SNMP agent's -p parameter. See *z/OS Communications Server: IP Configuration Reference* for information on the SNMP agent's -p parameter.
- o Valid starting with z/OS V1R10, specifies the port number, in the range 1 - 65535, used by IOBSNMP to communicate with the OSA-Express features. If this parameter is not specified, the TCP/IP stack will assign an ephemeral port. If you specify the -o parameter, you should also reserve the port for use by IOBSNMP by defining a PORT profile statement to the TCP/IP stack. See *z/OS Communications Server: IP Configuration Reference* for information on using the PORT profile statement.

Additional Resources

See *z/OS Communications Server: IP Configuration Guide* for information on configuring SNMP.

MIB

The MIB module files that ship with TCP/IP, or are available for the OSA Direct SNMP subagent, are files that may need to be copied to certain locations depending on the network management application being used. Normally, the network management applications only need these files if they provide a MIB browser. The MIB browser reads in the MIB module source and parses the definitions. By doing so the MIB browser is able to understand all the data by name, OID, and type. Some browsers then display the MIB objects by name and allow customers to execute SNMP requests against them. For instance, using a MIB browser, the OSA channel number is normally displayed as 1.3.6.1.4.1.2.6.188.1.1.1.1.nn = 0x40. However, when using the MIB with the MIB browser, the OSA channel number is displayed as ibmOSAExpChannelNumber.nn = 0x40.

If you require the OSA Direct Express MIB, the one that matches your servers MCL can be installed by either:

- Selecting **Advanced Functions** on the Support Element
- or
- Downloading from <http://www.ibm.com/servers/resource link>.

- After logging in, select **Library**
- Under "Library shortcuts" on the right side of the screen, select **Open System Adapter (OSA) Library**
- Select "OSA-Express SNMP Direct MIB Module" for a description, or click on "TXT" for the module
- Save the MIB file to the location required by your network management application

See your network application product information for management commands and procedures.

The OSA MIBS.DATA file is only used by the z/OS UNIX **snmp** command. This performs a similar function that the MIB browser provides with the OSA MIB. It enables the user of the z/OS UNIX command to use the names of the MIB objects with the z/OS command, instead of just using their Object Identifier values (OID values). For more information, see the SNMP chapters of the *z/OS Communications Server: IP Configuration Guide* and *z/OS Communications Server: IP Configuration Reference* for more information on how to use this file to configure SNMP support.

OSA-Express Direct SNMP Support for Linux

The OSA-Express direct SNMP subagent extends the capabilities of the ucd-snmp master agent (snmpd), which is required, and can retrieve SNMP management data from any OSA-Express feature defined as CHPID type OSD, running in QDIO mode. In order for the subagent to obtain management data, the OSA-Express feature must be active and must be defined in the appropriate files for the Linux distribution.

Starting the OSA-Express Direct SNMP Subagent

Use the osasnmppd command to start the subagent:

```
# osasnmppd options
```

options:

```
-h          Displays this usage message
-v          Version information
-l LOGFILE  Print warnings/messages to LOGFILE
            (By default LOGFILE=/var/log/osasnmppd.log)
-A          Append to the logfile rather than truncating it
-L          Print warnings/messages to stdout/err
-f          Do not fork() from the calling shell
-P PIDFILE  Save the process ID of the subagent in PIDFILE
```

How to Stop the Subagent: Stop the OSA-Express direct SNMP subagent issuing either a SIGINT or SIGTERM command to the main thread, for example:

```
killall osasnmppd
kill PID_of_subagent_main_thread
```

Note: Do not use kill -9 or kill -SIGKILL to stop the subagent under normal circumstances. This will prevent the OSA-Express MIB objects from being unregistered by the SNMP master agent and may cause problems when restarting the subagent.

Additional Resources

Refer to *Linux for zSeries: Device Drivers and Installation Commands*, LNUX-1103, available at www10.software.ibm.com/developerworks/opensource/linux390/index.shtml, for more information.

Port Management

The MIB that matches your server's MCL can be installed by either:

- Selecting **Advanced Functions** on the Support Element or
- Downloading from <http://www.ibm.com/servers/resource link>.
 - After logging in, select **Library**
 - Under "Library shortcuts" on the right side of the screen, select **Open System Adapter (OSA) Library**
 - Select "OSA-Express SNMP Direct MIB Module" for a description, or click on "TXT" for the module
 - Save the MIB file to the location required by your SNMP management application

For ucd-snmp downloads and information, see <http://net-snmp.sourceforge.net/>.

See your SNMP application product information for management commands and procedures.

For more on Linux, see

http://oss.software.ibm.com/developerworks/oss/linux390/april2004_documentation.shtml

http://oss.software.ibm.com/developerworks/oss/linux390/june2003_documentation.shtml

and

www.linux.org/docs.

Chapter 10. Problem Determination Aids

You must have OSA/SF installed in order to use OSA problem determination aids. OSA/SF problem determination aids include:

- Messages from OSA/SF (see Chapter 14, “OSA/SF Messages and Codes,” on page 179)
- Messages from OSA/SF GUI (see “Debugging the OSA/SF GUI startup” on page 98)
- “OSA/SF Message Log”
- “OSA/SF Trace Table” on page 138
- “OSA/SF Dump” on page 138
- “IOACMD Debug Data Sets” on page 139
- “OSA/SF Workstation Debug Settings” on page 139

Using OSA/SF Problem Determination Aids

OSA/SF Message Log

OSA/SF has a message log that contains a record of all OSA/SF commands issued, responses, and error messages. All error messages are logged, even when multiple failures occur that cause only one message to be displayed.

You can look at the message log and send the log to the IBM support center. Each OSA/SF image has a message log.

If the OSA/SF message log becomes full, a new message log is started and the log that is full is stored for your reference. A message is displayed indicating that the log is full and then another message displays the name of where the message log is stored. Both of these messages are put in the new message log.

The name of the message log is specified in the Startup Profile. The message log that becomes full is stored with the name specified in the Startup Profile with the Julian date appended to the end of the name.

If you want the message log for the logged-on system, you can use either the OSA/SF GUI or the REXX command (IOACMD EXEC) interface.

Using the GUI

1. From the **OSA/SF Commands** window, click on **Debug**.
2. Select **Get OSA/SF message log**.
3. Enter the **Workstation file name** for the workstation where the information is to be stored.
4. Click the **Set** pushbutton.

Using the REXX Command GET_DEBUG

See “GET_DEBUG” on page 164.

Problem Determination

```
IOAC101I OSA Support Facility initialization started 02/12/2003 10:34:32
IOAC100I OSA Support Facility version H0GI400 APAR H0GI400
IOAC153I Processing of OSA/SF startup profile started
IOAC152I Finished OSA/SF startup profile processing
IOAC150I 10:34:35 Interrupt handler component started
IOAK326I CHPID 02 is currently managed by image 0.1
IOAK326I CHPID 03 is currently managed by image 0.1
IOAK326I CHPID 10 is currently managed by image 0.1
IOAK326I CHPID 11 is currently managed by image 0.1
IOAC144I 10:34:40 ALL OSA devices initialized
IOAC141I 10:34:40 API APPC component started
IOAC174I 10:34:40 AutoLog component started
IOAC102I OSA Support Facility initialization completed 02/12/2003 10:34:40
```

Figure 47. Example of a Message Log

OSA/SF Trace Table

Each OSA/SF image has its own trace table. The trace table contains, in a format for IBM internal use, the 8000 most recent trace records generated during program execution. When the trace table is full, the oldest entries are overwritten.

Note: The IBM support center might request that you provide a trace table for OSA/SF.

If you want the trace table for the logged-on system, you can use either the OSA/SF GUI or the REXX command (IOACMD EXEC) interface.

Using the GUI

1. From the **OSA/SF Commands** window, click on **Debug**.
2. Select **Get OSA/SF trace table**.
3. Enter the **Workstation file name** for the workstation where the information is to be stored.
4. Click the **Set** pushbutton.

Using the REXX Command GET_DEBUG

See “GET_DEBUG” on page 164.

OSA/SF Dump

If OSA/SF on z/OS abends, the OSA/SF dump is sent to a dump data set, SYS1.DUMPxx. After an abend, OSA/SF must be restarted.

On VM, a non-formatted IPCS dump is sent to the OSAMAIN user's reader. If possible, OSA/SF then shuts down, cleans up its resources, and logs off the OSA/SF virtual machine. Reinitialization occurs upon receipt of the next OSA/SF command.

OSA/SF has a unique dump title that contains the abend code for the failure, the failing module, and the recovery routine that sent the dump:

```
ABEND aaa IN bbbbbbbb, COMPID=5688-008, ISSUER=cccccccc
```

where:

aaa

Is the abend code.

bbbbbbbb

Is the failing control section (CSECT) name.

cccccccc

Is the recovery routine that sent the dump.

IOACMD Debug Data Sets

Whenever you run the IOACMD exec, two data sets are produced for use in debugging. One contains the data sent to the main OSA/SF address space (input), and the other contains the data returned from the OSA/SF address space (output) when the command completes, whether or not it was successful.

In z/OS these data sets have the following names,

- **USERID.IOACMD.INPUT.*command_name***
- **USERID.IOACMD.OUTPUT.*command_name***

In VM they have the following names on the A-disk of the user who issued the command.:

- **IOACMDIN *command_name***
- **IOACMDOT *command_name***

In VSE they have the following names and are located where OSASF was started:

- ***library.sublibrary*.IOACMDIN.*command_name***
- ***library.sublibrary*.IOACMDOT.*command_name***

By default, IOACMD assigns the value of the USERID issuing the command as the high level qualifier in the data set name. This is how IOACMD.EXEC worked before APAR OW21887. To prepend USERID with a new high level qualifier that takes a different value, edit the IOACMD EXEC and find the line where `hlq=""` appears. Specify your value (up to 8 valid MVS characters are allowed) between the quotation marks. For example, to name the debug data sets **SYS1.USERID.IOACMD.INPUT.*command_name***, edit the line to `hlq = "SYS1"`.

OSA/SF Workstation Debug Settings

The OSA/SF GUI **Workstation Error and Trace Log Settings** window is available for use at the direction of IBM Support to help debug problems with the OSA/SF GUI.

The **Workstation Error and Trace Log Settings** window is accessed from the **OSA/SF Workstation Interface** window.

From the window, select **Options** → **Workstation debug settings**. Figure 48 on page 140 is a sample window:

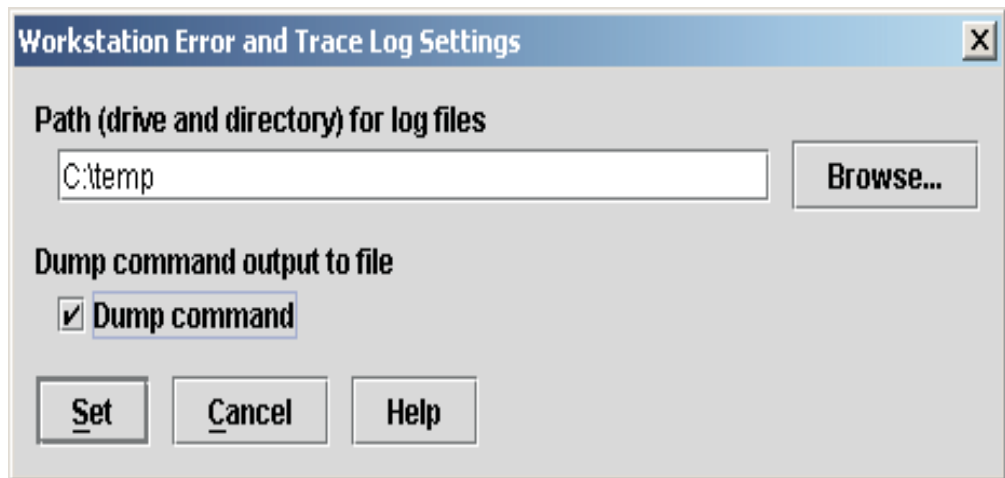


Figure 48. Specify GUI Trace and Dump Options

Path (drive and directory) for log files

Set this to a predefined directory of your choice.

Dump command output to file

Select **Dump command** when you want to write the contents of storage after the next GUI command is executed.

The dump output is written to the same directory in two files named IOADxxx.BIN (binary) and IOADxxx.DMP (ASCII), where xxx reflects the command for which the dump was collected:

MNG	Start or Stop Managing
SET	Set Parameters
QRY	Query
INS	Install
OAT	Get OATs
DBG	Get debug
CFG	Get config
CLR	Clear debug

CHPID Problems

Consider the following problem determination for CHPIDs.

- As an I/O channel with associated devices, an OSA is subject to the same problem determination procedures that apply to any other type of channel. For information on hardware procedures, refer to the system books listed in the bibliography.

Although the high availability with which OSA has been designed makes channel failure unlikely, such a possibility should be considered in the planning of your general management of an OSA in its network traffic. For example, by designing alternate connections for server-to-network and server-to-client traffic, you can prevent the OSA features in your enterprise from being candidates for a single point of failure.

- If an OSA memory dump or trace is required for the resolution of a problem, you will be directed by support personnel to obtain this information using the Get Debug command. This is described in the Commands section of the Appendix.
- An OSA LAN port can be managed by the LAN management tools available to the LAN administrator.
- If port diagnostics must be run, remember that an OSA is an z/OS channel type. The OSA CHPID must be configured online, and then LAN traffic to the port must be stopped.

If OSA/SF is managing the OSA, the associated entries in its OSA address table, or OAT, are useful when determining the status of the devices associated with the port. From the OSA/SF GUI **CHPID View** window, highlight the port associated with the CHPID, then from the menu bar choose **Select → Open OAT information**. For the IOACMD REXX exec, use the **Get OAT or Query** command.

- Some hardware failures are disruptive only to the port, and you would prefer to disable the port without configuring the channel off. You can do this using OSA/SF, the hardware support element or single object operations via the hardware management console.

Performance Data

You can use OSA/SF to obtain performance information for an OSA. From **CHPID View** on the OSA/SF GUI, highlight and double-click the CHPID entry. You receive the **Settings** window. Click on **Performance** to obtain the settings. For the REXX command, use **Query**:

PCI bus utilization (by CHPID)

The average, over the indicated time interval, of the percentage of time that the PCI bus was used to transfer data. This does not include idle time or time used by routine maintenance tasks.

Processor utilization (by CHPID)

The average, over the indicated time interval, of the percentage of time that the CHPID processor was used to transfer data. This does not include idle time or time used by routine maintenance tasks.

KBs read (by image)

The average number bytes read during the indicated time interval, expressed in KB/s.

KBs written (by image)

The average number bytes written during the indicated time interval, expressed in KB/s.

Processor utilization (by image)

The average percentage of processor resource usage during the indicated time interval.

All values displayed are set to zero when the CHPID is reset.

As Figure 49 on page 142 shows, this performance data is averaged over three time intervals. If you display this page before enough time has elapsed since the CHPID has been reset, no data is displayed in the columns for the longer time intervals.

Problem Determination

Performance data is also available through the Resource Measurement Facility, an element of z/OS.

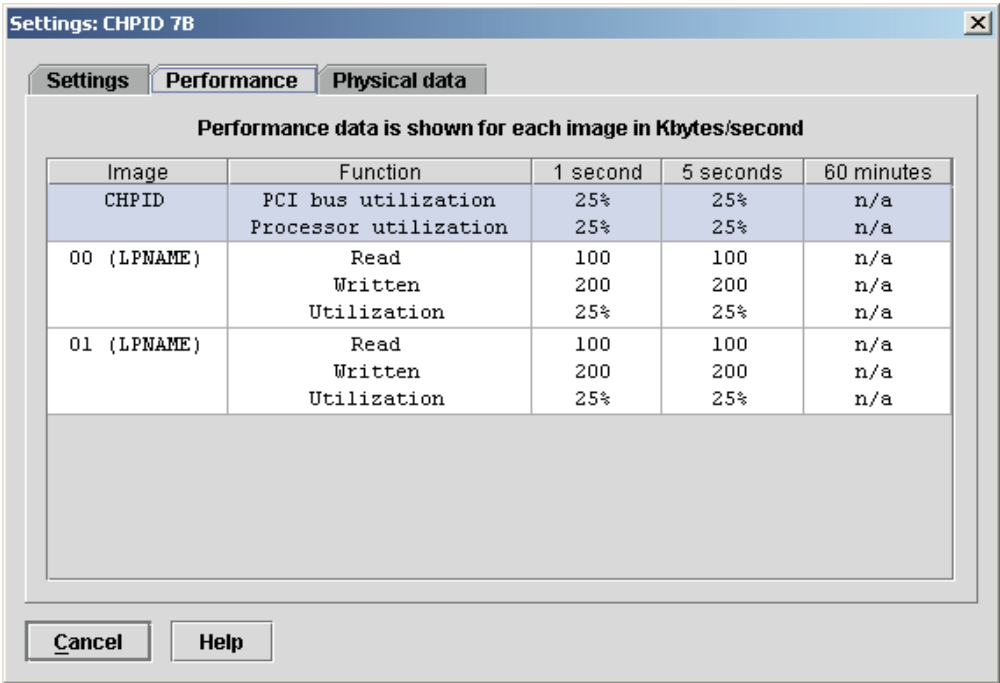


Figure 49. CHPID Performance Data in Channel Settings

Resource Measurement Facility

Resource Measurement Facility (RMF), an element of z/OS, measures and reports on the performance and availability of such system resources as processors, channel paths, devices, and storage. RMF can be set to issue reports about performance problems as they occur, so that your installation can take action before problems become critical. Your installation can also obtain long-term measurements of system performance that can be used for system tuning and capacity planning.

One of the RMF reports available is the *Channel Path Activity* report. For OSA-Express CHPIDs only, the Channel Path Activity report includes an *extended measurement mode* with five new fields, highlighted in Figure 50. These fields aid in the performance analysis of the multipath channel connection used by OSA-Express, which consists of one logical device for READ, one for WRITE, and another for data transfer (DATAPATH).

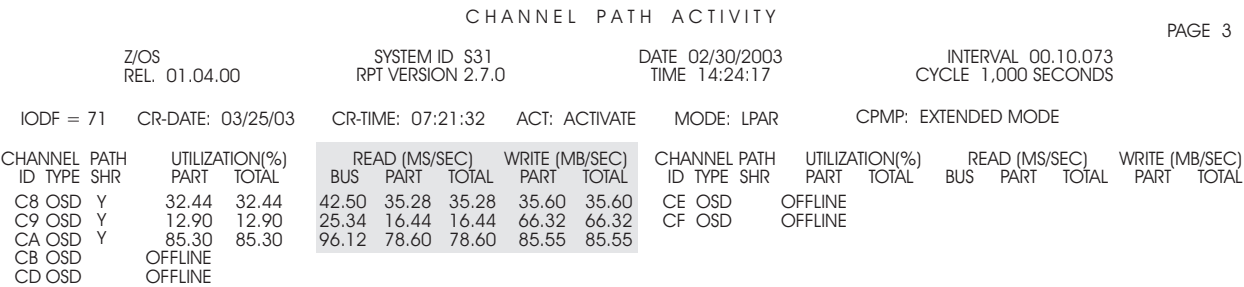


Figure 50. RMF Channel Path Activity Report

The leftmost field in the shaded area represents the percentage of bus cycles that are busy, relative to the theoretical limit.

You may see utilization values other than zero due to broadcast traffic on the LAN.

Under the READ heading, the PART value is the data transfer rate from the OSA-Express to the channel for this image. The value under Total represents the data transfer rate from the OSA-Express to the channel for the entire system.

Under the WRITE heading, the PART value is the data transfer rate from the channel to the OSA-Express for this image. The value under Total represents the data transfer rate from the channel to the OSA-Express for the entire system.

The reported data transfer rate is the total number of bytes handled for a given connection.

OSA-Express CHPIDs (device types OSD and OSE) may appear in the RMF Device Activity Report with messages reporting “NO H/W DATA” or “NO TIMING FACILITY”. It is also possible for zeroes to appear for these devices.

For these device types the data reported is not meaningful in the Device Activity Report and you may want to remove them from your specification list of devices. For data useful in tuning and capacity planning, see the RMF Channel Activity Report.

For information, see *z/OS RMF User's Guide* and *z/OS RMF Report Analysis*.

Reporting OSA/SF Problems to IBM

If you cannot correct a problem using the problem determination information provided, report the problem to the IBM support center. Use the following checklist for the call:

- ___ 1. Have your account name, license number, and other customer identification available.
- ___ 2. Have the following product-related information available:
 - ___ a. FMID:
H0G1400 for z/OS V1R4 base program
 - ___ b. PUT Level: ID of the latest program update tape installed
 - ___ c. Service Level:
See report headings and output data sets of the OSA/SF Main Menu for the OSA/SF service level.
- ___ 3. Have information available on any recent system definitions, or installed products that could be relevant.
- ___ 4. Have your record of service and updates to OSA/SF available.
- ___ 5. Report any OSA/SF service that has been bypassed.
- ___ 6. Have information available relevant to the type of problem.

In general, you will need to provide:

 - ___ a. A description of the problem
 - ___ b. The sequence of events leading to the problem; for example, the command being processed and the operands specified
 - ___ c. A list of the relevant messages, including both their identifiers and text

Problem Determination

- ___ d. An indication of how many times the error occurred and any other symptoms that appear relevant.

Chapter 11. Servicing OSA-Express and OSA/SF

Use these instructions after an OSA device is replaced or when a PTF is installed for OSA/SF.

Service for an OSA Hardware Replacement

Do the following whenever an OSA feature must be replaced and the new OSA will operate in the same OSA mode as the previous OSA. If you want to change the OSA mode of the new feature, you must customize the OSA mode from the beginning. See Chapter 8, “Configuring OSA-Express Modes,” on page 111.

Instructions are provided for using the REXX EXEC from the TSO/E userid or the OSA/SF GUI.

- ___ 1. Stop the affected host products for the OSA modes installed on the OSA.
 - If the OSA is configured for SNA mode, stop the use of OSA with VTAM.
 - If the OSA is configured for TCP/IP mode, stop the use of OSA with TCP/IP on the host.
- ___ 2. Vary off the OSA devices and then configure the OSA (CHPID) offline from all images that can use or share the CHPID.
- ___ 3. Service personnel installs the new OSA device.
- ___ 4. Configure the CHPID and OSAD device back online to the appropriate images. Use the REXX command (IOACMD EXEC) interface or OSA/SF GUI to issue the **Install** command for the configuration.
- ___ 5. Vary the OSA devices online.

Installing a PTF for OSA/SF

If the PTF affects OSA/SF, install the PTF using SMP/E (z/OS) or SES (VM), stop OSA/SF, then restart OSA/SF. If the PTF affects VSE, follow the PTF install steps for IUI Install IBM Service, IUI Fastpath 1422/1423.

Note: The description for the PTF will identify what is affected.

If the PTF affects the OSA/SF GUI, see “Setting up an OSA/SF GUI” on page 89.

Migrating to the OSA/SF Java-based GUI

When you migrate to the Java-based OSA/SF GUI from earlier versions of the OSA/SF GUI, consider the following restrictions:

- The earlier versions of the OSA/SF GUI cannot share files with the Java-based OSA/SF GUI.
- Any configuration that you have created with earlier versions of the OSA/SF GUI are not accessible to the Java-based OSA/SF GUI.

The Java-based OSA/SF GUI can read and save any configuration for a currently installed OSA. In order to obtain OSA configuration data that has been saved through the non-Java based OSA/SF GUI, perform the following steps from the Java-based GUI:

1. Start the GUI and from **CHPID View**, highlight the CHPID whose data you want to save.

2. From the menu bar, choose **Select** → **Configurations** → **Configuration** to open the configuration window for the CHPID.
3. From the configuration window menu bar, select **File** → **Get current configuration**. The configuration data for the OSA is loaded into the configuration window.
4. Give the OSA configuration a name. From the menu bar, select **Save configuration**. The OSA configuration data is saved to the host list for use by the Java based OSA/SF GUI.

Migrating to a New Version or Release of OSA/SF on z/OS

If a previous version or release of OSA/SF is installed, use the following to migrate to the new version or release.

- ___ 1. Follow the program directory instructions to install OSA/SF.
- ___ 2. Use the same startup profile that was setup for the previous OSA/SF. The default data set name was **IOA.STARTUP.PROFILE**. Do not change any of the data set names in the startup profile. These data set names will allow you to use configurations created by the previous version of OSA/SF.

Note: **CECNAME** is required and **SYSNAME** is optional. If you want to review the changes, see page 59.

- ___ 3. Replace the existing command EXEC (**IOACMD.EXEC**) with the new one from **IOA.SIOASAMP** member **IOACMD**.
- ___ 4. If you want to use the OSA/SF GUI, see “Setting up an OSA/SF GUI” on page 89.

Removing Data Sets or Files

During activate, OSA/SF creates various data sets for use during the configuration process. When you move an OSA from one CHPID to another or use a new processor and no longer use some of the CHPIDs, you do not need these configuration data sets or files. You can remove them from the system without affecting performance of the OSA or OSA/SF.

The following situations describe when you might remove unneeded data sets or files from your system:

- You no longer need a CHPID.
- A new machine is installed, and the CHPIDs are different types
- You have migrated from the non-Java-based version of the OSA/SF GUI, and you are using the OSA/SF Java-based GUI.

Examples of Removing Data Sets or Files from the System

In the following descriptions, &IOADSN indicates the high-level qualifier for your system as follows:

- For z/OS, &IOADSN is specified in the system OSA/SF startup profile (IOAPROF).
- For VSE, &IOADSN is specified in the library on the PARM= statement that you use to start OSA/SF.

For VM, the files that the REXX IOACMD EXEC or OSA/SF GUI creates during activate are stored on one of the 70xx minidisks. If you no longer use the CHPID, you can delete this minidisk.

Configuration Data Sets and Files created by the REXX IOACMD EXEC

If you have used the REXX command interface (IOACMD EXEC) to configure an OSA and you do not want to use the data sets or files for other CHPIDs, you can delete the data sets or files that you created as input on the **Configure OSA** command.

During **Configure OSA** command processing, the REXX IOACMD EXEC takes the user input and creates various data sets or files for use by OSA/SF. You can also delete these data sets and files. Table 16 shows the CHPID type and the corresponding data sets or files that the command creates on z/OS or VSE. You can delete these data sets and files. Use the following key:

- xx** CHPID number
- z** Port number
- c** A character that can be P, E, N, or S

Table 16. CHPID numbers and corresponding data sets and files created by the CONFIG OSA command

CHPID type	z/OS	z/VM	VSE
OSA-2 ATM	&IOAINATM.OATxx &IOAINMATM.ATMxx &IOAINATM.PVCxx	IOAINATM.OATxx IOAINATM.ATMxx IOAINATM.PVCxx	&IOADSN.OATxx) &IOADSN.ATMxx) &IOADSN.PVCx)
OSA-2 FDDI, ENTR or FENET	IOADSN.IOAINSNA.OATxx	IOASNAVM.OATxx	&IOASNAVM.OATxx)
OSA-Express Gigabit	&IOADSN.IOAINOSD.OSDxx	IOAINOSD.OSDxx	&IOADSN.OSDxx)
OSA-Express FENET	&IOADSN.IOAFENET.OATxx &IOADSN.IOAFENET.CFGxx &IOADSN.IOAFENET.SNAxx	IOAFENET.OATxx IOAFENET.CFGxx IOAFENET.SNAxx	&IOADSN.OATxx) &IOADSN.CFGxx) &IOADSN.SNAxx)
OSA-Express Token Ring	&IOADSN.IOATR.OATxx &IOADSN.IOATR.CFGxx &IOADSN.IOATR.SNAxx	IOATR.OATxx IOATR.CFGxx IOATR.SNAxx	&IOADSN.OATxx) &IOADSN.CFGxx &IOADSN.SNAxx)
OSA-Express ATM	&IOADSN.IOAxxzcc.OSEOAT &IOADSN.IOAxxzcc.OSDCFG &IOADSN.IOAxxzcc.OSECFG	IOAINOSE.OATxx IOAxxzcc.OSDCFG IOAxxzcc.OSECFG	&IOADSN.OATxxzcc) &IOADSN.OSDxxzcc) &IOADSN.OSExxzcc)
OSA-Express3	&IOADSN.IOAFENT.CFGxxpp &IOADSN.IOAFENT.SNAxxpp	&IOADSN.IOAFENT.CFGxxpp &IOADSN.IOAFENT.SNAxxpp	&IOADSN.IOAFENT.CFGxxpp) &IOADSN.IOAFENT.SNAxxpp)

where pp is the port number

Configuration Data Sets and Files created by the OSA/SF GUI

If you have used the OSA/SF GUI to configure an OSA, you can delete all the data sets or files that you created as a result of the GUI processing. The following tables show information about the OSA configuration and the configuration data sets and files based on the version of the OSA/SF GUI that creates them. (For VM, the files that the OSA/SF GUI creates are stored on one of the 70xx minidisks. If you are migrating from an old version of the GUI to the Java-based version, you can delete the configuration files from the minidisk.)

Non-Java-based OSA/SF GUI on OS/2 or Windows: Table 17 on page 148 shows the CHPID type and its corresponding data sets or files for configurations that have been created through the non-Java based version of the OSA/SF GUI (OS/2 or Windows). You can delete these data sets and files. Use the following key:

- xx** CHPID number
- yy[yy]** 2- or 4-character configuration number
- z** Port number

Table 17. CHPID numbers and corresponding data sets and files created by the non-Java based OSA/SF GUI on OS/2 or Windows

Configurations	z/OS	z/VM	VSE
Configuration list (1 configuration per CHPID)	&IOADSN.PWSOSAxx.CFGLIST	PWSOSAxx CFGLIST	&IOADSN.CFGLIST)
Configuration files (Up to 8 configurations per CHPID)	&IOADSN.PWSOSAxx.CFGNUMyy	PSWOSAxx CFGNUMyy	&IOADSN.CFGNUMyy)
OSA2 OAT	&IOADSN.PWSOSAxx.OATFILE	PWSOSAxx OATFILE	&IOADSN..CFGyyOxx)
OSA2 ATM Configuration	&IOADSN.PWSOSAxx. ALECFG	PWSOSAxx ALECFG	&IOADSN.ALECFGxx)
OSA2 ATM PVC	&IOADSN.PWSOSAxx.PVCFILE	PWSOSAxx PVCFILE	&IOADSN.PVCxx)
OSE ATM Native	&IOADSN.OSExxCN0	OSExxCN0 CONFIG	&IOADSN.OSExxCN0)
OSE ATM Native OAT	&IOADSN.OSExxON0.	OSExxON0 CONFIG	&.IOADSN.OSExxON0)
OSD or OSE ATM Physical	&IOADSN.OSExxCPH	OSExxCPH CONFIG	&.IOADSN.OSExxCPH)
OSD or OSE ATM Emulated :	&IOADSN.OSExxCEz	OSExxCEz CONFIG	&.IOADSN.OSExxCEz)
OSD or OSE ATM SNA	&IOADSN.OSExxCSz	OSExxCSz CONFIG	&.IOADSN.OSExxCSz)
OSD or OSE ATM Emulated OAT	&IOADSN.OSExxOEz	OSExxOEz CONFIG	&IOADSN.OSExxOEz)
OSD or OSE FENET, 1000Base-T, or TR	&IOADSN.OSExxCPH	OSExxCPH CONFIG	&IOADSN.OSExxCPH)
OSD or OSE FENET, 1000Base-T, or TR SNA	&IOADSN.OSExxCSN	OSExxCSN CONFIG	&IOADSN.OSExxCSN)
OSD or OSE FENET, 1000Base-T, or TR OAT	&IOADSN.OSExxOAT	OSExxOAT CONFIG	&IOADSN.OSExxOAT)
OSD Gigabit	&IOADSN.PWSOSAxx.OSDCFG	PWSOSAxx OSDCFG	&IOADSN.OSDCFGxx)

Java-based OSA/SF GUI on Windows or Linux: Table 18 shows the CHPID type and its corresponding data sets or files for configurations that have been created through the Java based version of the OSA/SF GUI (Windows or Linux). You can delete these data sets and files. Use the following key:

xx CHPID number

yy[yy] 2- or 4-character configuration number

z Port number

c A character that can be A, D, or E depending on the OSA type

Table 18. CHPID numbers and corresponding data sets and files created by the Java based OSA/SF GUI on Windows or Linux

Configurations	z/OS	z/VM	VSE
Configuration list (1 list)	&IOADSN.CFGLIST	CFGLIST.PWS	&IOADSN.CFGLIST)
Saved configuration name	&IOADSN.CFGyyyy	CFGyyyy.PWS	&IOADSN.CFGyyyy)
OSA2 ATM Configuration	&IOADSN.OScxxCFG	OScxxCFG CONFIG	&IOADSN.OScxxCFG)
OSA2 ATM PVC File	&IOADSN.OSAxxPVC	OSAxxPVC CONFIG	&IOADSN.OSAxxPVC)

Table 18. CHPID numbers and corresponding data sets and files created by the Java based OSA/SF GUI on Windows or Linux (continued)

OSE ATM Native	&IOADSN.OSExxCNT	OSExxCNT CONFIG	&IOADSN.OSExxCNT)
OSD or OSE ATM Emulated	&IOADSN.OScxxCEz	OScxxCEz CONFIG	&IOADSN.OScxxCEz)
OSD or OSE ATM Physical	&IOADSN.OScxxCPH	OScxxCPH CONFIG	&IOADSN.OScxxCPH)
OSA2 or OSE OAT	&IOADSN.OScxxOTz	OScxxOTz CONFIG	&IOADSN.OScxxOTz)
OSE SNA	&IOADSN.OSExxCSz	OSExxCSz CONFIG	&IOADSN.OSExxCSz)
OSD Gigabit	&IOADSN.OScxxCPH	OScxxCPH CONFIG	&IOADSN.OScxxCPH)
OSD or OSE FENET, 1000Base-T, or TR	&IOADSN.OScxxCPH	OScxxCPH CONFIG	&IOADSN.OScxxCPH)

Migrating to a New Version or Release of OSA/SF on VM

When migrating to a new version or release of OSA/SF on VM, use the VMSES/E procedure as instructed in the program directory.

To update the OSA/SF GUI, see “Setting up an OSA/SF GUI” on page 89.

Migrating to a New Version or Release of OSA/SF on VSE

When migrating to a new release of VSE, do not use any IOAxxx reader files created during a previous OSA/SF installation.

After installing a new release of VSE, follow the instructions in “OSA/SF and the VSE Environment” on page 80 to move all the necessary JCL from ICCF library 59 to your reader.

If any of the OSA/SF REXX procedures require service with a PTF, they will be included in IOAOCMD.O in your library.

To make these fixes active, delete the old IOACMD.PROC and rename the .O member to .PROC.

To update the OSA/SF GUI, see “Setting up an OSA/SF GUI” on page 89.

Migrating From OSA-2 to OSA-Express

If you are replacing an OSA-2 with an OSA-Express OSE CHPID, (that is, you are, using an OSA-Express in non-QDIO mode to provide the same LAN connectivity that a currently installed OSA-2 provides) you can use the OSA-2 OAT to configure the OSA-Express. You must use the REXX commands as follows, since the OSA/SF GUI does not allow you to use OSA-2 OAT data copied to an OSA-Express CHPID. (When you replace an OSA-2 with an OSA-Express OSD CHPID, the new OAT is automatically generated.)

1. **On z/OS:** Enter the following command:

```
EX 'IOACMD.EXEC' 'GET_OAT CHPID OAT.DAT' EXEC
```

Servicing OSA-Express and OSA/SF

On VM: Enter the following command:

```
IOACMD GET_OAT CHPID OAT DAT
```

On VSE/ESA: Enter the following command:

```
// EXEC REXX=IOACMD PARM='PRD2.OSASF GET_OAT CHPID PRD2.OSASF.OAT.DAT', SIZE=1100K
```

where *CHPID* is the OSA-2.

This command gets the OSA address table for the OSA-2 and, saves it as OAT.DAT on z/OS and as (OAT DAT on VM. You can specify any filename you want. For more information, see “GET_OSA_ADDRESS_TABLE | GET_OAT | GET_OSA | GET_TABLE” on page 166.

2. **On z/OS:** Enter the following command:

```
EX 'IOACMD.EXEC' 'CONFIG_OSA' EXEC
```

On VM: Enter the following command:

```
IOACMD CONFIG_OSA
```

On VSE/ESA: Enter the following command:

```
// EXEC REXX=IOACMD PARM='PRD2.OSASF CONFIG_OSA', SIZE=1100K
```

The command prompts you for the required input, including the name of the OAT saved in the previous step.

For more information on migrating from OSA-2 to OSA-Express, see <http://www-1.ibm.com/support/techdocs/atsmastr.nsf/WebIndex/WP100340>.

Chapter 12. About the OSA Address Table (OAT)

About the chapter

If you are installing any OSA feature other than channel type OSD and you are not using the OSA/SF GUI, this chapter provides useful information.

If either of the following cases apply, you don't need to know the details in this chapter, but you might want to use the information for reference:

- If you are installing OSA-Express features to run only as a channel type OSD (QDIO mode), the correct OAT entries are automatically created from I/O hardware configuration data and Communications Server.
- If you are using the OSA/SF GUI to customize any OSA feature other than channel type OSD, configuration windows organize the OAT and provide an easy method for creating and changing entries.

Each OSA has its own OAT. Each OAT contains one or more *entries*, or collections of parameters that identify one data path through the OSA. The OAT is stored in the OSA in non-volatile storage. There are two methods commonly used for manually creating an OAT using REXX:

- The Get OAT Command
- Sample Templates in IOA.SIOASAMP (z/OS) and on the E (200) minidisk (VM)

There are advantages to both methods. If you already have the OAT completed and installed on the OSA and you want to make a change, use the Get OAT command. If you are creating an OAT for the first time, the templates are easier to use. Instructions for changing the templates are included in the legend appended to each template.

The hardware configuration (IOCDS) has input to the OAT and must be defined before an OSA can transfer data. See “Using HCD for Hardware I/O Configuration” on page 37.

The OAT Format

An OAT entry always contains one image line and one OAT definition line. It may optionally contain additional OAT lines.

Image Line

For all OAT entry types, the first non-comment line in the OAT entry indicates the channel subsystem and image to which the following OAT entry lines refer. It always includes the same parameters, separated by one or more spaces:

Image number *css.i (hostname)*

where

Image number

is a keyword signaling the beginning of all OAT entries associated with the specified image.

CULA

is a two-byte identifier of the control unit logical address. This field is only valid for z890 or z990 starting with May 2004 level of Licensed Internal Code or z9-109.

About the OAT

css.i

where **css** is the 1–digit channel subsystem identifier and **i** is a 1-digit hex image number.

(hostname)

is an optional, descriptive, name ignored by the program.

OAT Definition Line

The content of the OAT definition line differs according to the type of entry. Parameters are separated by one or more spaces.

For TCP/IP

In an OAT entry for TCP/IP, the OAT definition line includes the following:

ua passthru port_number default_entry Home_IP Net_mask

where

ua is a 1 or 2–digit unit address number, either alone (0A, for example) or concatenated to a device address, as in 0A(023A). The device address is ignored.

passthru

identifies the type of entry.

port_number

specifies the port number.

default_entry

indicates whether this entry forwards unknown IP addresses, and is set to one of the following:

NO specifies that this is not a default entry.

PRI specifies a primary default entry.

SEC specifies a secondary default entry to be used when the primary is not available.

Home_IP

is the home IP address in standard w.x.y.z format, with values ranging from 0 to 255 in each position. This can be left blank when port sharing is not used, or when you do not want an address assigned to this OAT entry. You cannot have both zero and non-zero addresses in the same OAT.

For SNA

In an OAT entry for SNA, the OAT definition line includes the following:

ua sna port_number VTAM_id_num

where

ua is a 1 or 2–digit unit address number, either alone (0A, for example) or concatenated to a device address as in 0A(023A).

sna

identifies the type of entry.

port_number

specifies the port number

VTAM_id_num

is used only for SNA Network Management for OSA-2 FDDI and ENTR features.

For MPC

In an OAT entry for MPC, the OAT definition line includes the following:

ua mpc port_number default_entry osa_name (MPC_type)

where

ua is a 1 or 2-digit unit address number, either alone (0A, for example) or concatenated to a device address as in 0A(023A).

mpc

identifies the type of entry.

port_number

specifies the port number. **N/A** is specified for QDIO control.

default_entry

for QDIO data only, indicates whether this entry forwards unknown IP addresses, and is set to one of the following:

NO specifies that this is not a default entry.

PRI specifies the primary default entry.

SEC specifies the secondary default entry to be used when the primary is not available.

osa_name

for HPDT MPC and QDIO entries only. This is a maximum of 8 characters. This parameter must **not** begin with 0-9, but can contain the characters a-z, 0-9, @, #, \$ in all other positions.

(MPC_type)

is set to one of the following:

(QDIO Data)

(QDIO Control)

To Remove an OAT Entry

Replace the entry type of an existing OAT entry with the keyword **unassigned** or **N/A** to remove it from the OSA configuration.

Additional OAT Lines

When modifying OAT entries returned from the Get OAT command, you may see additional lines for certain TCP/IP and MPC entries. For MPC entries, a home IP address may be shown. This value cannot be set through OSA/SF. If it occurs in the input file, it is ignored.

The Default OAT

The OSA-Express FENET, 1000Base-T, and Token Ring features ship with an IBM-supplied default OAT for use in non-QDIO modes only, that contains one pair of Passthru entries per image for each port through the OSA. These Passthru OAT entries, therefore, allow the OSA to be run in the TCP/IP Passthru mode either with or without the services of OSA/SF. Note the following characteristics:

- On the z890 processor, you can have 2 channel subsystems or LCSS. On the z990 and z9-109 processor, you can have 4 channel subsystems or LCSS. You can spread the OSA CHPIDs across any images in a subsystem.
- Because the FENET and 1000Base-T features each have one port per CHPID, the OATs for these features have 32 default Passthru entries for the z800 and z900 processor, 64 default Passthru entries for the z890, and 128 default Passthru entries for the z990 and z9-109 processors.

About the OAT

- No default OATs exist for CHPIDs that run in QDIO mode.

To define a FENET, 1000Base-T, or TR OSA for a default TCP/IP Passthru mode configuration, that is, a configuration in the TCP/IP Passthru mode without customization through OSA/SF, you only have to define the OSA channel path with its pairs of associated device numbers and unit addresses in the system hardware I/O configuration (IOCDS), **but you must specify 00 as the starting unit address**. Use the same commands or programs that you would use for any channel path (CHPID).

There is no default configuration for QDIO mode. You need only define the OSA channel path in the system hardware I/O configuration. The OAT is then automatically built for QDIO architecture.

Although the services of OSA/SF are not required for a default configuration, they are still recommended. Even in a default configuration, OSA/SF can still be used to obtain data that can assist you in determining the cause of OSA-related problems.

If you use CS TCP/IP SNMP subagent with an OSA-Express OSE CHPID, you must install OSA/SF, and the port name in your configuration must match the port name in the TCP/IP profile. If you are running z/OS V1R4 or Linux kernel 2.4.14 or above with an OSA-Express feature in QDIO mode or z/OS V1R6 or above with an OSA-Express feature in non-QDIO mode, the OSA-Express MIB is directly accessible through an OSA-Express SNMP subagent. For z/OS V1R6, non-QDIO CHPIDs (OSE) are also supported. See “Support for Simple Network Management Protocol (SNMP)” on page 31 for more information.

There are several situations in which you must have an IP address on your passthru entries in order for all the defined modes to operate properly in port sharing mode:

- Different images use the port for TCP/IP traffic
- TCP/IP and SNA traffic share the port
- More than one TCP/IP stack uses the port

If any of these descriptions apply, you cannot use the default OAT. You must use OSA/SF to customize the OAT.

Guidelines for Changing an OAT

An OAT entry defines the data path between a port and an image and unit address.

- Port sharing is defined as:
 - One port enabled for traffic of more than one kind, for example passthru and SNA
 - or
 - One type of traffic for more than one image
- Multiple partition/unit address pairs can be associated with a single port only if the IP addresses are unique. If a port is being shared and IP traffic is flowing, each passthru OAT entry must have an IP address assigned to it.
- OSE CHPIDs are limited to a maximum of 8 IP addresses per OAT entry. See Table 30 on page 263 for more information. (For OSA-2, the same limit of 8 IP addresses per OAT entry exists, but no more than 16 IP addresses per port can be distributed over multiple OAT entries.)
- If the port is not shared between image, all IP addresses should be set to a value of 0.0.0.0.

- When changing an existing entry, any operation currently executing may be interrupted if you use the FORCE option. (The PUT_OAT command does not apply to OSA-Express features.)
- Make sure that an entry for each partition is defined when sharing a specific port.
- **When using a dedicated or reconfigurable CHPID, the image must be specified at 0.**

OAT Examples

TCP/IP with Port Sharing Between Images

This OAT manages TCP/IP traffic through an OSA CHPID communicating with two images.

```
*****
* UA(Dev) Mode      Port      Entry specific information      Entry Valid
*****
                                Image 0.1 (HOST1)
00(0400) passthru   00 pri 009.112.018.017                      SIU   ALL
                                Image 0.2 (HOST2)
04(0404) passthru   00 no 009.112.012.016                      SIU   ALL
```

Figure 51. Example of OAT for TCP/IP with Port Sharing

About the OAT

TCP/IP with Multiple IP Addresses

This OAT manages TCP/IP traffic through an OSA CHPID with one image for which three different IP addresses are defined.

```
*****
* UA(Dev) Mode      Port      Entry specific information      Entry Valid
*****
                                Image 0.1 (HOST1)
00(0400) passthru    00 PRI 010.200.035.158                      SIU    ALL
                                002.003.035.158
                                018.019.019.030
*****
```

Figure 52. Example of OAT for TCP/IP with Multiple IP Addresses

SNA

This OAT manages SNA traffic through the OSA CHPID.

```
*****
* UA(Dev) Mode      Port      Entry specific information      Entry Valid
*****
                                Image 0.1 (HOST1)
00(0100) sna        0                      SIU    ALL
*****
```

Figure 53. Example of OAT for One SNA Entry

Chapter 13. OSA/SF Commands for REXX

This section provides information for using a General-use programming interface.

Enter OSA/SF commands from a z/OS Ready prompt or TSO command line, or from CMS in a VM environment. For VSE, submit an IOACMD job for each command. All OSA/SF commands are also available from the OSA/SF GUI, and from the following menu, displayed when you enter **IOACMD** without parameters:

```
IOACMD:0-End IOACMD
IOACMD:1-Clear Debug
IOACMD:2-Configure OSA CHPID
IOACMD:3-Convert OAT
IOACMD:4-Get Configuration File
IOACMD:5-Get Debug
IOACMD:6-Get OSA Address Table
IOACMD:7-Install
IOACMD:9-Query
IOACMD:10-Set Parameter
IOACMD:11-Shutdown (VM only)
IOACMD:12-Start Managing
IOACMD:13-Stop Managing
```

Attention

Enter **IOACMD.EXEC** (or, for VM, **IOACMD**) with all OSA/SF commands.

- See step 1 on page 86 for the fully-qualified z/OS data set name that was used to set up IOACMD.EXEC
- “Setting up the REXX Command Interface for z/VM” on page 86 discusses the interfaces in a VM environment.
- “Copy the Skeleton Job for IOACMD” on page 82 describes the JCL used in VSE.

Example:

For z/OS:

```
EX 'IOACMD.EXEC' 'CLEAR_DEBUG' EXEC
```

For VM:

```
IOACMD CLEAR_DEBUG
```

For VSE:

```
// EXEC REXX=IOACMD PARM='PRD2.OSASF CLEAR_DEBUG',  
SIZE=1100K
```

To have the EXEC prompt you for the commands, just enter:

```
EX 'IOACMD.EXEC' EXEC
```

For VM:

```
IOACMD
```

For VSE:

```
// EXEC REXX=IOACMD PARM='PRD2.OSASF', SIZE=1100K
```

How to read syntax diagrams

This section describes how to read syntax diagrams. It defines syntax diagram symbols, items that may be contained within the diagrams (keywords, variables, delimiters, operators, fragment references, operands) and provides syntax examples that contain these items.

Syntax diagrams pictorially display the order and parts (options and arguments) that comprise a command statement. They are read from left to right and from top to bottom, following the main path of the horizontal line.

Symbols

The following symbols may be displayed in syntax diagrams:

Symbol	Definition
▶▶—	Indicates the beginning of the syntax diagram.
—▶	Indicates that the syntax diagram is continued to the next line.
▶—	Indicates that the syntax is continued from the previous line.
—▶▶	Indicates the end of the syntax diagram.

Syntax items

Syntax diagrams contain many different items. Syntax items include:

- **Keywords** - a command name or any other literal information.
- **Variables** - variables are italicized, appear in lowercase and represent the name of values you can supply.
- **Delimiters** - delimiters indicate the start or end of keywords, variables, or operators. For example, a left parenthesis is a delimiter.
- **Operators** - operators include add (+), subtract (-), multiply (*), divide (/), equal (=), and other mathematical operations that may need to be performed.
- **Fragment references** - a part of a syntax diagram, separated from the diagram to show greater detail.
- **Separators** - a separator separates keywords, variables or operators. For example, a comma (,) is a separator.

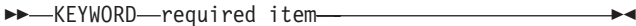
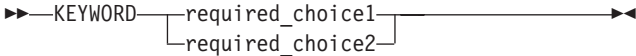
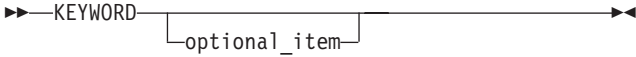
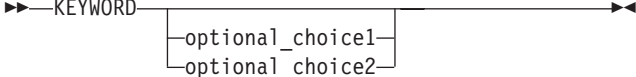
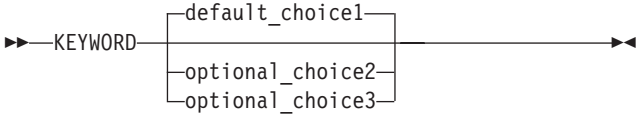
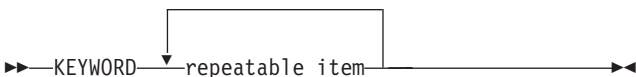
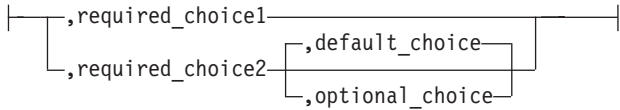
Keywords, variables, and operators may be displayed as required, optional, or default. Fragments, separators, and delimiters may be displayed as required or optional.

Item type	Definition
Required	Required items are displayed on the main path of the horizontal line.
Optional	Optional items are displayed below the main path of the horizontal line.
Default	Default items are displayed above the main path of the horizontal line.

Syntax examples

The following table provides syntax examples.

Table 19. Syntax examples

Item	Syntax example
Required item.	
Required items appear on the main path of the horizontal line. You must specify these items.	
Required choice.	
A required choice (two or more items) appears in a vertical stack on the main path of the horizontal line. You must choose one of the items in the stack.	
Optional item.	
Optional items appear below the main path of the horizontal line.	
Optional choice.	
A optional choice (two or more items) appear in a vertical stack below the main path of the horizontal line. You may choose one of the items in the stack.	
Default.	
Default items appear above the main path of the horizontal line. The remaining items (required or optional) appear on (required) or below (optional) the main path of the horizontal line. The following example displays a default with optional items.	
Variable.	
Variables appear in lowercase italics. They represent names or values.	
Repeatable item.	
An arrow returning to the left above the main path of the horizontal line indicates an item that can be repeated.	
An arrow returning to the left above a group of repeatable items indicates that one of the items can be selected, or a single item can be repeated.	
Fragment.	
The — fragment — symbol indicates that a labelled group is described below the main syntax diagram. Syntax is occasionally broken into fragments if the inclusion of the fragment would overly complicate the main syntax diagram.	 fragment: 

CLEAR_DEBUG | CLR | CLR_DEBUG | CLEAR

Purpose

The Clear Debug command clears the contents of the current message log maintained by the OSA/SF. The message log contains a history of all commands issued, responses generated, informational messages, and any errors that have occurred since the Clear Debug command was last issued.

Note: IBM Service may require the contents of the message log to perform problem isolation; therefore, do not use this command unless you are sure you want to clear the current contents of the message log.

Syntax

►►—CLEAR_DEBUG—◄◄

Operands

None

This command requires no parameters.

Results

None

No response is displayed from the command.

Limitations

If RACF is installed, Clear Debug requires a minimum of CONTROL authority. The RACF authority you specify pertains to the appropriate RACF facility as defined in “Controlling Access to OSA/SF” on page 64 for z/OS, and on page 75 for VM.

This command does not require an OSA (CHPID) number to be entered; therefore it does not matter what OSA/SF image is managing the OSAs.

Examples

For z/OS: **EX 'IOACMD.EXEC' 'CLEAR_DEBUG' EXEC**

For VM: **IOACMD CLEAR_DEBUG**

For VSE: **// EXEC REXX=IOACMD PARM='PRD2.OSASF CLEAR_DEBUG',
SIZE=1100K**

Clears the OSA/SF message log.

CONFIG_OSA

Purpose

Use this command to customize any OSA feature.

A configuration file **and** an OAT are required for:

- OSA-Express ATM CHPIDs defined as channel type OSE
- FENET or 1000Base-T CHPIDs defined as channel type OSE
- Token Ring CHPIDs defined as channel type OSE

Only a configuration file is required for any OSA-Express CHPID defined as channel type OSD (QDIO mode).

Syntax

►►—CONFIG_OSA—◄◄

Operands

None

This command requires no parameters. It will prompt you for input.

Results

Prompting

The command prompts you for input based on the task you want to do.

Limitations

Configure OSA calls a number of other OSA/SF routines and requires the proper authority to execute all of these routines.

Configure OSA uses the **Query**, **Get File**, **Put File**, **Start Managing** and **Install** commands.

For more information, see “OSA/SF Tasks and Commands” on page 65.

Examples

For z/OS: **EX 'IOACMD.EXEC' 'CONFIG_OSA' EXEC**

For VM: **IOACMD CONFIG_OSA**

For VSE: **// EXEC REXX=IOACMD PARM='PRD2.OSASF CONFIG_OSA',
SIZE=1100K**

The command will prompt you for the required input based on the OSA-Express feature and the mode of operation you want to install.

CONVERTOAT

Purpose

This command works only for OSA address tables for SNA, passthru, and MPC created in detailed format in OSA/SF releases prior to V2R1. It converts an OAT file created in detailed format to the summary OAT format in the specified output file. The output file can be changed and used as input with the CONFIGURE OSA or PUT OAT command.

Syntax

►►—CONVERTOAT—*input_file_name*—*output_file_name*—◄◄

Operands

input_file_name

Name of a valid detailed OAT file.

output_file_name

Name of the new summary format OAT file.

Results

The detailed OAT file is converted to summary format. The new format can now be used with the PUT OAT or CONFIGURE OSA command.

Limitations

This command is only for use with OSA address tables for SNA, passthru, and MPC created in detailed format in OSA/SF releases prior to V2R1.

Examples

Execute the IOACMD command, select Convert OAT, and follow the prompts.

For z/OS: **EX 'IOACMD.EXEC' 'CONVERTOAT osa8.sna osa8.snanew' EXEC**

For VM: **IOACMD CONVERTOAT osa8 sna osa8s snanew**

For VSE: **// EXEC REXX=IOACMD PARM='PRD2.OSASF CONVERTOAT',
SIZE=1100K**

If the IOACMD job was set up as recommended, submit the job, select Convert OAT, and follow the prompts.

GET_CONFIG

Purpose

Use the Get Config command to get the configuration file for an OSA-Express feature in a format that can be used as input with the Configure OSA command. This is helpful when you have an existing OSA that you want to modify or copy to a new OSA.

Syntax

```
►► GET_CONFIG chpid dataset_or_file_name ◀◀
```

Operands

chpid

Value that indicates the hexadecimal OSA number for the command. The value is **not** entered with single quotes around it. For example, CHPID 4B should be entered as 4B, not X'4B'.

This field is required.

dataset_or_file_name

The name of the data set or file used to store the command's results.

Results

The current configuration file for the specified CHPID is stored in the specified data set.

Limitations

If RACF is installed, Get Config requires READ authority. The RACF authority you specify pertains to the appropriate RACF facility as defined in “Controlling Access to OSA/SF” on page 64 for z/OS, and on page 75 for VM.

Examples

Execute the IOACMD command, select Get Configuration File, and follow the prompts.

For z/OS: **EX 'IOACMD.EXEC' 'GET_CONFIG 40 dataset1.config' EXEC**

For VM: **IOACMD GET_CONFIG 40 dataset1 config**

For VSE: **// EXEC REXX=IOACMD PARM='PRD2.OSASF GET_CONFIG 44 PRD2.OSASF.CFG.CHP44', SIZE=1100K**

GET_DEBUG

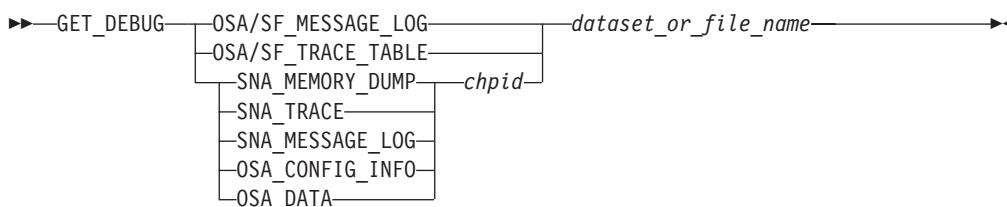
Purpose

Use this command at the direction of IBM support to gather information to debug OSA or OSA/SF problems that are reported. You will be instructed to issue this command by IBM support personnel when appropriate. Most of the information returned is not in a readable format.

A data set or file name must be specified. For z/OS, only sequential data sets can be used but they need not be pre-allocated.

If an error occurs, no data is returned and a failing message is displayed.

Syntax



Operands

OSA/SF_MESSAGE_LOG

The OSA/SF message log contains information on every command issued, command returned, informational messages, and any errors that occurred since the last Clear Debug command was issued that cleared the message log.

OSA/SF_TRACE_TABLE

The OSA/SF trace table contains up to the last 8000 trace points that the OSA/SF code executed. When the table is full the oldest entries are overwritten.

OSA_CONFIG_INFO

The output will be the entire configuration file read from the OSA. This can be used by IBM for failure analysis.

OSA_DATA

The OAT and port parameters will be read from the OSA. This can be used by IBM for failure analysis.

chpid

Represents the OSA number.

dataset_or_file_name

The name of the data set or file where you want to store the returned data.

Results

The Get Debug command returns either the contents of the OSA/SF message log or trace table or the OSA SNA trace or message log. These commands are also available on the OSA/SF GUI.

On VM, the resulting file is sent to the userid that issued the command.

Limitations

If RACF is installed, Get Debug requires READ authority. The RACF authority you specify pertains to the appropriate RACF facility as defined in “Controlling Access to OSA/SF” on page 64 for z/OS, and on page 75 for VM.

Examples

1. Get the OSA/SF trace table and put it in DATASET1.TRACE (DATASET1 TRACE on VM) (PRD2.OSASF.DATASET1.TRACE on VSE).
 For z/OS: **EX 'IOACMD.EXEC' 'GET_DEBUG OSA/SF_TRACE_TABLE DATASET1.TRACE' EXEC**
 For VM: **IOACMD GET_DEBUG OSA/SF_TRACE_TABLE DATASET1 TRACE**
 For VSE: **// EXEC REXX=IOACMD PARM='PRD2.OSASF GET_DEBUG OSA/SF_TRACE_TABLE PRD2.OSASF.DATASET1.TRACE', SIZE=1100K**
2. Get the OSA/SF message log and put it in DATASET2.LOG on z/OS (DATASET2 LOG on VM) (PRD2.OSASF.MSG.LOG for VSE).
 For z/OS: **EX 'IOACMD.EXEC' 'GET_DEBUG OSA/SF_MESSAGE_LOG DATASET2.LOG' EXEC**
 Or, for VM: **IOACMD GET_DEBUG OSA/SF_MESSAGE_LOG DATASET2 LOG**
 For VSE: **// EXEC REXX=IOACMD PARM='PRD2.OSASF GET_DEBUG MESSAGE_LOG PRD2.OSASF.MSG.LOG', SIZE=1100K**
3. Get the OSA Address Table and port parameters for the OSA and put them in DATASET3.PARMS on z/OS (DATASET3 PARMS on VM) (PRD2.OSASF.DATASET3.PARMS for VSE).
 For z/OS: **EX 'IOACMD.EXEC' 'GET_DEBUG OSA_DATA DATASET3.PARMS' EXEC**
 Or, for VM: **IOACMD GET_DEBUG OSA_DATA DATASET3 PARMS**
 For VSE: **// EXEC REXX=IOACMD PARM='PRD2.OSASF GET_DEBUG OSA_DATA PRD2.OSASF.DATASET3.PARMS', SIZE=1100K**

GET_OSA_ADDRESS_TABLE | GET_OAT | GET_OSA | GET_TABLE

Purpose

Use the Get OSA Address Table command to obtain the OSA address table for the specified CHPID (OSA) number. The output returned can be modified and used (for OSA-2 CHPIDs only) as input for the Put OAT Address Table command. See Chapter 12, “About the OSA Address Table (OAT),” on page 151 for examples of the OAT entries.

Syntax

►► `GET_OAT—chpid—dataset_or_file_name` ◄◄

Operands

chpid

Value that indicates the hexadecimal OSA number for the command. The value is **not** entered with single quotes around it. For example, CHPID 4B should be entered as 4B, not X'4B'.

This field is required.

dataset_or_file_name

This specifies the data set name where the OSA address table is to be stored.

Note: Only sequential data sets can be used but they do not need to be preallocated by the user.

This field is required.

Results

The **GET_OAT** command gets the OSA address table for the CHPID specified. A data set **must** be specified. The address table returned is placed into this data set. The data set created, along with an explanation of all the fields, is shown in Chapter 12, “About the OSA Address Table (OAT),” on page 151.

Limitations

If RACF is installed, this command requires READ authority. The RACF authority you specify pertains to the appropriate RACF facility as defined in “Controlling Access to OSA/SF” on page 64 for z/OS, and on page 75 for VM.

The copy of OSA/SF issuing this command does NOT need to be managing the CHPID specified.

Examples

For z/OS: **EX 'IOACMD.EXEC' 'GET_OAT 4C CHAN4C.DAT' EXEC**

Or, on VM: **IOACMD GET_OAT 4C CHAN4C DAT**

For VSE: **// EXEC REXX=IOACMD PARM='PRD2.OSASF GET_OAT 4C PRD2.OSASF.CHAN4C.DAT', SIZE=1100K**

Gets the OSA address table for CHPID 4C and puts it into CHAN4C.DAT (CHAN4C DAT on VM) (PRD2.OSASF.CHAN4C.DAT on VSE).

INSTALL

Purpose

Use the Install command to load an existing configuration onto an OSA only when replacing the OSA feature, not for initial installation. To perform initial configuration, use the Configure OSA (REXX) or Activate (GUI) command.

The Install command sets up the OAT, OSA mode, and port parameters on the specified OSA (CHPID) depending on the OSA feature type:

- For OSA-Express features defined as OSE (non-QDIO) CHPIDs, the OAT and port configuration are installed on the CHPID.
- For OSA-Express features defined as OSD (QDIO) CHPIDs, only the port configuration is installed on the CHPID.

The Install task is disruptive to all devices using the OSA (CHPID). The names of the files to be installed are contained in the IOACFG data set specified in the STARTUP.PROFILE. See step 59.

Syntax

```

▶▶—INSTALL—chpid—┐
                     └─FORCE─┘
  
```

Operands

chpid

Value that indicates the hexadecimal CHPID for the command. The value is **not** entered with single quotes around it. For example, CHPID 4B should be entered as 4B, not X'4B'. The CHPID **must** be online and accessible.

Results

The Install command returns a successful completion status if all the data sets were installed properly, the OAT was successfully set, and the CHPID is operational.

If any configuration data could not be installed properly, or if any of the OAT entries fails, a list of failures is returned.

Limitations

If RACF is installed, this command requires CONTROL authority. The RACF authority you specify pertains to the appropriate RACF facility as defined in “Controlling Access to OSA/SF” on page 64 for z/OS, and on page 75 for VM.

This command must be entered from the OSA/SF image managing the OSA.

Examples

For z/OS: **EX 'IOACMD.EXEC' 'INSTALL 7C' EXEC**

On VM: **IOACMD INSTALL 7C**

For VSE: **// EXEC REXX=IOACMD PARM='PRD2.OSASF INSTALL 7C',
SIZE=1100K**

OSA/SF Commands

Installs the specified files and OSA mode (image) onto CHPID 7C.

Optional command

Modify (z/OS operator command only)

Purpose

The Modify command is similar to the Install command in what it does. It is an MVS console command rather than an OSA/SF command.

The Modify command updates the OAT, OSA mode, and port parameters on the specified OSA (CHPID) depending on the OSA feature type:

- For OSA-Express features defined as OSE (non-QDIO) CHPIDs, the OAT and port configuration are installed on the CHPID.
- For OSA-Express features defined as OSD (QDIO) CHPIDs, only the port configuration is installed on the CHPID.

Modify is disruptive to all devices using the OSA (CHPID). The names of the files to be installed are contained in the IOACFG data set specified in the STARTUP.PROFILE. See step 59.

Syntax

```
►► —f—osaf_job_name—,—INSTALL—chpid—┐—————►  
└,—FORCE—┘
```

Operands

osaf_job_name

Indicates the name of the OSA/SF started Proc.

chpid

Value that indicates the hexadecimal CHPID for the command. The value is **not** entered with single quotes around it. For example, CHPID 4B should be entered as 4B, not X'4B'. The CHPID **must** be online and accessible.

FORCE (OSA-2 only)

Causes the OSA mode (image) to be loaded, even if it already exists on the feature.

QUERY

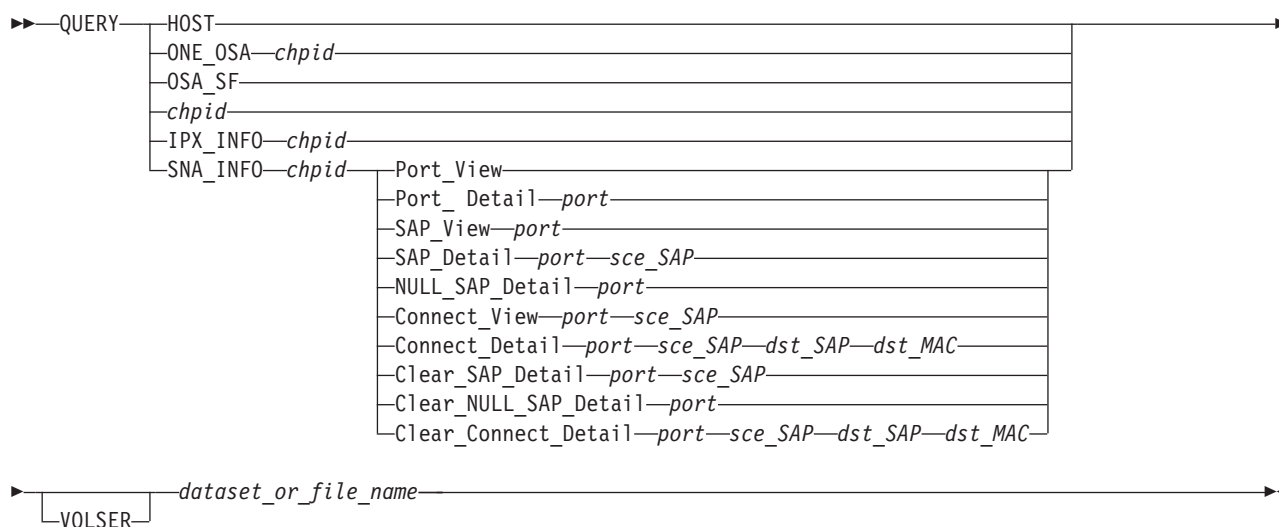
Purpose

Use the Query command to obtain information about all or parts of the OSA, Open Systems Adapter/Support Facility, and OSA modes running on the OSA.

Syntax

Attention: The following abbreviations are used in the syntax diagram:

- port - port number
- sce - source
- dst - destination



Operands

Host

Returns all information about OSA/SF, CHPIDs, ports, OSA modes, and devices.

ONE_OSA

Returns information related to one CHPID (OSA). You must enter **ONE_OSA** with the CHPID number.

OSA_SF

Returns only information related to OSA/SF.

SNA_INFO

Used for SNA network management information. See the examples at the end of this section.

IPX_INFO

Use this option to query the IPX connection data. Specify a CHPID and a data set name with this option.

chpid

This value indicates the hexadecimal CHPID for the command. The value is **not** entered with single quotes around it. For example, CHPID 4B should be entered as 4B, not X'4B'.

VOLSER

You can specify the volume serial number. If nothing is specified, the system default is used. If the data set already exists, the VOLSER is ignored. The format is VOLSER or VOLSER(UNIT).

dataset_or_file_name

The name of the data set or file where the requested information is to be stored. This is required.

Limitations

If RACF is installed, Query requires READ authority. The RACF authority you specify pertains to the appropriate RACF facility as defined in “Controlling Access to OSA/SF” on page 64 for z/OS, and on page 75 for VM.

Examples

1. Query the port view for CHPID 64 and put it in data set "USER4.QUERY.OUTPUT" (USER4 QUERY file on VM) (PRD2.USER4.QUERY.OUTPUT on VSE).
For z/OS: **EX 'IOACMD.EXEC' 'QUERY SNA_INFO 64 PORT_VIEW USER4.QUERY.OUTPUT' EXEC**
Or, for VM: **IOACMD QUERY SNA_INFO 64 PORT_VIEW USER4 QUERY**
For VSE: **// EXEC REXX=IOACMD PARM='PRD2.OSASF QUERY SNA_INFO 64 PORT_VIEW PRD2.OSASF.USER4.QUERY.OUTPUT', SIZE=1100K**
2. Query the port details for CHPID 7C and show the data on the display.
For z/OS: **EX 'IOACMD.EXEC' 'QUERY SNA_INFO 7C PORT_DETAIL 0' EXEC**
For VM: **IOACMD QUERY SNA_INFO 7C PORT_DETAIL 0**
For VSE: **// EXEC REXX=IOACMD PARM='PRD2.OSASF QUERY SNA_INFO 7C PORT_DETAIL 0', SIZE=1100K**
3. Query the SAP view for CHPID 7C, port 1 and put the data set in "USER4.QUERY.OUTPUT" (USER4 QUERY file on VM) (PRD2.USER4.QUERY.OUTPUT on VSE).
For z/OS: **EX 'IOACMD.EXEC' 'QUERY SNA_INFO 7C SAP_VIEW 1 USER4.QUERY.OUTPUT' EXEC**
For VM: **IOACMD QUERY SNA_INFO 7C SAP_VIEW 1 USER4 QUERY**
For VSE: **// EXEC REXX=IOACMD PARM='PRD2.OSASF QUERY SNA_INFO 7C SAP_VIEW PRD2.OSASF.USER4.QUERY.OUTPUT', SIZE=1100K**
4. Query the SAP details for CHPID 7C, port 1, SAP C and show the data on the display.
For z/OS: **EX 'IOACMD.EXEC' 'QUERY SNA_INFO 7C SAP_DETAIL 1 C' EXEC**
For VM: **IOACMD QUERY SNA_INFO 7C SAP_DETAIL 1 C**
For VSE: **// EXEC REXX=IOACMD PARM='PRD2.OSASF QUERY SNA_INFO 7C SAP_DETAIL 1 C', SIZE=1100K**
5. Query the NULL SAP details for CHPID 38, port 1 and show the data on the display.
For z/OS: **EX 'IOACMD.EXEC' 'QUERY SNA_INFO 38 NULL_SAP_DETAIL 1' EXEC**
For VM: **IOACMD QUERY SNA_INFO 38 NULL_SAP_DETAIL 1**
For VSE: **// EXEC REXX=IOACMD PARM='PRD2.OSASF QUERY SNA_INFO 38 NULL_SAP_DETAIL 1', SIZE=1100K**

6. Query the connection view for CHPID 7C, port 1, SAP 8 and show the data on the display.
 For z/OS: **EX 'IOACMD.EXEC' 'QUERY SNA_INFO 7C CONNECT_VIEW 1 8'**
 For VM: **IOACMD QUERY SNA_INFO 7C CONNECT_VIEW 1 8**
 For VSE: **// EXEC REXX=IOACMD PARM='PRD2.OSASF QUERY SNA_INFO 7C CONNECT_VIEW 1 8', SIZE=1100K**
7. Query the connection details for CHPID 7C, port 1, source SAP 8, destination SAP 14, destination MAC 123456789012 and show the data on the display.
 For z/OS: **EX 'IOACMD.EXEC' 'QUERY SNA_INFO 7C CONNECT_DETAIL 1 8 14 123456789012'**
 For VM: **IOACMD QUERY SNA_INFO 7C CONNECT_DETAIL 1 8 14 123456789012**
 For VSE: **// EXEC REXX=IOACMD PARM='PRD2.OSASF QUERY SNA_INFO 7C CONNECT_DETAIL 1 8 14 123456789012', SIZE=1100K**
8. Clear the SAP details for CHPID 68, port 1, SAP 4.
 For z/OS: **EX 'IOACMD.EXEC' 'QUERY SNA_INFO 68 CLEAR_SAP_DETAIL 1 4'**
 For VM: **IOACMD QUERY SNA_INFO 68 CLEAR_SAP_DETAIL 1 4**
 For VSE: **// EXEC REXX=IOACMD PARM='PRD2.OSASF QUERY SNA_INFO 68 CLEAR_SAP_DETAIL 1 4', SIZE=1100K**
9. Clear the connection details for CHPID 20, port 0, source SAP 4, destination SAP 1C, destination MAC 123456789012 and show the data on the display.
 For z/OS: **EX 'IOACMD.EXEC' 'QUERY SNA_INFO 20 CLEAR_CONNECT_DETAIL 0 4 1C 123456789012'**
 For VM: **IOACMD QUERY SNA_INFO 20 CLEAR_CONNECT_DETAIL 0 4 1C 123456789012**
 For VSE: **// EXEC REXX=IOACMD PARM='PRD2.OSASF QUERY SNA_INFO 20 CLEAR_CONNECT_DETAIL 0 4 1C 123456789012', SIZE=1100K**

SET_PARAMETERS | SET_PARM | SET_PARMS

Purpose

Use the Set Parameters command to set information for one of the ports on an OSA (CHPID). One parameter is set each time the command is entered. Multiple parameters cannot be set with one Set Parameters command.

Syntax

```
►►—SET_PARMS—chpid—port_number—item_to_set—value_to_set—◄◄
```

Operands

chpid

Value that indicates the hexadecimal CHPID (OSA) for the command. The value is **not** entered with single quotes around it. For example, CHPID 4B should be entered as 4B, not X'4B'. The CHPID **must** be online and accessible.

port_number

Port on the specified OSA (chpid) that is to be changed.

item_to_set

For a list of items that can be specified here, use the HELP command as follows:

For z/OS:

```
EX 'IOACMD.EXEC' 'HELP SET_PARM' EXEC
```

In VM:

```
IOACMD HELP SET_PARM
```

In VSE:

```
// EXEC REXX=IOACMD PARM='PRD2.OSASF HELP SET_PARM', SIZE=1100K
```

Value_to_set

The value to be set.

Results

The Set Parameter command sets the value for the item specified on the port specified.

Limitations

If RACF is installed, Set Parameter requires CONTROL authority. The RACF authority you specify pertains to the appropriate RACF facility as defined in “Controlling Access to OSA/SF” on page 64 for z/OS, and on page 75 for VM.

You must enter this command from the OSA/SF image managing the OSA.

Examples

For z/OS: **EX 'IOACMD.EXEC' 'SET_PARMS 54 0 fddi_group2_addr 534259474351' EXEC**

Or, for VM: **IOACMD SET_PARMS 54 0 fddi_group2_addr 534259474351**

For VSE: // EXEC REXX=IOACMD PARM='PRD2.OSASF SET_PARMS 54 0
fddi_group2_addr 534259474351', SIZE=1100K

Sets the parameter second group address on FDDI CHPID 54, Port 0 to
"534259474351".

SHUTDOWN

Purpose

The SHUTDOWN command causes the OSA/SF server machine to release all resources and logoff the userid. Once the server is shutdown, commands from the GUI or from CMS will cause the server to logon and start again.

Syntax

►►—SHUTDOWN—◄◄

Operands

None

Results

The OSASF userid is logged off and the server machine releases all resources.

Limitations

If RACF is installed, Shutdown requires CONTROL authority.

This command is only valid on VM.

Examples

On VM: **IOACMD SHUTDOWN**

START_MANAGING

Purpose

The Start Managing command results in the copy of OSA/SF that runs in the image where the command is issued to take over management of the specified CHPID (OSA). If the CHPID is currently managed by a copy of OSA/SF running in another image, the Force indicator (z/OS, and z/VM only) must be set. When this command completes, another copy of OSA/SF running on another image is limited to executing commands to this CHPID that do not change the CHPID's environment. To determine if a command can be used from another image, see that command's "Limitations" section.

Syntax

```

▶▶—START_MANaging—chpid—┐
                             └─FORCE─┘▶▶
  
```

Operands

chpid

Value that indicates the hexadecimal CHPID for the command. The value is **not** entered with single quotes around it. For example, CHPID 4B should be entered as 4B, not X'4B'. The CHPID **must** be online and accessible.

FORCE

If the channel is being managed by a different copy of OSA/SF on another image, this indicator must be set to "force" this copy of OSA/SF to take over the management of the specified CHPID.

Results

The Start Managing command causes the copy of OSA/SF currently running in this image to take over management of the specified CHPID.

Under certain conditions message IOAK873I displays the image and device number of the channel path that has become the default for the CHPID. This message is only displayed on the image where OSA/SF is running and where the CHPID is managed. The secondary image does not display the message if the primary manages the CHPID and fails, nor does the primary display the message when the secondary, or some other image, manages the CHPID.

Limitations

If RACF is installed, Start Managing requires UPDATE authority. If the Force option is specified, CONTROL authority is required. The RACF authority you specify pertains to the appropriate RACF facility as defined in "Controlling Access to OSA/SF" on page 64 for z/OS, and on page 75 for VM.

Examples

For z/OS: **EX 'IOACMD.EXEC' 'START_MANAGING 58 FORCE' EXEC**

Or, for VM: **IOACMD START_MANAGING 58 FORCE**

For VSE: **// EXEC REXX=IOACMD PARM='PRD2.OSASF START_MANAGING 58 FORCE', SIZE=1100K**

OSA/SF Commands

Starts managing CHPID 58. If another OSA/SF was managing OSA 58, this OSA gets control.

STOP_MANAGING

Purpose

The Stop Managing command stops the copy of OSA/SF that runs in the image where the command is issued from managing the OSA CHPID. The command must be issued from the same image that is currently managing the CHPID. To have another copy of OSA/SF running on another image manage the CHPID, issue the Start Managing command to that copy of OSA/SF, using the force indicator if needed.

Syntax

►►—STOP_MANaging—*chpid*—————►►

Operands

chpid

Value that indicates the hexadecimal CHPID for the command. The value is **not** entered with single quotes around it. For example, CHPID 4B should be entered as 4B, not X'4B'. The CHPID **must** be online and accessible.

Results

The Stop Managing command stops management of the specified CHPID.

Limitations

If RACF is installed, Stop Managing requires UPDATE authority. The RACF authority you specify pertains to the appropriate RACF facility as defined in “Controlling Access to OSA/SF” on page 64 for z/OS, and on page 75 for VM.

This command must be entered from the OSA/SF image managing the OSA.

Examples

For z/OS: **EX 'IOACMD.EXEC' 'STOP_MANAGING 22 EXEC**

Or, for VM: **IOACMD STOP_MANAGING 22**

For VSE: **// EXEC REXX=IOACMD PARM='PRD2.OSASF STOP_MANAGING 22',
SIZE=1100K**

Stops managing CHPID 22 from this copy of OSA/SF. If an OSA mode is running, it continues to run.

Chapter 14. OSA/SF Messages and Codes

This section lists OSA error messages and provides explanations and corrective actions. This chapter also includes the following information:

- Errors associated with OSA in “OSA Reject Codes” on page 246
- Java errors associated with starting the OSA/SF GUI in “Debugging the OSA/SF GUI startup” on page 98.

OSA/SF Messages

Attention

- Message numbers contain a lower case *x* in this book because the character is a variable. Messages in which the variable would be a *G* or *X* are **not** documented and cannot be viewed in LookAt. The variable is assigned when a component detects the condition.

Example:

Message number: IOAA954E
Documented as: IOAx954E

The following return codes are provided by OSA/SF:

- | | |
|-----------|---|
| 0 | Indicates that the command completed successfully. |
| 4 | Indicates the command completed and any data that is returned is valid. However, a warning message is issued. |
| 8 | The command failed. Any data that is returned is not valid. A message with an E-severity level is issued. |
| 12 | The command failed. No data is returned. A message with an S-severity level is issued. |

OSA/SF messages have the following format:

Example: **IOAxnnns**

IOA The first three characters are the product identifier.

If you are looking at the OSA/SF message log, you may see a message without a message ID or with a message ID in the format IOBxnnns. Take the action that is stated explicitly or implicitly by the message text. If the severity level of an IOB message is E or S, report the message to IBM.

x Component that detected the condition. In some cases, more than one component can cause OSA/SF to issue the same message; therefore messages are listed in the book with the variable *x*. If you search for a message and the message is shown with an *x*, it is the correct description.

nnn 3 digit message sequence number. The messages in this book are listed numerically according to these three digits.

s The message severity, denoted by one of the following characters:

I Informational, no action required

W Warning, action is not required, but an error can occur later

Messages

- A** Action, which is a severity level indicating that some user action may be required
- E** Error that requires action eventually
- S** Severe or serious error that requires immediate action

How to Find a Message

Messages are listed numerically according to the last four characters.

Use LookAt, the online message facility, to look up messages and explanations that appear in this topic. You can access LookAt from the internet at:

<http://www.ibm.com/eserver/zseries/zos/bkserv/lookat/>

OSA/SF Reason Codes:

Reason codes that are issued as part of OSA/SF messages are for IBM use only. It is for this reason that explanations of reason codes are not documented. Reason codes may be encountered in messages found in the OSA/SF message log.

In the event that a message contains a reason code, note the message number, the reason code, refer to “Reporting OSA/SF Problems to IBM” on page 143.

IOAx001E Device *nnnn* incorrectly defined

Explanation: The device number *nnnn* is not defined in the hardware I/O configuration (IODF/IOCDS) with unit type=OSAD.

User response: Verify the hardware I/O configuration to ensure the unit type of this device number is OSAD.

IOAx002E Device *nnnn* is offline

Explanation: Device *nnnn* is offline to the operating system.

User response: Vary device *nnnn* online and then retry the task you were performing.

IOAx003E Device *nnnn* incorrectly defined and is offline

Explanation: The OSAD device (UNITADD=FE) is not defined correctly in the hardware I/O configuration (IODF/IOCDS), and the device is offline.

User response: Check the I/O configuration to ensure device *nnnn* is specified with a unit type = OSAD. Then vary the device online. Retry the task.

IOAx004E Cannot establish non-swappable environment for device *nnnn*

Explanation: An internal OSA/SF error has occurred.

User response: Check the I/O configuration (IODF/IOCDS) for proper OSA device definitions. Refer

to OSA documentation for OSA IODF/IOCDS requirements. If the condition continues, see “Reporting OSA/SF Problems to IBM” on page 143.

IOAx005E Unit control block not found for device *nnnn*

Explanation: OSA/SF attempted to find device *nnnn* and could not locate the unit control block (UCB).

User response: Verify that the device is correctly defined in the hardware I/O configuration (IODF/IOCDS). Refer to OSA documentation for OSA IODF/IOCDS requirements. If the condition continues, see “Reporting OSA/SF Problems to IBM” on page 143.

IOAx006E Status Modifier received when accessing device *nnnn*

Explanation: An error occurred while trying to perform an action to the OSA device. This is probably a hardware error.

User response: Review the console log for hardware related messages. Also check the SYS1.LOGREC (EREP) data set. Attempt a retry of the last task that was being performed. If problems continue, see “Reporting OSA/SF Problems to IBM” on page 143.

IOAx007E Unable to pagefix/pagefree storage for device *nnnn*

Explanation: OSA/SF was unable to manage storage

for OSA device *nnnn*. This could also be an OSA/SF internal error.

User response: Verify that the OSA/SF region size is correct. Also check for system storage constraints. If the problem persists, see “Reporting OSA/SF Problems to IBM” on page 143.

**IOAx008E Unable to build CCW chain for device
 nnnn**

Explanation: An internal OSA/SF error has occurred.

User response: Verify that OSA device *nnnn* is properly defined in the hardware I/O configuration (IODF/IOCDS). If the problem persists, see “Reporting OSA/SF Problems to IBM” on page 143.

**IOAx009E Failed to get the OSA lock for device
 nnnn**

Explanation: An internal software lock could not be obtained in order to communicate with OSA device *nnnn*.

User response: Verify that another copy of OSA/SF, the hardware system console (PCE), or the hardware management console (HMC) is not currently accessing this CHPID, then retry the command. If problem persists, see “Reporting OSA/SF Problems to IBM” on page 143.

**IOAx010E Failed when testing the OSA lock for
 device nnnn**

Explanation: While in the process of performing a task on the OSA, changes to the state of the OSA were detected for device number *nnnn*.

User response: Verify that another copy of OSA/SF, the hardware system console (PCE), or the hardware management console (HMC) is not currently performing a task on this OSA at the same time, then retry the command.

**IOAx011E Failed when freeing the OSA lock for
 device nnnn**

Explanation: An internal OSA/SF error has occurred.

User response: Stop OSA/SF. Then vary device *nnnn* offline to and then online. Restart OSA/SF. If the problem persists, see “Reporting OSA/SF Problems to IBM” on page 143.

**IOAx015E Communication with OSA device nnnn
 failed (cond code=3)**

Explanation: Communication failed with the OSA device.

User response: Look for I/O errors on the system console. If using the API, check control block definitions

for the OAT and the OSA mode. If you are using the OSA/SF GUI, do a Refresh from the OSA Channels Tree view or Details view. Ensure the OAT definitions and OSA mode feature are correctly defined by reviewing the configuration panels. Retry the task. If the problem persists, see “Reporting OSA/SF Problems to IBM” on page 143.

**IOAx016E Communication with OSA device nn
 timed out**

Explanation: Internal error

User response: See “Reporting OSA/SF Problems to IBM” on page 143.

**IOAx018E Cannot install/initialize the interrupt
 handler for device nn**

Explanation: The OSA/SF interrupt handler could not be started.

User response: Check for I/O errors on the system console. Stop OSA/SF if it is running, and then restart it. If the problem persists, see “Reporting OSA/SF Problems to IBM” on page 143.

Common Problems: If this message is accompanied by MSGIOAA090E and IOAA086E, verify that the OSA/SF load library, SYS1.SIOALMOD and the runtime library OSA/SF was linked with, are in the PROGXX member.

**IOAx019E Cannot start or stop managing device
 nnnn**

Explanation: The OSA CHPID is currently being managed by a different copy of OSA/SF in another image. The action that was requested can not be performed from this image.

User response: Submit the action from the image running the OSA/SF image that is managing the OSA. If you don't know what image is managing the OSA, from the GUI double-click on the OSA number from the Channels Tree view and select the Statistics page.

If you want to manage the OSA from this image, from the GUI select Help from the menu bar of any window, select How To, and then double-click on "Manage OSAs from a different OSA/SF image". Once this image is managing the OSA, resubmit the action.

**IOAx020E Device nnnn is already managed by
 another image**

Explanation: The OSA device *nnnn* is currently being managed by a different OSA/SF image in another image.

User response: The OSA/SF image that is managing the OSA must be used to perform the action that received this message. To locate which image is managing the OSA, from the GUI double-click on this

Messages

OSA number from the Channels Tree view and select the Statistics window.

If you want to manage the OSA from this image, use the Start Managing with Force option.

IOAx022E I/O Error for device *nnnn* with return code *nnnn*

Explanation: OSA/SF issued the EXCP macro to start an I/O operation to the OSA. Communications failed between OSA/SF and the specified device. The return code may be one of the following hexadecimal expressions. The return codes are:

- X'0000': The specified device is working correctly but VM is not at the Version 2 Release 4 level (or level 2.2 or 2.3 with APAR VM62184 applied).
- X'0000': on VM, VM not at V2R4 or APAR VM62184
- X'0041': permanent I/O error
- X'0042': extent error (DASD only)
- X'0044': an error occurred after the previous I/O request to the device was posted complete
- X'0045': program check or machine check occurred in IOS while the I/O request was being processed
- X'0048': channel program was purged
- X'0051': command reject
- X'0052': bus out check
- X'0053': equipment check
- X'0054': undefined bit on in sense byte 0
- X'0061': protection check
- X'0062': channel data check
- X'0063': channel control check
- X'0064': interface control check
- X'0065': chaining check
- X'0074': simulated error status, which is set for the following conditions:
 - A start I/O operation was attempted to a device that is in a permanent error state, boxed, or not connected.
 - A missing interrupt was detected and the I/O operation was terminated as a result of recovery operations by the missing interrupt handler.

User response: Check the console for additional messages pertaining to this failure. For more information, refer to the EXCP macro description in *DFSMS/MVS V1R4 DFSMSdfp Advanced Services*, SC26-4921. Contact IBM Support if a hardware error occurred.

IOAx023E Unit check on device *dddd* with sense byte 10 value *xx*

Explanation: The command that was sent to the OSA returned a unit check.

User response: Locate the value in the message and follow the instructions.

01 - 16 Internal OSA error occurred. See “Reporting OSA/SF Problems to IBM” on page 143.

17 The OSA mode installed on the OSA is not

active. Configure the OSA (CHPID) offline in all images and then back online to activate the OSA mode.

18 The OSA mode loaded on the OSA has ABENDED. Configure the OSA (CHPID) offline in all images and then back online to activate the OSA mode.

19 - 24 Internal OSA error occurred. See “Reporting OSA/SF Problems to IBM” on page 143.

25 The OSA mode installed on the OSA is not active. Configure the OSA (CHPID) in all images and then back online to activate the OSA mode.

26–84 Internal OSA error occurred. Refer to “Reporting OSA/SF Problems to IBM” on page 143, then contact the IBM Support Center.

85 The OSA mode installed on the OSA is not active. Configure the OSA (CHPID) in all images and then back to activate the OSA mode.

86–AF Internal OSA error occurred. Refer to “Reporting OSA/SF Problems to IBM” on page 143, then contact the IBM Support Center.

B0 The drive (A:, B:, SYS:) specified is not valid.

B1 The directory specified does not exist.

B2 An attempt was made to remove the current directory. Switch out of the current directory and reissue the command.

B3 An attempt to remove the specified directory failed. Ensure the directory is empty and retry the command.

B4 An attempt was made to create a directory, and the path does not exist. Check that the drive and sub-directories are correct. Retry the command.

B5 The file name or extension is incorrect. Check the spelling and retry the command.

B7, B8, or B9 The file does not exist on the directory. An internal OSA error occurred. If the problem persists, see “Reporting OSA/SF Problems to IBM” on page 143, then contact the IBM Support Center.

BB - FF The file does not exist on the directory. An internal OSA error occurred. If the problem persists, see “Reporting OSA/SF Problems to IBM” on page 143, then contact the IBM Support Center.

IOAx024E **Parameter value is too large for device**
nn

Explanation: An attempt was made to access an OSA device for application area that does not exist.

User response: See “Reporting OSA/SF Problems to IBM” on page 143.

IOAx025E **Missing value in parameter table for device** *nn*

Explanation: Internal error

User response: See “Reporting OSA/SF Problems to IBM” on page 143.

IOAx026E **Requested function is unsupported for device** *nn*

Explanation: Internal error

User response: See “Reporting OSA/SF Problems to IBM” on page 143.

IOAx027E *ssssssssss* for **CHPID** *dddd*

Explanation: The command completed with one of the following messages (*sss...*) for the CHPID in *dddd*.

Application is in initialization state
 Retry the command.

A status modifier was received
 This is used whenever a status modifier is received for an OSA feature.

Data Port ID is not assigned
 This is an OSA/SF internal error. See “Reporting OSA/SF Problems to IBM” on page 143.

Device is in use
 Stop the use of this device by the application and then retry the command.

OAT Device Type is incompatible
 Native Passthru or native SNA OAT cannot be specified in OSA address table when the specified port is not native Token Ring, Ethernet, FDDI, or an emulated Token Ring or Ethernet. MPC cannot be specified in the OSA address table when the specified port is not an HPDT ATM Native port. Correct the device type and retry the command.

Port cannot be disabled
 If it is a physical port, try disabling it from the Hardware Management Console (HMC) and then retry the command. Check configuration parameters. Check physical connections.

Port cannot be enabled
 If it is a physical port, try enabling it from the Hardware Management Console (HMC) and

then retry the command. Check configuration parameters. Check physical connections.

Port is in definition error state
 Check the Hardware Management Console for hardware errors.

Port is in Disabled state
 The port must be enabled to complete the command. See “Enabling and Disabling Ports” on page 127.

Port is in disabling state
 The port was in the process of being disabled when the command was issued. Retry the command.

Port is in Enabled state
 The port must be disabled to complete the command. See “Enabling and Disabling Ports” on page 127.

Port is in enabling state
 The port was in the process of being enabled when the command was issued. Retry the command.

Port is in Link Failure state
 Check the Hardware Management Console for hardware errors.

Port is in unavailable state
 The port was not available when the command was entered. Retry the command.

Port is in undefined state
 This port must be configured and activated before use.

Unknown status modifier code
 Vary offline the devices associated with the CHPID (except the OSAD device) and reissue command.

User response: Take steps appropriate to the message generated. If the problem persists, see “Reporting OSA/SF Problems to IBM” on page 143.

IOAx028E **x code = *xx* for device** *nn*

Explanation: Internal error

User response: See “Reporting OSA/SF Problems to IBM” on page 143.

IOAx03nE **API failed attempting to make the connection with OSA/SF**

Explanation: An APPC connection between the user address space and the OSA/SF address space failed.

User response: Verify the APPC/MVS and VTAM definitions are correct. Then restart APPC/MVS, followed by the VTAM OSA/SF major nodes. Then restart OSA/SF.

Messages

Note: APPC/MVS and VTAM must be started before starting OSA/SF.

Common Problems:

- The APPC LU may not be active or successfully configured. Display the APPC LU (**D APPC,LU,ALL**) and verify the following attributes:

```
LLUN=IOASERV      SCHED=*NONE*    BASE=NO
STATUS=ACTIVE     PARTNERS=00000   TPLEVEL=SYSTEM
TPDATA=SYS1.APPCTP
```

This example illustrates the BASE=NO. If this is the only LU defined for APPC, the BASE should then be equal to YES. Only one LU must be the BASE.

- Security violation via RACF or Security product. Verify that the USERID has sufficient authorization to use the APPC facility. If the security product is other than RACF, be certain that APPC is an authorized facility of the host operating system.

IOAx051E Memory allocation error

Explanation: Memory allocation failed in the OSA/SF address space.

System programmer response: The request was for storage in the OSA/SF address space. Check the region size allocated for OSA/SF, it may have to be increased. Stop OSA/SF if required, correct the condition, and restart OSA/SF. If the problem persists, see “Reporting OSA/SF Problems to IBM” on page 143.

IOAx052E Memory free error

Explanation: There has been a FREEMAIN failure in the OSA/SF address space.

User response: See “Reporting OSA/SF Problems to IBM” on page 143.

IOAx053E File I/O error

Explanation: The file that was being accessed has encountered an I/O error.

User response: Verify the file name is correct and that no hardware errors have been encountered. Retry the command. If the problem persists, see “Reporting OSA/SF Problems to IBM” on page 143.

IOAx054E Command code is unknown or not valid

Explanation: An internal error has occurred.

User response: See “Reporting OSA/SF Problems to IBM” on page 143.

IOAx055E Incorrect parameter

Explanation: An incorrect parameter was detected by OSA/SF on the command received.

User response: If you are not calling OSA/SF at the API and not using your own EXEC, verify that you entered the parameters correctly, if the problem persists, contact the IBM Support Center.

If you are calling the API or using your own EXEC to call IOACMD.EXEC then verify that the command target in the API control block structure is correct and then retry the command.

IOAx056E file not found

Explanation: The data set *fff...fff* was not found.

User response: Ensure that the data set exists, that the data set is catalogued to the system, and that it is accessible to this image. Hint: Use another method of access for the data set, such as TSO BROWSE, to verify the data set's integrity. If the problem persists, see “Reporting OSA/SF Problems to IBM” on page 143.

IOAx057E File write failed for

file

Explanation: An attempt to write to the data set *fff...fff* failed.

User response: Verify there is enough space available on the volume and in the VTOC. Verify that the data set is not open by another user nor by the operating system, including other images. If the data set was built as part of the OSA/SF startup profile, verify that the data set allocations are correct. The OSA/SF Startup Profile is a data set that is pointed to from the DD card IOAPROF within the OSA/SF Started Procedure (task). See Chapter 2 for more information about the OSA/SF startup profile. Hint: Use another method of access for the data set, such as TSO BROWSE, to verify the data set's integrity.

Retry the command. If the problem persists, see “Reporting OSA/SF Problems to IBM” on page 143.

IOAx058E File open failed for

file

Explanation: An attempt to open the data set *fff...fff* failed.

User response: If you are trying to write the data set,

- Verify there is enough space available on the volume and in the VTOC.

If you are trying to read the data set, verify that:

- The data set descriptors are correct
- The data set exists
- The data set is catalogued to the system
- No I/O errors occurred

- The integrity of the data set by using another approach: for example; try to browse the data set with TSO.

For both read and write,

- Reference the open failure messages that should come back to the session having the problem.
- Check the system log (probably with the help of the system programmer) for details of what failed.

Hint: Use another method of access for the data set, such as TSO BROWSE, to verify the data set's integrity.

If the problem persists, see "Reporting OSA/SF Problems to IBM" on page 143.

IOAx059E File close failed for
 #####

Explanation: An attempt to close data set *fff...fff* failed.

User response: See "Reporting OSA/SF Problems to IBM" on page 143.

IOAx060E File read failed from
 #####

Explanation: An attempt to read file *fff...fff* failed.

User response: Verify that:

- The data set descriptors are correct
- The data set exists
- The data set is catalogued to the system
- No I/O errors occurred
- The integrity of the data set by using another approach: for example; try to browse the data set with TSO.

Then retry the command. If the problem persists, see "Reporting OSA/SF Problems to IBM" on page 143.

IOAx061E Delete of file failed

Explanation: An attempt to delete a data set failed. A command was issued to replace a data set. Before the data set can be replaced, the existing data set must be deleted.

User response: Verify that the data set exists and is cataloged. Verify that no other user or function has the data set allocated, including from another image. Retry the command. If the problem persists, see "Reporting OSA/SF Problems to IBM" on page 143.

IOAx062E IOAx062E File %s failed

Explanation: A file operation has failed during execution of an OSA/SF command. The following may replace the %s: write, open, or read. Based upon the operation which has failed, refer to the message explanation/user response from the following OSA/SF

messages: Write - IOAx057E; Open - IOAx058E; Read - IOAx060E.

User response: Dependent upon the operation which has failed, from the appropriate message

See "Reporting OSA/SF Problems to IBM" on page 143.

IOAx063E Cannot do a PUT file for sss...sss

Explanation: A Put File operation was attempted to the OSA/SF message log file. This is a protected OSA/SF file. It cannot be over-written.

User response: Information in the message log data set cannot be altered by the user. If you want a copy of the message log file, and then modify the copy, enter the OSA/SF Get Debug command to get a copy of the message log. The new data set name for the copy can not match the message log data set name.

IOAx064E Dataset specified for STARTUP PROFILE not found

Explanation: During the start up of OSA/SF the data set name IOAPROF, which was allocated during OSA/SF set up, was not found or could not be opened.

User response: Verify that the data set ID specified for filename IOAPROF in the OSA/SF startup procedure has been previously allocated and cataloged. See **Setting Up OSA/SF** in Chapter 2. If all set up instructions were completed properly and the problem persists, see "Reporting OSA/SF Problems to IBM" on page 143.

IOAx065E Filename specified xxxxx, is incorrect

Explanation: Too many characters, or characters that are not, valid were entered in the file name xxxxx or its extension.

User response: Use a valid file name and extension.

IOAx066I File error code xxxxxxxx; Last operation yyyyyyy

Explanation: This message contains information to help diagnose an error which occurred during a file operation. It is for the user's information and OSA/SF debug purposes only.

User response: Try to determine the file error based upon the information in the OSA/SF message log.

See "Reporting OSA/SF Problems to IBM" on page 143.

IOAx068I Shutdown footprints %X %s %x

Explanation: This message is for engineering use only. It is created to put foot prints during shutdown

User response: None.

Messages

IOAx081E Cannot allocate working storage

Explanation: OSA/SF cannot obtain the necessary working storage.

User response: Stop OSA/SF, check the region size and increase the region size if necessary. Restart OSA/SF. If the problem persists, see “Reporting OSA/SF Problems to IBM” on page 143.

IOAx084E Unknown op code in caller's request

Explanation: An internal error has occurred in the OSA/SF program.

User response: See “Reporting OSA/SF Problems to IBM” on page 143.

IOAx085E Incorrect length in caller's request

Explanation: An internal OSA/SF error has occurred.

User response: Verify that all API control block length fields are valid. If everything is correct and the problem persists, see “Reporting OSA/SF Problems to IBM” on page 143.

IOAx086E Initialization of OSA/SF attention handler failed

Explanation: A system level name token created during initialization of the OSA/SF was not found by the attention handler code. The attention handler for this OSA/SF was not started.

User response: Shut OSA/SF down for this image and restart it. If the problem persists, see “Reporting OSA/SF Problems to IBM” on page 143.

Common Problems: If this message is accompanied by MSGIOAA090E, verify that the OSA/SF load library, SYS1.SIOALMOD and the runtime library OSA/SF was linked with, are in the PROGXX member.

IOAx087I Terminating attention handler attached processor.

Explanation: The attention handler code for this OSA/SF is being shut down.

User response: None. Normal OSA/SF exit processing continues.

IOAx088I Unexpected attention handler postcode of dddd received

Explanation: The OSA/SF attention handler code received an unexpected post code. The attention is handled and processing continues.

User response: None. OSA/SF operation continues. If the problem continues to reoccur, then see “Reporting OSA/SF Problems to IBM” on page 143.

IOAx089I Attention handler attached processor terminated

Explanation: The attention handler code for this OSA/SF has completed its shut down processing.

User response: None. Normal OSA/SF exit processing continues.

IOAx090W Loading of the OSA/SF attention handler code failed.

Explanation: The attention handler code for this OSA/SF failed to load during initialization of OSA/SF. Attention interrupts from the OSA device will not be processed for this OSA/SF.

User response: OSA/SF will continue to run, but to display interrupts for an OSA, issue the Start Managing command. To resolve the problem, stop OSA/SF in this image and restart it. If the problem persists, see “Reporting OSA/SF Problems to IBM” on page 143.

Common Problems: If this message is accompanied by IOAA086E, verify that the OSA/SF load library, SYS1.SIOALMOD and the runtime library OSA/SF was linked with, are in the PROGXX member.

IOAx100I OSA Support Facility version xxx

Explanation: Self-explanatory. xxx is the version number with BASE or an APAR number appended.

User response: None.

IOAx101I OSA Support Facility initialization started hh:mm:ss

Explanation: Self-explanatory.

User response: None. OSA/SF is in the process of starting. Wait for message IOAx102I to be issued.

IOAx102I OSA Support Facility initialization completed hh:mm:ss

Explanation: Self-explanatory.

User response: None. OSA/SF operations and commands can now be processed. The GUI interfaces can now be established.

IOAx103I OSA Support Facility terminated at hh:mm:ss

Explanation: The OSA/SF successfully stopped at the specified time. Before you can issue another OSA/SF command, you must re-start OSA/SF.

User response: None.

IOAx104E OSA/SF internal error. Could not spawn task *ttttttt*

Explanation: An attempt to start the OSA/SF task, *ttttttt*, failed. An internal OSA/SF error has occurred.

User response: See "Reporting OSA/SF Problems to IBM" on page 143.

IOAx105E *hh:mm:ss* Unrecognized command *cc* was entered by *uuuu* on *sssss*

Explanation: An unknown command, *cc*, was sent to OSA/SF by the API interface. *uuuu* is the userid issuing the command. *sssss* is the system name.

User response: If you are not calling OSA/SF at the API or using your own EXEC, see "Reporting OSA/SF Problems to IBM" on page 143.

If you are calling the API or using your own EXEC to call IOACMD.EXEC, then verify that the command code in the API control block structure is correct, and then retry the command. If the condition persists, see "Reporting OSA/SF Problems to IBM" on page 143.

IOAx106E Improper syntax was used in command

Explanation: An API interface command, the Put File command, and the Get Debug command are all possible sources of a command that is not in the required format (syntax). The command was not executed.

User response: The following are some common reasons for this message:

- Verify the command syntax in the API control block if the API interface was used. Especially check the command target and the command identifier.
- If the Put File command was used, check that a data set name was passed as part of the command, that it is valid, and that the data set name is catalogued to the system.
- If the Get Debug command was used, especially for the SNA message file, the SNA trace file, or an SNA member, double check that the data set name was passed as part of the command, that it is valid, and that the data set name is catalogued to the system.

Then retry the command that cause the message to be issued.

IOAx107E Incorrect block length passed on the command

Explanation: The command was issued from the API interface. The command requires more parameters than OSA/SF received.

User response: Check the amount of data passed on input along with the length indication given. Verify the API command control block structure. (Refer to the control block section for the command control block

structure.) Then retry the command that received the message.

IOAx108E *hh:mm:ss* *userid* on system not authorized to use *command*

Explanation: *userid* has attempted to issue a command (*command*) and does not have the proper user access authority. See "Planning to Control OSA/SF User Access (RACF)" in the OSA publication.

User response: Check with your system administrator to coordinate the user access authority for this *userid* with this command.

IOAx109E File allocation error. Error code *eeee* info code *iii*

Explanation: OSA/SF internal code attempted to allocate a data set using the DYNALLOC macro. The allocation failed.

- *eeee* - Error code from the DYNALLOC macro
- *iii* - Information code from the DYNALLOC macro

User response: For information on the two codes, refer to the DYNALLOC macro in *MVS/ESA Programming: Authorized Assembler Services Guide*.

IOAx110I Notice - Shut down complete

Explanation: The sub-components of OSA/SF have all successfully ended.

User response: None.

IOAx111I OSA/SF task *ttttttt* not terminated

Explanation: An OSA/SF sub-task (*ttttttt*) has not terminated within the time limit. OSA/SF will still terminate.

User response: OSA/SF has issued this warning message for self-documentation and an audit trail. No action is required unless other messages indicate that a call to the IBM Support Center is necessary in which case this message should be reported.

IOAx112W OSA/SF is shutting down. You will be disconnected

Explanation: This message is sent to any *user_ID* that is currently waiting for a response while OSA/SF is terminating.

User response: Check with your system administrator as to why OSA/SF on this host was shut down.

IOAx113I Waiting for *ttttttt* to terminate

Explanation: OSA/SF is waiting for internal task *ttttttt* to terminate. This message is part of normal OSA/SF shutdown.

Messages

User response: None. Normal OSA/SF shutdown will resume shortly.

IOAx114I *ttttttt* has terminated

Explanation: As part of OSA/SF shutdown, task *ttttttt* has ended. This message is part of a normal OSA/SF shutdown.

User response: None. Normal OSA/SF shutdown continues.

IOAx115E **This OSA/SF level does not support the configuration for CHPID *cc***

Explanation: The installed mode on OSA CHPID *cc* is at a different level than is supported by this version of OSA/SF.

User response: Ensure that the version of OSA/SF that has been started on this system is at the required level for the mode installed on the OSA. See the OSA publication for detailed information about needed version-release levels for OSA mode support.

IOAx116E **A copy of OSA/SF is already running. Start OSA/SF not completed**

Explanation: An attempt was made to start a second copy of OSA/SF in this image; a copy of OSA/SF is already running. The second copy of OSA/SF was not started.

User response: Verify that a copy of OSA/SF is running. Only one copy of OSA/SF can be running on an image at a time. See Chapter 2 for more information on OSA/SF start-up.

IOAx118I **Inx Comp Type ID Address Time**

Explanation: This is the header information for the OSA/SF trace table dump. The information from the trace table dump is used by IBM for problem determination. The field headings are:

- Inx - The Trace entry number
- Comp - Component that inserted the trace entry
- Type - A reference indicator to point to the location in the source code
- ID - Identifies which task was active when the entry was put into the trace table
- Address - The address in memory where the entry resides
- Time - Time stamp in hours, minutes, and micro-seconds.

User response: Save the trace table dump output, see "Reporting OSA/SF Problems to IBM" on page 143.

IOAx119E **No trace table available**

Explanation: A Get_Debug operation was attempted and no trace table was found. A trace table should always be available. An internal OSA/SF error has occurred.

User response: See "Reporting OSA/SF Problems to IBM" on page 143.

IOAx120I **OSA Support Facility terminated**

Explanation: OSA/SF has completed its shutdown sequence.

User response: None. Normal OSA/SF termination is complete.

IOAx121E **The Message Log processing has ended due to an error**

Explanation: This error indicates that the Message Log function had an error and is no longer active. No message logging is currently being done.

User response: To reactivate message logging, OSA/SF must be stopped and restarted. Also, check to see if message IOAx143W was displayed. If so, this problem may have occurred due to a user viewing the message log data set while OSA/SF was trying to write to it.

IOAx123E **OSA/SF load module is not installed in an APF authorized library**

Explanation: In order for OSA/SF to execute, the OSA/SF module must be installed in an authorized partitioned data set (APF authorized). Also, the LE/370 or C/370 run time libraries that are used by the OSA/SF module must also be in APF authorized libraries.

User response: Ensure that all the libraries used by OSA/SF are APF authorized. This includes the partitioned data set that contains the OSA/SF module, and either the C/370 or LE/370 run time libraries, whichever is being used.

IOAx124I *hh:mm:ss domain sss port nn internet address nn*

Explanation: Internal error

User response: See "Reporting OSA/SF Problems to IBM" on page 143.

IOAx125I *hh:mm:ss user_ID on ssssssss issued command ccc...ccc*

Explanation: The user ID *user_ID* on system *ssssssss* issued the command *ccc...ccc* at time *hh:mm:ss*

User response: This message is part of OSA/SF's audit trail. No user action is required.

IOAx126I *hh:mm:ss user_ID cmd*
 ccccccccccccccccccccccc RC=cc
 Reason=rrrr

Explanation: The specified *user_ID* on the system entered the specified command with the resulting return code and reason code.

User response: Look in the OSA/SF message log for previous messages with additional information regarding this condition.

IOAx127I *hh:mm:ss API connection x number y*

Explanation: An APPC connection of type *x* was made to OSA/SF, thus bringing the total of currently active connections to *y*.

User response: None. Normal APPC operation continues.

IOAx128W *hh:mm:ss Reading of OSA device nnnn*
 information failed with RC=cc, reason
 rrr

Explanation: Device *nnnn* has had changes made since the last command was issued.

User response: Make sure no other instance of OSA/SF, the hardware system console (PCE), or hardware management console (HMC) is attempting to communicate with this device. Review the message log for additional messages that will accompany this message. Retry the command. If it fails again, see "Reporting OSA/SF Problems to IBM" on page 143.

IOAx130E *hh:mm:ss APPC call ATBRFA2 RC:*
 aaaaaaa Reason:bbbbbbb

Explanation: An error occurred from APPC for a call to ATBRFA2. See the APPC manuals for more information on the return codes and reason codes.

aaaaaaa = return code

bbbbbbb = reason code

User response: Refer to *SAA: Common Programming*, SC26-4399, and *Application Development: Writing Servers for APPC/MVS*, GC28-1070, for return code, reason code, and more information. If the condition can not be corrected after reviewing the APPC manuals, then see "Reporting OSA/SF Problems to IBM" on page 143.

Common Problems: There can be several symptoms associated with this message code. The following represents the most common:

- SOC4 ABEND during startup of OSA/SF. Also the message log contains the following error: is APPC call ATBRFA2 RC: ATBCTS_REQUEST_UNSUCCESSFUL ATBCTS_INVALID_LOCAL_LU: Verify the TP profile VSAM dataset has been created and cataloged. Verify that APPC was started prior to starting OSA/SF.
- IOACMD returns:

IOACMD: Incorrect command code returned from call to OSA/SF

IOACMD: Command issued failed with rc 16

IOACMD: Call to OSA/SF never worked

IOACMD: This usually occurs when the OSA/SF code has been

IOACMD: updated, but the copy running has not been refreshed

Verify that the load library, SYS1.SIOALMOD and the runtime library that OSA/SF was linked with, are in the User's TSO LOGON PROC.

- APPC call ATBCTS RC: ATBCTS_REQUEST_UNSUCCESSFUL ATBCTS_NOT_AUTH_TO_LOCAL_LU From console, issue: **D APPC,LU,ALL** and verify the following:

1. Do you see any LU defined with "BASE=YES"? The IOASERV LU doesn't have to be the one defined as a BASE but at least one LU must be defined.

2. Do you see: "LLUN=IOASERV"? If, by convention, you do not use the name IOASERV, there must be a corresponding statement put in the Startup Profile, SET APPC NAME luname. This luname must match the name defined in the ACBNAME for APPC. If so,

- a. Does it show: "SCHED=*NONE"?

- b. Does it show: "STATUS=ACTIVE"?

- APPC is failing, however, all of the above symptoms have been verified. If you are using an OEM security product, verify that APPC is an authorized facility and the USERID has sufficient authorization to use it. Security violations from an OEM product may not be found in the message log.

IOAx131E *hh:mm:ss APPC call ATBRAL2*
 RC=aaaaaaa Reason:bbbbbbb

Explanation: This indicates an error from APPC for a call to ATBRAL2. See the APPC manuals for further explanation of the return code and reason code.

aaaaaaa = return code

bbbbbbb = reason code

User response: Refer to *SAA: Common Programming*, SC26-4399, and *Application Development: Writing Servers for APPC/MVS*, GC28-1070, for return code, reason code, and more information. If the condition can not be corrected after reviewing the APPC manuals, then see "Reporting OSA/SF Problems to IBM" on page 143.

IOAx132E *hh:mm:ss APPC call ATBRAL2*
 RC=aaaaaaa Reason:bbbbbbb

Explanation: This indicates an error from APPC for a call to ATBRAL2. Look at the APPC manuals for explanation of the return code and reason code.

aaaaaaa = return code

bbbbbbb = reason code

User response: Refer to *SAA: Common*

Messages

Programming, SC26-4399, and Application Development: Writing Servers for APPC/MVS, GC28-1070, for return code, reason code, and more information. If the condition can not be corrected after reviewing the APPC manuals, then see “Reporting OSA/SF Problems to IBM” on page 143.

IOAx133E *hh:mm:ss APPC call ATBURA2*
RC=aaaaaaa Reason:bbbbbbb

Explanation: This indicates an error from APPC for a call to ATBURA2. See the APPC manuals for explanation of the return code and reason code.

aaaaaaa = return code
bbbbbbb = reason code

User response: Refer to *SAA: Common Programming, SC26-4399, and Application Development: Writing Servers for APPC/MVS, GC28-1070, for return code, reason code, and more information. If the condition can not be corrected after reviewing the APPC manuals, then see “Reporting OSA/SF Problems to IBM” on page 143.*

IOAx134E *hh:mm:dd cmrcv return code error*

Explanation: An APPC **CMRCV** function call error has occurred. The data displayed after this message will show the reason for the failure.

User response: Refer to *SAA: Common Programming, SC26-4399, and Application Development: Writing Servers for APPC/MVS, GC28-1070, for return code, reason code, and more information. If the condition can not be corrected after reviewing the APPC manuals, then see “Reporting OSA/SF Problems to IBM” on page 143.*

IOAx135E *hh:mm:ss cmsend return code error*

Explanation: An APPC **CMSEND** function call error has occurred. The data displayed after this message will show the reason for the failure.

User response: Refer to *SAA: Common Programming, SC26-4399, and Application Development: Writing Servers for APPC/MVS, GC28-1070, for return code, reason code, and more information. If the condition can not be corrected after reviewing the APPC manuals, then see “Reporting OSA/SF Problems to IBM” on page 143.*

IOAx136E *hh:mm:ss cmsdt return code error*

Explanation: An APPC **CMSDT** function call error has occurred. The data displayed after this will show the reason for the failure.

User response: Refer to *SAA: Common Programming, SC26-4399, and Application Development: Writing Servers for APPC/MVS, GC28-1070, for return code, reason code, and more information. If the condition can not be corrected after*

reviewing the APPC manuals, then see “Reporting OSA/SF Problems to IBM” on page 143.

IOAx137E *hh:mm:ss cmptr return code error*

Explanation: An APPC **CMPTTR** function call error has occurred. The data displayed after this will show the reason for the failure.

User response: Refer to *SAA: Common Programming, SC26-4399, and Application Development: Writing Servers for APPC/MVS, GC28-1070, for return code, reason code, and more information. If the condition can not be corrected after reviewing the APPC manuals, then see “Reporting OSA/SF Problems to IBM” on page 143.*

IOAx138I **APPC call to aaaaaaaa failed with**
ss

Explanation: This displays the return code text for the failure that occurred in the function indicated.

aaaaaaa = APPC function
ss = return code text

User response: Refer to *SAA: Common Programming, SC26-4399, and Application Development: Writing Servers for APPC/MVS, GC28-1070, for return code, reason code, and more information. If the condition can not be corrected after reviewing the APPC manuals, then see “Reporting OSA/SF Problems to IBM” on page 143.*

IOAx139E *mm/dd/yy hh:mm:ss OSA/SF failed to start due to error nn*

Explanation: The OSA Support Facility failed to start for the reason listed below.

- *mm/dd/yy hh:mm:ss* are the date and time stamp
- *nn* is the value that represents what area of OSA/SF had the error.

All Errors after error 4 are also recorded in the message log. Error numbers 6, 8, and 9 have additional information in the message log.

The following is a list of possible error numbers and their meaning:

- 1 - SVM error
- 0 - Reserved
- 1 - Trace table initialization
- 2 - File command error
- 3 - Startup profile parser
- 4 - Startup profile parser open log file
- 5 - System console error
- 6 - SCC error (see message log)
- 7 - Data manager failure
- 8 - OSA/SF interrupt handler error (see message log)
- 9 - APPC error (see message log)
- 10 - Missing startup profile data sets

- 11 - Startup profile data set name error
- 12 - Startup profile data set UNIT/VOLSER error
- 13 - Missing Message Log data set name
- 14 - Message Log data set allocation failed

If any of the failures occur before the message log is created, all the messages that were intended for the message log will be displayed on the system console.

User response: When OSA starts, it attempts to open and use the user-defined message log (IOAMSG.inn where *nn* is the image number where OSA is being run. If IOAx139E prevents OSA from initializing, the message log used to determine the problem may be shown as IOAMSG without .inn appended to it. When attempting to look in the message log to determine the cause of the failure, check for both message log filenames.

Use the above list of error numbers to isolate the failure. Correct the problem, if possible.

For error number 2, be sure that the APPC started task is started prior to OSA/SF.

For error number 7, if this is a VM operating system and MVS is running as a guest, verify that VM is authorized to put OSA/SF in the VM guest's directory. Also, if this is not a new installation of OSA/SF, it's possible that the channel files were corrupted. Find the channel files (HLQ.@CECNAME.#CHP.INFO) and delete them. Startup OSA/SF (the channel files will be dynamically created by OSA/SF).

For error number 14, check for the following common problems:

1. IOAMSG (message log) is defined in STARTUP PROFILE with an invalid data set name.
2. IOAMSG should not be cataloged on the system.
3. IOAMSG (message log) is RACF protected and OSA/SF does not have authority. (Check JES job log for violation errors.)
4. OSA/SF was linked with one version of C library and executed under another version because of LNKLIST or incorrect STEPLIB.

Stop and restart OSA/SF. If the nature of the problem is unknown or persists, see "Reporting OSA/SF Problems to IBM" on page 143.

IOAx140I *hh:mm:ss API APPC component ended*

Explanation: Informational message to track that the API of the APPC component terminated.

User response: None. Normal APPC termination continues.

IOAx141I *hh:mm:ss API APPC component started*

Explanation: Informational message to track that the API of the APPC component has activated.

User response: None. Normal APPC activation continues.

IOAx142E *Message file ffffffff error nn*

Explanation: An error occurred attempting to open the message log data set.

- ffffffff - Message log data set name
- nn - The value is used by IBM service.

User response: This message will occur after a predetermined number of opens were attempted. If the value of *nn* is 45 or 61, check to see if this data set is open by a user or another program, including users and programs in other images. If the data set is open, it must be closed before the message log data set can be opened by OSA/SF.

If the value of *nn* is neither 45 nor 61, then see "Reporting OSA/SF Problems to IBM" on page 143.

IOAx143I *hh:mm:ss API COMM component ended*

Explanation: The COMM component is the APPC component which handles the individual API connection. This message is issued as part of the normal system shutdown sequence.

User response: None. The API COMM component has ended normally. The shutdown sequence continues.

IOAx144I *hh:mm:ss ALL OSA devices initialized*

Explanation: This is an OSA/SF startup message. OSA/SF has made the internal connection with all OSA CHPIDs and OSAD (X'FE') unit addresses.

User response: None. Normal OSA/SF initialization continues.

IOAx145W *hh:mm:ss Only x of y OSA devices initialized*

Explanation: Of the total number of OSAs, *y*, known to the channel subsystem only *x* were successfully initialized.

User response: Check the preceding entries in the message log to determine why the remaining device numbers could not be initialized.

The following items should be checked:

- Check OSA definitions in the IODF/IOCDS
- Verify channel and diagnostic devices (X'FE') are online.
- Verify that the OSA device addresses are online.

Messages

Stop OSA/SF, correct any problems, then restart OSA/SF. If the remaining OSA devices still do not initialize, see “Reporting OSA/SF Problems to IBM” on page 143.

IOAx146E *hh:mm:ss* **No OSA devices were initialized**

Explanation: None of the OSA devices found in the channel subsystem could be initialized. Additional messages in the message log explain why the devices were not initialized.

User response: Check the message log to determine why the OSA devices could not be initialized.

Check the following items:

- Check OSA definitions in the IODF/IOCDS
- Verify channel and diagnostic devices (X'FE') are online.
- Verify that the OSA device addresses are online.

Stop OSA/SF, correct any problems, then restart OSA/SF. If the OSA devices still do not initialize, see “Reporting OSA/SF Problems to IBM” on page 143.

IOAx147E **Bind socket error in port *nn***

Explanation: Internal error

User response: See “Reporting OSA/SF Problems to IBM” on page 143.

IOAx149I *hh:mm:ss* **Interrupt handler component ended**

Explanation: This message is issued as part of OSA/SF shutdown. The interrupt handler component has ended normally.

User response: None. Normal OSA/SF shutdown continues.

IOAx150I *hh:mm:ss* **Interrupt handler component started**

Explanation: This message is issued as part of normal OSA/SF initialization. The interrupt handler component has started.

User response: None. Normal OSA/SF initialization continues.

IOAx151E **SVM return code received was not valid**

Explanation: An internal OSA/SF error has occurred.

User response: See “Reporting OSA/SF Problems to IBM” on page 143.

IOAx152I **Finished OSA/SF startup profile processing**

Explanation: This message is a part of normal OSA/SF initialization. The OSA/SF Startup Profile is a data set that is pointed to from the DD card IOAPROF within the OSA/SF Started Procedure (task). See Chapter 3, “Setting Up OSA/SF on z/OS,” on page 55 for more information about the OSA/SF startup profile.

User response: None. Normal OSA/SF initialization continues.

IOAx153I **Processing of OSA/SF startup profile started**

Explanation: This message is a part of normal OSA/SF initialization. The OSA/SF Startup Profile is a data set that is pointed to from the DD card IOAPROF within the OSA/SF Started Procedure (task). See Chapter 3, “Setting Up OSA/SF on z/OS,” on page 55 for more information about the OSA/SF startup profile.

User response: None. Normal OSA/SF initialization continues.

IOAx154E **STARTUP.PROFILE SET NAME *ssssss* has duplicate *uuuuuu* parm**

Explanation: A duplicate UNIT or VOLSER keyword was found after the SET NAME command *ssssss* in the OSA/SF startup profile. OSA/SF initialization has terminated.

- *ssssss* - One of the SET NAME entries in the OSA/SF startup profile; for example, IOAINX, IOACFG, IOAMSG, IOADSN, and so on.
- *uuuuuu* - Will be either UNIT or VOLSER

User response: Delete one of the duplicate UNIT or VOLSER entries in the *ssssss* SET NAME entry.

The OSA/SF Startup Profile is a data set that is pointed to from the DD card IOAPROF within the OSA/SF Started Procedure (task). See Chapter 3, “Setting Up OSA/SF on z/OS,” on page 55 for more information about the OSA/SF startup profile.

IOAx155I *hh:mm:ss* **Startup profile command *ssss***

Explanation: This message is issued as part of the OSA/SF start-up message series.
ssss = the OSA/SF startup profile command that is going to be processed.

User response: None. Normal OSA/SF start-up continues.

IOAx156E **Unknown command in dataset STARTUP.PROFILE at line *dd***

Explanation: This message is a part of OSA/SF initialization. In the OSA/SF startup profile, a command

at line *dd* is not valid. OSA/SF initialization did not complete.

User response: In the OSA/SF startup profile, a member in the IOAPROF data set of the OSA/SF started procedure, check the specified line and correct it. Refer to Chapter 3, "Setting Up OSA/SF on z/OS," on page 55 for more information about the OSA/SF startup profile and for what commands are valid. Then restart OSA/SF.

IOAx157E Incorrect number of parameters on 'SET' command in STARTUP.PROFILE

Explanation: The SET command was found in the OSA/SF startup profile but the number of parameters to support the SET command is not correct. OSA/SF initialization did not complete.

User response: Check the parameters on each of the SET commands in the OSA/SF startup profile. The OSA/SF Startup Profile is a data set that is pointed to from the DD card IOAPROF within the OSA/SF Started Procedure (task). Refer to Chapter 3, "Setting Up OSA/SF on z/OS," on page 55 for more information about the OSA/SF startup profile and the SET commands. Correct the OSA/SF startup profile then restart OSA/SF.

IOAx158E Incorrect parameter *ssss* on 'SET' command in STARTUP.PROFILE

Explanation: Parameter *ssss* on one of the SET commands in the OSA/SF startup profile is not correct. OSA/SF initialization terminates.

- *ssss* - Parameter keyword in SET command that is not valid

User response: Locate the incorrect parameter in the OSA/SF startup profile and correct it. Restart OSA/SF. The OSA/SF Startup Profile is a data set that is pointed to from the DD card IOAPROF within the OSA/SF Started Procedure (task). See Chapter 3, "Setting Up OSA/SF on z/OS," on page 55 for more information about the OSA/SF startup profile.

IOAx159E SET ALIAS in STARTUP.PROFILE has incorrect number of parameters

Explanation: In the startup profile for OSA/SF, the SET ALIAS keyword has an incorrect number of parameters. OSA/SF initialization has terminated.

User response: Check the OSA/SF startup profile and locate the Set Alias command. It must contain 2 parameters. Any other number of parameters will cause this error. For example: "SET ALIAS CECNAME SYS1" contains the correct number of parameters; in this example, CECNAME and SYS1. Correct the OSA/SF startup profile and restart OSA/SF. The OSA/SF Startup Profile is a data set that is pointed to from the DD card IOAPROF within the OSA/SF Started Procedure (task). See Chapter 3, "Setting Up OSA/SF on z/OS," on page

55 for more information about the OSA/SF startup profile.

IOAx160E STARTUP.PROFILE requires *cecname/sysname* before SET NAME command

Explanation: In the OSA/SF startup profile, the OSA/SF Set Alias command, either the *cecname* or the *sysname* parameter was missing or was in the wrong location. It must be specified before the OSA/SF Set Name command. OSA/SF initialization has terminated.

User response: Locate the Set Alias command in the OSA/SF startup profile. Make sure it proceeds all the Set Name commands. The OSA/SF Startup Profile is a data set that is pointed to from the DD card IOAPROF within the OSA/SF Started Procedure (task). Refer to Chapter 3, "Setting Up OSA/SF on z/OS," on page 55 for more information about the startup profile.

Correct the startup profile, then restart OSA/SF.

IOAx161E Incorrect parm *ssss* after SET NAME *IOAx* in STARTUP.PROFILE

Explanation: The specified parameter, *ssss*, in the Set Name command of the OSA/SF startup profile, is not valid.

- *ssss* - Parameter that is in error
- *IOAx* - The Set Name command containing the incorrect parameter, where *IOAx* can be any of the IOA-group sets such as IOAINX, IOADSN, IOACFG, and so on in the OSA/SF startup profile.

User response: Check the startup profile for OSA/SF. Locate the Set Name command. Make sure all the parameters are correct. Correct the startup profile then restart OSA/SF. The OSA/SF Startup Profile is a data set that is pointed to from the DD card IOAPROF within the OSA/SF Started Procedure (task). See Chapter 3, "Setting Up OSA/SF on z/OS," on page 55 for more information about the OSA/SF startup profile.

IOAx162E IOAPROF incorrect ALIAS in DATASET *ssssssss*

Explanation: The only aliases allowed in the OSA/SF startup profile (IOAPROF) are &CECNAME and &SYSNAME. An unknown alias (a variable beginning with an ampersand) has been found. OSA/SF startup has terminated.

- *ssssssss* - Startup profile SET NAME qualifier with error

User response: Locate *ssssssss* in the OSA/SF startup profile. Ensure that only &CECNAME and &SYSNAME are used in the profile. Correct the OSA/SF startup profile, then restart OSA/SF. The OSA/SF Startup Profile is a data set that is pointed to from the DD card IOAPROF within the OSA/SF Started Procedure (task). See Chapter 3, "Setting Up OSA/SF

Messages

on z/OS,” on page 55 for more information about the OSA/SF startup profile.

IOAx163E **STARTUP.PROFILE missing '&' in ALIAS name in DATASET ssssssss**

Explanation: In the startup profile, in the SET NAME command's DATASET keyword, the value following DATASET is missing either the &CECNAME, the &SYSNAME, or the '&'. OSA/SF startup has terminated.

- ssssssss - Startup profile SET NAME qualifier with error

User response: In the OSA/SF startup profile, check the alias name in DATASET ssssssss for a correct '&'. Ensure that only &cecname and &sysname are used in the data set. Correct the startup profile, then restart OSA/SF. The OSA/SF Startup Profile is a data set that is pointed to from the DD card IOAPROF within the OSA/SF Started Procedure (task). See Chapter 3, “Setting Up OSA/SF on z/OS,” on page 55 for more information about the OSA/SF startup profile.

IOAx164E **Missing quote mark after SET NAME ssssssss in STARTUP.PROFILE**

Explanation: The name after the DATASET keyword of the SET NAME command is missing a single quote. OSA/SF initialization has terminated.

- ssssssss - Startup profile SET NAME qualifier with error

User response: In the OSA/SF startup profile, locate the SET NAME command with ssssssss. Following the DATASET keyword, add the missing single quote. Then restart OSA/SF.

The OSA/SF Startup Profile is a data set that is pointed to from the DD card IOAPROF within the OSA/SF Started Procedure (task). See Chapter 3, “Setting Up OSA/SF on z/OS,” on page 55 for more information about the OSA/SF Startup Profile.

IOAx165E **Incorrect qualifier after SET NAME ssssssss in STARTUP.PROFILE**

Explanation: A qualifier in the OSA/SF startup profile DATASET value is not valid. OSA/SF startup has terminated.

- ssssssss - Startup profile SET NAME command with error in supplied value

User response: Locate the data set name specified after the DATASET keyword in the OSA/SF startup profile. Some of the rules for DATASET qualifiers are:

- The first character of any qualifier cannot begin with a numeric character
- All DATASET values can have any number of qualifiers but each qualifier can not exceed 8 characters in length. (The maximum number of characters, however, including periods, can not

exceed 44, except in the IOADSN value where the maximum number of characters can not exceed 26, including periods.)

- DATASET values only need one qualifier (but more are permitted)

Make needed corrections, then restart OSA/SF.

The OSA/SF Startup Profile is a data set that is pointed to from the DD card IOAPROF within the OSA/SF Started Procedure (task). See Chapter 3, “Setting Up OSA/SF on z/OS,” on page 55 for more information about the OSA/SF Startup Profile.

IOAx166E **STARTUP.PROFILE DSN ssssssss has VOLSER but no UNIT**

Explanation: When specifying a VOLSER keyword in the SET NAME command in the OSA/SF startup profile, the UNIT keyword must be specified. The UNIT keyword must proceed the VOLSER keyword. OSA/SF startup has terminated.

- ssssssss - Startup profile SET NAME qualifier with error

User response: In the OSA/SF startup profile, locate the SET NAME command that specified the VOLSER keyword and NOT the UNIT keyword. Correct the condition. Then restart OSA/SF. The OSA/SF Startup Profile is a data set that is pointed to from the DD card IOAPROF within the OSA/SF Started Procedure (task). See Chapter 2 for more information about the OSA/SF startup profile.

IOAx167E **Incorrect ssssss name ffffffff after SET command in STARTUP.PROFILE**

Explanation: The OSA/SF startup profile is not valid. The values specified for either the UNIT or VOLSER keywords are not correct.

- ssssss - will be either keyword *UNIT* or *VOLSER*
- ffffffff - the incorrect value that follows the ssssss keyword

User response: Check the OSA/SF startup profile and correct the value after either keyword VOLSER or UNIT. The value must be specified; blanks are not permitted. Then restart OSA/SF. See Chapter 3, “Setting Up OSA/SF on z/OS,” on page 55 for more details about the OSA/SF Startup Profile UNIT and VOLSER keywords. The OSA/SF Startup Profile is a data set that is pointed to from the DD card IOAPROF within the OSA/SF Started Procedure (task).

IOAx168E **STARTUP.PROFILE command has incorrect length at line dd**

Explanation: In the OSA/SF startup profile, the maximum length of the command is 64 characters. The command at line *dd* is too long. In this context, the OSA/SF startup profile, a "command" is one line in the OSA/SF profile. Only 64 characters are allowed on each

line of the OSA/SF startup profile. Blanks do not count in the total character count. Quote marks and periods do count in the total character count per line. OSA/SF initialization has terminated.

User response: Shorten the command length on line *dd* to 64 or less characters. Then restart OSA/SF.

The OSA/SF Startup Profile is a data set that is pointed to from the DD card IOAPROF within the OSA/SF Started Procedure (task). See Chapter 3, "Setting Up OSA/SF on z/OS," on page 55 for more information about the OSA/SF startup profile.

**IOAx169E STARTUP.PROFILE has same DSN for
 ssssssss and dddddddd**

Explanation: The data set names in two of the SET NAME statements in the OSA/SF startup profile are the same. This is not permitted. OSA/SF initialization is terminated.

- *ssssssss* - The first SET NAME entry
- *ddddddd* - The second SET NAME entry

User response: Change the two entries in the OSA/SF startup profile so that they no longer match. Then restart OSA/SF.

The OSA/SF Startup Profile is a data set that is pointed to from the DD card IOAPROF within the OSA/SF Started Procedure (task). See Chapter 3, "Setting Up OSA/SF on z/OS," on page 55 for more information about the OSA/SF startup profile.

**IOAx170E SET ALIAS aaaaaa in
 STARTUP.PROFILE has already been
 set**

Explanation: The SET ALIAS value for *aaaaaa* has already been declared. Only one SET ALIAS *aaaaaa* value is allowed in the OSA/SF start profile. OSA/SF initialization is terminated.

User response: In the OSA/SF startup profile, remove one of the SET ALIAS *aaaaaa* entries. Then restart OSA/SF.

The OSA/SF Startup Profile is a data set that is pointed to from the DD card IOAPROF within the OSA/SF Started Procedure (task). See Chapter 3, "Setting Up OSA/SF on z/OS," on page 55 for more information about the OSA/SF startup profile.

**IOAx171E STARTUP.PROFILE DSN for ssssssss is
 too long**

Explanation: In the OSA/SF startup profile, the data set name following the DATASET keyword for SET NAME entry *ssssssss* contains too many characters. If the data set name is part of the SET NAME IOADSN entry, the maximum number of characters permitted is 26, including periods. For all other entries, the maximum number of characters is 44, including periods. OSA/SF initialization is terminated.

- *ssssssss* - One of the SET NAME entries in the OSA/SF startup profile; for example, IOAINX, IOACFG, IOAMSG, IOADSN, and so on.

User response: Check the data set name that follows the DATASET keyword in the OSA/SF startup profile for too many characters. Make corrections, then restart OSA/SF. The OSA/SF Startup Profile is a data set that is pointed to from the DD card IOAPROF within the OSA/SF Started Procedure (task). See Chapter 3, "Setting Up OSA/SF on z/OS," on page 55 for more information about the OSA/SF startup profile.

**IOAx172I OSA Support Facility mm/dd/yy
 hh:mm:ss**

Explanation: This message is used as a date and time stamp in the message log. This message serves as a delimiter when looking through the message log to determine what day entries where placed in the message log. It is output by OSA/SF when the 1st command of a particular day is issued. For example, if no commands are issued for 2 days, this message will not show up in the message log until the next OSA/SF command is issued on the 3rd day.

User response: None. Normal OSA/SF operation continues.

**IOAx173I mm/dd/yy hh:mm:ss AutoLog
 component ended**

Explanation: This message indicates the AutoLog component has completed. This should only occur when OSA/SF is stopped.

User response: During normal OSA/SF termination, no user action is required and OSA/SF termination continues. If this message is issued at a time other than normal OSA/SF termination, see "Reporting OSA/SF Problems to IBM" on page 143.

**IOAx174I mm/dd/yy hh:mm:ss AutoLog
 component started**

Explanation: When OSA/SF is being initialized, this message indicates that the AutoLog component is running.

User response: None. Normal OSA/SF initialization continues.

**IOAx175I OSA S/F Communication module
 SOCKET START**

Explanation: Internal error

User response: See "Reporting OSA/SF Problems to IBM" on page 143.

Messages

**IOAx176I OSA S/F Communication module
 SOCKET ENDED**

Explanation: Internal error

User response: See "Reporting OSA/SF Problems to IBM" on page 143.

IOAx177I Listen socket error

Explanation: Internal error

User response: See "Reporting OSA/SF Problems to IBM" on page 143.

IOAx178I Read socket error

Explanation: Internal error

User response: See "Reporting OSA/SF Problems to IBM" on page 143.

IOAx179I Select socket error

Explanation: Internal error

User response: See "Reporting OSA/SF Problems to IBM" on page 143.

**IOAx181E The message log is FULL. A new one
 will be created**

Explanation: The message log has reached its maximum size and a new message log will be created. The log that is full will be named to the name specified in IOAC182I and the new empty message log will be created.

User response: Decide what to do with the renamed message log.

**IOAx182I Backup message log named
 ffffffff.LPnn.Dyyyddd**

Explanation: The message log has reached its maximum size and was renamed as follows:

- ffffffff — The name specified in IOAMSG NAME in the startup profile.
- LPnn — The image number.
- Dyyyddd — The 'D' is hardcoded; 'ddd' is today's date; 'yyy' is the current year.

User response: Decide what to do with the renamed message log. See Chapter 3, "Setting Up OSA/SF on z/OS," on page 55 for more information about the OSA/SF startup profile.

IOAx183E Error renaming file ffffffff

Explanation: A file rename error has occurred for file ffffffff.

User response: Check the file name for proper

naming convention or see the startup profile for the proper IOAMSG name. See Chapter 3, "Setting Up OSA/SF on z/OS," on page 55 for more information about the OSA/SF startup profile.

**IOAx184E STARTUP.PROFILE error reported at
 line dd**

Explanation: You specified an invalid parameter in the set statement in the startup profile at line number *dd*. The previous message for the startup profile will explain the error.

User response: Check for the message prior to this one for the exact error and fix the problem.

**IOAx185I Messages logged to SYSPRINT as
 message log is unavailable.**

Explanation: OSA/SF was unable to get access to the message log file for some reason so is saving the messages which need to be logged in the place defined in the job as the SYSPRINT location. The most likely cause of this error is that a user is accessing (browsing or editing) the message log file.

User response: Determine the cause of the error by using the error code presented in accompanying message IOAC142E. Correct the error.

**IOAx186I Messages were not logged here while
 the message log was unavailable.**

Explanation: This message is presented after OSA/SF has regained access to the message log file. Because messages could not be put into the message log for a period of time, the messages were saved in the area defined as the SYSPRINT location in the job which is used to start OSA/SF. Those messages have not been put into the message log.

User response: To see the missing messages, check the location specified as the SYSPRINT location.

**IOAx201I hh:mm:ss CHPID cc reports a logical
 port state change**

Explanation: A logical port state has changed other than the OSA/SF host program which triggered an alert to OSA/SF which issued this message. The change could have been from an external network manager, a cable pull, a LAN Emulation Server, etc.

User response: Refresh the GUI Tree or Detail channel view to reflect the change and view the current state of the logical ports for the given OSA.

IOAx202I hh:mm:ss CHPID cc reports OSA ready

Explanation: OSA/SF has been signaled that OSA CHPID *cc* has entered the "ready" state. This could occur if the OSA CHPID had been in the "not ready"

state and the condition was corrected.

User response: None. Normal OSA/SF operation continues with CHPID *cc*.

IOAx204I *hh:mm:ss* **CHPID *cc* reports Application area dump alert**

Explanation: An error has occurred in the application code that was installed on the OSA by OSA/SF. A dump was taken by OSA/SF. The OSA and OSA/SF continue to run. The dump is stored in the data set specified by the SET NAME IOADSN statement in the Startup Profile. See Chapter 3, "Setting Up OSA/SF on z/OS," on page 55 for the Startup Profile. The sample name was IOA.&CECNAME;OSASF.

User response: See "Reporting OSA/SF Problems to IBM" on page 143.

IOAx205I *hh:mm:ss* **CHPID *cc* reports an undefined register bit (5)**

Explanation: An internal alert has been received from OSA. This is not an error.

User response: None. Normal OSA/SF operation continues.

IOAx206I *hh:mm:ss* **CHPID *cc* reports an undefined register bit (6)**

Explanation: An internal alert has been received from OSA. This is not an error.

User response: None. Normal OSA/SF operation continues.

IOAx207I *hh:mm:ss* **CHPID *cc* reports an undefined register bit (7)**

Explanation: An internal alert has been received from OSA. This is not an error.

User response: None. Normal OSA/SF operation continues.

IOAx210I *hh:mm:ss* **CHPID *cc* reports Error Log Alert**

Explanation: This is a result of an interrupt from the OSA device. This indicates that an unusual condition requiring immediate host attention has occurred. This message is only issued for an OSA running in SNA mode.

As a result of this condition an error event record has been written to an data set constructed from the SET NAME DATASET IOADSN keyword entry in the OSA/SF startup profile. The data set name is constructed using the IOADSN data set suffixed with "SNA_chpid" and "ERRORLOG".

For example, if the DATASET name for the SET NAME

IOADSN was 'IOA.VOL1.OSASF' and the chpid was 2D, the data set would be 'IOA.VOL1.OSASF.SNA2D.ERRORLOG'.

User response: Save the error log described above, see "Reporting OSA/SF Problems to IBM" on page 143.

IOAx211I *hh:mm:ss* **CHPID *cc* reports Abend Alert**

Explanation: This indicates that the OSA device reported an alert indicating that a non-recoverable error has occurred within an application running on the OSA device. As a result the application has abended. Message IOAC233E will indicate the application and the error code.

User response: The CHPID must be reset for the operation to be resumed. To recover operations, configure the CHPID Offline in all images (CF CHP(nn),OFFLINE) and then back ONLINE (CF CHP(nn),ONLINE).

If using TSO, issue the Get Debug command to save the OSA/SF SNA memory dump. From the GUI, using the Command window, get the SNA memory dump. See "Reporting OSA/SF Problems to IBM" on page 143.

IOAx212E *hh:mm:ss* **CHPID *cc* reports Application Area Startup Failure**

Explanation: The OSA mode failed during initialization.

hh:mm:ss = time of entry
cc = CHPID

User response: From the OSA/SF GUI, do the following to issue the ACTIVATE command.

1. Display the **Configuration** window for the OSA (CHPID).
2. Enter or select the configuration name for the OSA.
3. Select **Configuration** from the menu bar and then select **Activate**.

Note: After the activate you will have to reset the CHPID.

If the problem persists, contact the IBM support center.

IOAx213I *hh:mm:ss* **CHPID *cc* reports Application Area Config. Rejection**

Explanation: A mismatch exists between the OSA mode files and the OSA/SF GUI on OS/2. Message IOAC234E should also be displayed with more information.

hh:mm:ss = time of entry
cc = CHPID

User response: Make sure the latest level of the OSA/SF GUI for OS/2 is installed. See Chapter 11, "Servicing OSA-Express and OSA/SF," on page 145.

Messages

IOAx214I hh:mm:ss CHPID cc reports Diagnostic Completion Report

Explanation: A port diagnostic subcommand has completed. This message is only for information. There is not a problem.

hh:mm:ss = time of entry

cc = CHPID

User response: No response required.

IOAx215I hh:mm:ss OSA mode on CHPID cc is now functional

Explanation: The OSA mode has completed initialization and is ready.

hh:mm:ss = time of entry

cc = CHPID

User response: No response required. Message is for information only.

IOAx216I hh:mm:ss CHPID cc reports Application Area Config. Mod.

Explanation: The OSA's ATM logical, or LAN emulation client (LEC), parameters for configuration were changed during initialization from the ATM network to allow the OSA mode to run. For example, the LAN Emulation Configuration Server (LECS) could have changed the parameters if **Allow LEC automatic configuration** was specified for the logical port in the configuration.

hh:mm:ss = time of entry

cc = CHPID (OSA)

User response: This message is for your awareness. If you want to see the OSA's ATM logical port parameters, do the following from the OSA/SF GUI:

1. Refresh the OSA/SF GUI by selecting **View** and then **Refresh now** from an OSA Channels window.
2. Double-click on the port number from the **OSA Channels - Tree View** window.

IOAx217I hh:mm:ss CHPID cc reports Device Offline Alert

Explanation: A device has failed or has been stopped.

hh:mm:ss = time of entry

cc = CHPID

User response: Display the **OSA Channels - Details View** on the OSA/SF GUI and look at the **Entry state** for the entries to determine what the current values are.

If one of the entries is **Not Started**, this device is the problem. The device will also go offline to the operating system and will no longer be available for use by the host program.

IOAx218I hh:mm:ss CHPID cc reports a Physical port state change

Explanation: The state of the physical port on the OSA has changed.

hh:mm:ss = time of entry

cc = CHPID

User response: Message IOAC242I will display the state of the physical port.

IOAx219I (timestamp) CHPID nn reports an asynchronous event

Explanation: An unexpected event has occurred in the CHPID named in the message. This message is followed by another giving details of the event that occurred.

User response: See additional messages.

IOAx2yyI hh:mm:ss CHPID cc reports an Undefined Register Bit n

Explanation: *yy*=19 through 32 to indicate messages **IOAC219I** through **IOAC232**. Bit *n* is one digit less than the last two digits (*xx*) in the message ID. Each of these messages reports this internal OSA/SF error at *hh:mm:ss* time for CHPID *cc*.

User response: See "Reporting OSA/SF Problems to IBM" on page 143.

IOAx233E CHPID cc OSA mode xxxxxxxx failed with a code of xxxxxxxx

Explanation: After an application area abend alert is posted from the OSA, this message indicates which CHPID *cc*, OSA mode, and failure code *xxxxxxx* were associated with the application area abend alert. Message IOAC211I should accompany this message.

User response: The CHPID must be reset for the operation to be resumed. To recover operations, configure the CHPID offline in all images, then back online. See "Reporting OSA/SF Problems to IBM" on page 143.

IOAx234E CHPID cc sssss configuration reject code of xx

Explanation: The OSA mode configuration created for this OSA was found to be in error.

cc = CHPID

xx = Hex value of the reject code.

sssss = String describing configuration type.

User response: Try to reactivate the configuration from the Configuration window on the OSA/SF GUI. If the problem persists contact the IBM support center.

IOAx235I Created Dump file ssssssss

Explanation: This message is displayed with message 211. When the alert took place the dump area was read and placed into file ssssssss

User response: OSA/SF automatically gathers problem determination information. In an event of a service need, IBM support will direct you to send this file for detailed analyst.

IOAx236E Dump file ssssssss already exists

Explanation: The file that was to be used to read the dump area into already exist and needs to be renamed or deleted so another dump area can be read.

User response: Rename or erase the filename ssssssss.

IOAx237E Empty Appl. Area Dump Alert request code for CHPID cc

Explanation: The Alert data for the dump area was empty so no dump could be taken.

User response: Call the IBM support center.

IOAx238A hh:mm:ss CHPID cc reports Logical port n sssss

Explanation: The OSA ATM logical port (LAN Emulation Client) parameter, **Client enabled state** changed. This parameter indicates the condition of the OSA's logical port for LAN emulation.

hh:mm:ss = time of entry

cc = CHPID (OSA)

n = Port number

sssss = Disabled by Internal Failure, Disabled by Physical Port, Disabled by OSA/SF, Disabled Externally, Not Defined, LEC Activating, Enabled, or Unknown.

User response: Use this status to determine the state of the logical ATM port (LAN Emulation Client). You can display the port's ATM LAN Emulation Settings by double-clicking on the OSA port number from the OSA Channels - Tree view, or issuing the QUERY command from REXX.

Take any corrective action necessary, based on the information provided in the sssss portion of the message. In some cases the condition may be desirable, based on action already taken, and no further action will be required.

IOAx239I hh:mm:ss CHPID cc reports logical port p changed, REASON=rr

Explanation: This reason code is displayed when the status changes for an OSA ATM port. The state of the port is displayed in message IOAC238I.

hh:mm:ss = time of entry

cc = CHPID

p = Port number

rr = Reason Code

User response: No response required. The reason code is information for IBM support.

IOAx240I hh:mm:ss CHPID cc reports port parameter changed for logical port p

Explanation: An OSA ATM logical port (LAN Emulation Client) parameter changed. This parameter indicates the status of the OSA's logical port for LAN emulation. Message IOAC238I indicates the state of the logical port.

hh:mm:ss = time of entry

cc = CHPID (OSA)

p = Port number

User response: To display the parameter from the OSA/SF GUI, do the following:

1. Refresh the OSA/SF GUI by selecting **View** and then **Refresh now** from an OSA Channels window.
2. Double-click on the port number from the **OSA Channels - Tree View** window.
3. Select the **Emulation** notebook tab and look for **Client enabled state**.

You can view the port parameters by double-clicking on the OSA port number from the **OSA Channels - Tree View** window.

IOAx241I hh:mm:ss CHPID cc had port value v, bytes 4/5 as y are not valid

Explanation: The OSA ATM port parameters were changed, but the data is not valid.

hh:mm:ss = time of entry

cc = CHPID

v = Port value

y = invalid data

User response: Record the information in this message and report the problem to the IBM support center.

IOAx242I hh:mm:ss CHPID cc reports physical port p is sssss

Explanation: The state of the physical port has changed to enabled, disabled, or unknown.

hh:mm:ss = time of entry

cc = CHPID

p = Port number

sssss = Enabled, Disabled, or unknown.

User response: Use the status in the message to determine what to do next. You can display the OSA's physical port parameters by double-clicking on the port number from the **OSA Channels - Tree View** window, and then selecting the Physical notebook tab.

Messages

IOAx250I **A port parameter was changed for port *nnn* on CHPID *nn***

Explanation: A port parameter was changed by a source other than OSA/SF.

User response: See message IOAC251I to determine what port parameter changed, and if you need to take any action.

See “Reporting OSA/SF Problems to IBM” on page 143.

IOAx251I **Port parameter *sssssss* changed for port *nn***

Explanation: The port parameter, *sssssss*, was changed by a source other than OSA/SF.

User response: Determine if any action is necessary based on the parameter that changed.

IOAx252I **The state of *ssssss* port *p* changed on CHPID *cc***

Explanation: The state of *physical* or *logical* port *p* on CHPID *cc* has changed. Message IOAC253I contains the state of the port if it became disabled. Message IOAC260I contains the state of the port if it became enabled.

User response: See the user response for either message IOAC253I or IOAC260I, whichever applies.

IOAx253I ***ssssss* port *p* is disabled with *sssssss***

Explanation: The state of *physical* or *logical* port *p* has changed. The state is one of the following:

1. Internal port failure
2. Port temporarily disabled
3. Support element disabled
4. External disabled
5. Host program disabled
6. Configuration change (N/A for OSD)
7. Link failure threshold.

User response: Do one of the following:

- If the disabled reason is 3, 4 OR 5, enter a command from the SE, with LAN manager, or with OSA/SF, to enable the port. See “Enabling and Disabling Ports” on page 127.
- All other reasons are generated by the CHPID. You can reset the CHPID; this may bring the port online.

IOAx254E **CHPID *nn* rejected a configuration file**

Explanation: CHPID *nn* rejected the configuration file from either a LAN driver or an SNA application.

User response: Check the configuration file for the error. Message IOAC255I contains additional information to help pinpoint the error.

IOAx255I ***sss* field *sss* is in error.**

Explanation: The first value in the message is the configuration file type. This can be:

LAN emulation
Native ATM
Physical ATM
Gigabit Ethernet
Native SNA

The second value (*sss*) tells you what field is in error.

User response: Check validity of values for the specified field in the configuration file. Make corrections and reissue command.

IOAx256W **CHPID *cc* port *pp* reports a configuration change mismatch.**

Explanation: The LAN driver has used a different set of parameter values than those specified in the configuration file.

User response: None required - this is to make you aware of this change. IOAC257I below contains additional information about which field was changed.

IOAx257I ***sss* field *sss* has been changed**

Explanation: The first value in the message is the configuration file type. This can be:

LAN emulation
Native ATM
Physical ATM
Gigabit Ethernet
Native SNA

The second value (*sss*) tells you what field has been changed.

User response: None. This message is for your awareness.

IOAx258I **CHPID *c* reports a discarded message alert**

Explanation: The message buffer for the specified CHPID is full. Some alert conditions may have been lost. This will occur when there is no OSA/SF running and managing the specified CHPID.

User response: Make sure there is always an OSA/SF on one image running and managing each OSA.

IOAx260I *ssssss port p enabled on CHPID c*

Explanation: The *physical* or *logical* port is now enabled.

User response: None.

IOAx261I **An alert condition has occurred for CHPID *nn***

Explanation: This message is to inform you that an alert has occurred on the given CHPID.

User response: Message **IOAC262I** contains the detailed information about this alert.

IOAx262I **CHPID *nn* port *pp* error code=*eeee* severity=*ss***

Explanation: This message provides the details of the alert condition that occurred for the CHPID.

User response: See the following table for a detailed explanation and to determine the action you should take for the error code and severity.

Error Code	Sev	Explanation	User Response
1144	1	Indicates a port number mismatch between a request that was received from the host and the port number saved in the LSA LAN control block at initialization.	Check for errors in the VTAM configuration file.
1400	2	LLC reported that the LAN header is not valid. Alert Category: 2	Contact IBM Support.
1401	2	Unsupported routing information length received from VTAM. Alert Category: 2	Contact IBM Support.
1402	2	User LLC station or service access point (SAP) undefined. Alert Category: 2	Contact IBM Support.
1403	1	VTAM commands received before initialization. Alert Category: 2	Re-activate the XCA Major node. If the problem persists, contact IBM Support.

1404	1	VTAM commands received before LAN adapter enabled. Alert Category: 2	Contact IBM Support.
1405	2	Unsupported VTAM interface header length. Alert Category: 2	Contact IBM Support.
1406	2	Parameter data length not valid. Alert Category: 2.	Contact IBM Support.
1407	2	Network layer identifier not supported. Alert Category: 2.	Contact IBM Support.
1408	2	Identifier type not valid. Alert Category: 2.	Contact IBM Support.
1409	2	Unsupported VTAM interface version. Alert Category: 2.	Contact IBM Support.
140A	2	Padding length not valid in data from VTAM. Alert Category: 2.	Contact IBM Support.
140C	2	Command or response bits not valid for LAN data. Alert Category: 2.	Contact IBM Support.
140D	1	Unsupported function for network management SAP. Alert Category: 2.	Verify that the host is configured for NetView on the SAP. If the problem persists, contact IBM Support.
140E	1	LLC connection not opened by VTAM. Alert Category: 2.	Contact IBM Support.
140F	2	Unsupported LLC options received from VTAM. Alert Category: 2.	Contact IBM Support.
1410	2	Unsupported LLC flow control options received from VTAM. Alert Category: 2.	Contact IBM Support.

Messages

1411	2	Unsupported function request received from VTAM. alert Category: 2.	Contact IBM Support.
1412	1	Received connect request or response before LLC station opened. Alert Category: 2.	Contact IBM Support.
1413	2	Unsupported connection confirmation options received from VTAM. Alert Category: 2.	Contact IBM Support.
1414	1	Received close LLC station response with no request outstanding. Alert Category: 2.	Contact IBM Support.
1803	3	Normal indication if token-ring cable is not connected to access unit or appropriate wall outlet; if token-ring cable is connected, status code might indicate lobe wire fault or defective access unit. Alert Category: 3.	Make sure the Token Ring port is attached to the network. If so, contact IBM Support.
191D	3	An unspecified network error has occurred. Alert Category: 10.	Verify the cable connection to the network. Verify that the correct transceiver type is configured. The adapter device driver will periodically attempt to recover. It will clear the error if recovery is successful. If the problem persists, contact IBM support.

IOAx263I Unknown alert type *sss* was received for CHPID *nn*

Explanation: An alert was received from the OSA feature but it is not an alert that OSA/SF recognizes. Processing is not affected by this alert.

User response: You can ignore the alert or save the log and contact IBM (see "Reporting OSA/SF Problems to IBM" on page 143) for more information.

IOAx264I The state of port *p* is *ssss*

Explanation: The state of the port specified in the message has changed to a state other than enabled or disabled.

User response: None.

IOAx265I Port *p* reports a *ssss*

Explanation: An alert has been received. Message IOAC252I, which precedes this message, defines the CHPID for the alert. There are three values for this message: loss of signal, registration failure, or loss of SAAL connection.

User response: Dependent upon the alert value.

Loss of signal

The most likely cause is an improperly installed or broken cable. Remedy this condition.

Registration failure (ATM only)

The registration was rejected by the ATM switch or the switch is not operational. This is most likely the result of the configuration not matching the configuration of the LES. Fix the configuration and make sure that the required switch is operational. Then enable the port (see "Enabling and Disabling Ports" on page 127).

Loss of SAAL connection (ATM only)

This is set when there is a problem with the communication to the switch. Have your network specialist check the switch connection.

UNKNOWN

This is presented if the LAN driver reports an invalid alert value. Call IBM service if this occurs.

IOAx266I Logical ports associated with physical port *p* have been removed

Explanation: The physical port associated with these logical ports has been disabled for the reason presented in IOAC253I. The logical ports may no longer function when their physical port has been disabled.

User response: None.

IOAx276E A copy of the attention server already exists

Explanation: A copy of the attention server (IOANMAIN) is already attached.

User response: Determine if the other attention server (IOANMAIN) is running.

IOAx277E An incorrect command target was entered

Explanation: An internal error has occurred

User response: See “Reporting OSA/SF Problems to IBM” on page 143.

IOAx278E SNA image for port *pp* does not support this command.

Explanation: The current level of the SNA mode running on the OSA does not support this command.

User response: Apply a new version of the SNA image that supports this command. To help you determine which image to install, do one or more of the following:

- Check RETAIN.
 - Review applicable PTFs.
 - Contact IBM Support Center.
-

IOAx279E Error opening message log data set

Explanation: An error has occurred while processing the Clear Debug command. The message log data set could not be opened.

User response: Verify that the message log data set exists, is catalogued in this image, and is not in use in another image. The message log data set is pointed to by the OSA/SF startup profile entry IOAMSG. Retry the Clear Debug command.

The OSA/SF Startup Profile is a data set that is pointed to from the DD card IOAPROF within the OSA/SF Started Procedure (task). See Chapter 3, “Setting Up OSA/SF on z/OS,” on page 55 for more information about the OSA/SF startup profile.

If the condition continues, see “Reporting OSA/SF Problems to IBM” on page 143.

IOAx280E Error closing file

Explanation: Internal error

User response: See “Reporting OSA/SF Problems to IBM” on page 143.

IOAx281E File already exists

Explanation: A command has been issued against an OSA/SF data set that requires that the OSA/SF data set be rewritten. The data set already exists but the Replace option was not specified on the command.

User response: Reissue the command that received this message specifying the Replace option.

IOAx282E OSAD device does not exist for CHPID *cc*

Explanation: The OSAD device with unit address *X'FE'* associated with the specified CHPID (*cc*) has not been defined.

User response: Perform the following checks and steps:

- Check the I/O definitions in the IODF/IOCDS to ensure an OSAD device (*X'FE'*) has been defined for this CHPID.
 - Update and activate the IODF if necessary
 - Display the CHPID and unit status information for CHPID *cc*
 - Verify the OSAD device is ONLINE
 - Then restart operations on CHPID *cc*
-

IOAx283W ND mismatch occurred on CHPID *cc*

Explanation: A node descriptor (ND) mismatch occurred on the indicated CHPID. This occurs if there has been a change in the hardware associated with the specified CHPID or if the data currently known by OSA/SF has been altered.

User response: Verify that the system is operating correctly and issue the Synchronize command.

IOAx284W OSA/SF internal data has been updated with new ND value

Explanation: The ND value found on the card has been stored internally.

User response: None.

IOAx286E Dataset name was not specified

Explanation: A data set name was not included when the command was issued. The command to be executed requires a data set name. The command did not execute.

User response: Retry the command that received this message specifying a data set name.

IOAx289E CHPID_{nn} does not support this command

Explanation: The command you issued to the specified CHPID is not valid for this type of CHPID.

Messages

User response: Check Chapter 13, “OSA/SF Commands for REXX,” on page 157 to make sure this command is valid.

IOAx290E Internal SNA command error for port *pp*

Explanation: Internal processing error occurred during SNA command

User response: See “Reporting OSA/SF Problems to IBM” on page 143.

IOAx292E Force indicator is required as one or more devices are in use

Explanation: One or more devices, as described in the OAT, are in use. For the Set Parameter command to complete, the FORCE option must be used, but this option was not specified.

User response: Use IOACMD or the GUI to invoke the Set Parameter command with the FORCE option. This will stop all traffic on the target port. To use the GUI, go to the Port Settings notebook, choose Set LAN traffic state (Hardware State for OSA-2), followed by Disable and Force.

IOAx294E OSA configuration data has changed

Explanation: Changes have been made to OSA configuration information since the last command was entered. This can be caused by another OSA/SF in another image with controlling access.

User response: Refresh the GUI or use the Query command to obtain the new configuration information, then retry the command that received this message.

IOAx295E Cannot complete command since CHPID *cc* is in use

Explanation: Another command is currently being processed by this OSA/SF. The command that received this message could not be executed.

User response: Wait a short period of time then retry the command that received the message. If contention continues, check OSA/SF status in each image. Stop and restart OSA/SF if necessary.

IOAx296W Unable to start managing CHPID *cc* for this OSA/SF

Explanation: OSA/SF was unable to start managing this OSA CHPID.

User response: See the command output window, if using the GUI, for more details and additional messages. If using the TSO interface, additional messages will be presented to the TSO screen.

IOAx298W Unable to stop managing CHPID *cc* for this OSA/SF

Explanation: OSA/SF was unable to stop managing this OSA CHPID.

User response: See the command output window, if using the GUI, for more details and additional messages. If using the TSO interface, additional messages will be presented to the TSO screen.

IOAx299I VTAM is not using port *pp*.

Explanation: There is no VTAM currently using port *pp*.

User response: Refresh the port view on the GUI.

IOAx301W Unable to synchronize this CHPID for this OSA/SF

Explanation: Synchronization between the OSA/SF internally stored data and OSA device data failed.

User response: Refer to the message log and the command output window for additional messages. If the cause of the problem can not be located or the problem persists, see “Reporting OSA/SF Problems to IBM” on page 143.

IOAx303E *cccc* is only permitted on a single CHPID

Explanation: The command *cccc* that was issued is restricted to just one channel at a time; that is, multiple channels or ALL are not allowed.

User response: Specify ONE CHANNEL as the command target and retry the command.

IOAx304E CHPID *cc* is not managed by this copy of OSA/SF

Explanation: An OSA/SF command was entered to a copy of OSA/SF that is not managing the OSA channel that was specified in the command.

User response: Try this command from the image in which the managing OSA/SF is running, or enter the command after this OSA/SF becomes the managing facility. Refer to the Start Managing command for more information.

IOAx305E Input value for *ssss* is out of range

Explanation: The input value for a load balancing parameter is out of range. *ssss* is one of the following:

- Session Delay (0-375)
- Load Balancing (0-25)
- Load Balancing Enable (0 or 1)

User response: Enter a value within the specified range.

IOAx306E OSA port type does not match the OSA/SF internal data record

Explanation: Synchronization was attempted to update the card with the OSA/SF internal port data but the port type was not the same as found on the OSA device. This situation can occur if a new OSA was installed that contains different port parameters than the OSA that was originally installed (for example, ports were token ring and are now FDDI).

User response: Check that the correct OSA device was installed. If so, then issue the Synchronize command to store the OSA data into the OSA/SF internally maintained data records.

If an OSA device with different port parameters has been installed, refer to Chapter 11, "Servicing OSA-Express and OSA/SF," on page 145. Also, refer to the OSA publication for a description of mode and port parameters.

IOAx307W Channel offline, only data from OSA/SF returned

Explanation: The channel that the command was directed to is offline to the operating system. The only valid information that OSA/SF could determine was from the OSA/SF internally maintained data. No data from the OSA device is available.

User response: The command requires that the OSA CHPID be online to the operating system. Determine why the channel is offline by issuing the "D M=CHP(nn)" command. Remedy the problem and then retry the command.

IOAx308I CHPID *cc* Port *pp* *ssssssss* has different values

Explanation: For the port on OSA *cc*, a mismatch was detected between the data maintained by OSA/SF on the host system and the value on the OSA device.

- *pp* - Port number
- *cc* - OSA CHPID number
- *ssssssss* - Description of the port parameter that does not match between OSA/SF and OSA device

User response: Review the message log for additional information regarding the mismatch. If the OSA is determined to be correct, issue the Synchronize command to realign the OSA/SF data sets. If the OSA/SF data sets are determined to be correct, issue the Install command to put the parameters on the OSA. Refer to the Synchronize and Install commands as well as Chapter 11, "Servicing OSA-Express and OSA/SF," on page 145.

Then retry the command that received the message.

IOAx309I CHPID *cc* image *p* UA *uu* *ssssssss* was found to have different values

Explanation: The item indicated was found to have a mismatch between OSA/SF internally maintained data and the value on the OSA.

cc = OSA CHPID
p = image number
uu = Unit Address
ssssssss = Description of item in conflict

User response: Review the message log for additional information regarding the mismatch. The data from the message log should provide help in determining whether the OSA device or the OSA/SF host data sets contain the correct information. If the card is determined to be correct, issue the Synchronize command to realign the OSA/SF data sets. If the OSA/SF data sets are determined to be correct, issue the Install command to put the parameters on the OSA. Refer to the Synchronize and Install commands as well as Chapter 11, "Servicing OSA-Express and OSA/SF," on page 145.

Then retry the command that received the message.

IOAx310W Unable to set parameter for a port on this CHPID

Explanation: The Set Parameters command that was issued contained a parameter that is not valid or that was unable to be set.

User response: See the command output response in the message log for more information.

IOAx312I Station doesn't exist on port *pp*. See message log.

Explanation: A station on port *pp* does not exist. The source SAP *nn*, destination SAP *nn*, and destination MAC address *mmmmmmmmmmmm*, is shown in the message log (IOAMSG).

User response: Refresh the connection view on the GUI.

IOAx313I SAP *nn* is not open on port *nn*

Explanation: The SAP that was open has changed since the last operation.

User response: Refresh the SAP view on the GUI.

IOAx314E Incorrect LAN port parameter ID *iiiiiii*

Explanation: An incorrect LAN port parameter has been specified or the LAN port parameter is not valid for this OSA mode of operation.

iiiiiii = port parameter ID that is not valid

User response: Check the Parameter ID specified with the SET PARM command. If using the GUI, verify

Messages

that the configuration is valid for this OSA mode and OSA device type. Then retry the command that received this message.

IOAx315I OSA/SF internal data has value dddddd

Explanation: This message corresponds to a previous message, IOAK308I, which describes which item OSA/SF found to be mismatched with the channel hardware. A following message, IOAK316I shows the value obtained from the channel.

 dddddd = hexadecimal value OSA/SF has in its internal record

User response: Using the values from messages IOAx308I, IOAx315I, and IOAx316I, determine which data value is correct. The data from the messages should provide help in determining whether the OSA device or the OSA/SF host data sets contain the correct information. If the card is determined to be correct, issue the Synchronize command to realign the OSA/SF data sets. If the OSA/SF data sets are determined to be correct, issue the Install command to put the parameters on the OSA. Refer to the Synchronize and Install commands as well as Chapter 11, "Servicing OSA-Express and OSA/SF," on page 145.

IOAx316I OSA hardware has data value dddddd

Explanation: This message corresponds to a previous message, IOAK308I, which describes which item OSA/SF found to be mismatched with the channel hardware. A previous message, IOAK315I shows the value obtained from the internal OSA/SF data.

 dddddd = hexadecimal value received from the channel

User response: Using the values from messages IOAx308I, IOAx315I, and IOAx316I, determine which data value is correct. The data from the messages should provide help in determining whether the OSA device or the OSA/SF host data sets contain the correct information. If the card is determined to be correct, issue the Synchronize command to realign the OSA/SF data sets. If the OSA/SF data sets are determined to be correct, issue the Install command to put the parameters on the OSA. Refer to the Synchronize and Install commands as well as Chapter 11, "Servicing OSA-Express and OSA/SF," on page 145.

IOAx317E Unable to set the managing image for CHPID cc

Explanation: A Start Managing command was issued to OSA/SF. OSA/SF was unable to set the "managing image" indicator in the specified OSA CHPID. An internal OSA/SF error has occurred.

User response: See "Reporting OSA/SF Problems to IBM" on page 143.

IOAx318E Update to OAT failed due to in use OAT entries

Explanation: An attempt to unassign an OAT entry that is associated with the subchannel was attempted. The unassign attempt was not successful.

User response: OAT entries that are currently in use can not be unassigned. The currently executing applications for those entries that are in use must be UNLOADED from the OSA. Refer to the LANRES mode section for more information. Once the applications have been UNLOADED, then update the OAT.

IOAx319E Update to OAT failed due to in use passthru entries

Explanation: An attempt was made to unassign an OAT entry that is associated with an active device address in the OSA/SF TCP/IP Passthru mode. The device address was in use and cannot be unassigned without the Force parameter.

User response: Retry this command with the Force parameter. USE CAUTION! This is an active TCP/IP Passthru port. The FORCE option will terminate active connections through the port. An alternative action is to stop the use of entries by terminating devices from TCP/IP at the host.

IOAx320E Prime of database did not complete successfully

Explanation: An operation was attempted to copy database records from the OSA and it failed. This indicates that an OSA channel file data set could not be created.

User response: The OSA channel file data sets are pointed to by the LOADSN keyword in the OSA/SF startup profile. Ensure that the OSA/SF startup profile LOADSN keyword is correct and that there is sufficient space on the DASD for the OSA channel file data sets. The OSA/SF Startup Profile is a data set that is pointed to from the DD card IOAPROF within the OSA/SF Started Procedure (task). See Chapter 3, "Setting Up OSA/SF on z/OS," on page 55 for more information about the OSA/SF startup profile. If the condition continues, see "Reporting OSA/SF Problems to IBM" on page 143.

IOAx321I OSA/SF internal data has value dddddd

Explanation: This message corresponds to a previous message, IOAK308I, which describes which item OSA/SF found to be mismatched with the channel hardware. A following message, IOAK322I shows the character string value obtained from the OSA.

 dddddd = character string OSA/SF has in its internal record

User response: Using the values from messages

IOAx308I, IOAx321I, and IOAx322I, determine which data value is correct. The data from the messages should provide help in determining whether the OSA device or the OSA/SF host data sets contain the correct information. If the card is determined to be correct, issue the Synchronize command to realign the OSA/SF data sets. If the OSA/SF data sets are determined to be correct, issue the Install command to put the parameters on the OSA. Refer to the Synchronize and Install commands as well as Chapter 11, "Servicing OSA-Express and OSA/SF," on page 145.

**IOAx322I OSA hardware has data value
 dddddd**

Explanation: This message corresponds to a previous message, IOAx308I, which describes which item OSA/SF found to be mismatched with the channel hardware. A previous message, IOAx321I shows the character string value obtained from the internal OSA/SF data.

ddddddd = character string received from the OSA

User response: Using the values from messages IOAx308I, IOAx321I, and IOAx322I, determine which data value is correct. The data from the messages should provide help in determining whether the OSA device or the OSA/SF host data sets contain the correct information. If the card is determined to be correct, issue the Synchronize command to realign the OSA/SF data sets. If the OSA/SF data sets are determined to be correct, issue the Install command to put the parameters on the OSA. Refer to the Synchronize and Install commands as well as Chapter 11, "Servicing OSA-Express and OSA/SF," on page 145.

**IOAx323W CHPID *cc* OSA OAT and OSA/SF
 internal OAT data are out of sync**

Explanation: The OSA address table (OAT) data and the data maintained by OSA/SF in host data sets for the specified OSA CHPID do not match.

- *cc* - OSA CHPID that is no longer synchronized

User response: Review the message log for additional information regarding the mismatch. The data from the messages should provide help in determining whether the OSA device or the OSA/SF host data sets contain the correct information. If the card is determined to be correct, issue the Synchronize command to realign the OSA/SF data sets. If the OSA/SF data sets are determined to be correct, issue the Install command to put the parameters on the OSA. Refer to the Synchronize and Install commands as well as Chapter 11, "Servicing OSA-Express and OSA/SF," on page 145.

Then retry the command that received the message.

**IOAx324W CHPID *cc* OSA PORT OSA/SF internal
 PORT data are out of sync**

Explanation: The port data maintained by the OSA hardware (CHPID *cc*) no longer matches the internal port data maintained by OSA/SF on the host system. This condition can occur, for example, if a network management program that has access to the OSA has altered the PORT data.

User response: Review the message log for additional information regarding the mismatch. The data from the messages should provide help in determining whether the OSA device or the OSA/SF host data sets contain the correct information. If the card is determined to be correct, issue the Synchronize command to realign the OSA/SF data sets. If the OSA/SF data sets are determined to be correct, issue the Install command to put the parameters on the OSA.

Then retry the command that received the message.

**IOAx325I CHPID *cc* is no longer managed by
 image *pp***

Explanation: CHPID *cc* is no longer managed by image *pp* because a Stop Managing command was entered from this image.

cc = CHPID

pp = image number

User response: No action is required. The Stop Managing command has completed successfully.

**IOAx326I CHPID *cc* is currently managed by
 image *pp***

Explanation: This message was issued during initialization or a Start Managing command.

cc = CHPID

pp = image number

User response: None. Normal OSA/SF initialization or the Start Managing command continue.

IOAx327W ND mismatch occurred on CHPID *cc*

Explanation: An OSA device has been replaced and the physical information from the old card does not match the physical information on the new card. The current and previous physical information are listed in the message log.

cc = CHPID

ND = Node Descriptor

User response: Review the data in the message log. Refer to Chapter 11, "Servicing OSA-Express and OSA/SF," on page 145 for additional information on OSA device replacement.

Messages

IOAx328W No saved configuration file for CHPID *cc*

Explanation: No information about the specified channel was saved while OSA/SF was being refreshed or initialized; that is, the channel file information for CHPID *cc* does not exist or the channel file data set for CHPID *cc* cannot be located.

User response: The channel file data sets are pointed to by the IOADSN entry of the OSA/SF start-up procedure. Ensure that the pointer has not changed and that the DASD volume, pointed to by the volume keyword, is operational. The channel file data set for CHPID *cc* must also be catalogued on the system.

If the channel file data set does not exist, use the VARY command to vary the OSAD device (X'FE') offline, then vary the OSAD device back online. When the OSAD device is brought back online, the channel file data set will be rebuilt. Then stop and start OSA/SF.

IOAx329W Could not write OSA information to file for CHPID *cc*

Explanation: A write error occurred while trying to save information about the specified channel in an OSA/SF data set.

User response: Check the system console for error messages. Verify that the OSA/SF startup profile is valid. Check for other users accessing the data set at the same time. The OSA/SF channel information data sets are pointed to by the SET NAME IOADSN entry in the OSA/SF startup profile. The OSA/SF Startup Profile is a data set that is pointed to from the DD card IOAPROF within the OSA/SF Started Procedure (task). See Chapter 3, "Setting Up OSA/SF on z/OS," on page 55 for more information about the OSA/SF startup profile.

If problems continue, see "Reporting OSA/SF Problems to IBM" on page 143.

IOAx330E Port *pp* on CHPID *cc* is not in the enabled state

Explanation: The specified port must be enabled for LAN traffic (Hardware state for OSA-2) in order for the previous task to complete.

User response: Change the port to **LAN Traffic Enabled** (enabled Hardware State for OSA-2) and retry the command. See "Enabling and Disabling Ports" on page 127.

IOAx333E Port *pp* does not exist on this CHPID

Explanation: A Set Parameters command has been issued specifying a PORT number as part of the command. The OSA targeted by the command does not contain the specified PORT number.

- *pp* - The port number on the OSA that does not exist

User response: Check that the OSA targeted by the command is correct. Verify the number of PORTs on the OSA. From the OSA GUI, the PORT information can be checked from the Channel View window. Reissue the Set Parameters command.

IOAx334E Port is in support element control mode. Operation not allowed.

Explanation: An attempt was made to enable or disable LAN traffic on a port on an OSA. The action cannot be completed because the port on the OSA is in hardware support element control mode.

User response: Using the HMC or the PCE, depending on the hardware configuration, remove support element control mode from the port. Then enable or disable LAN traffic on the port (change Hardware State to enable or disable for OSA-2). See "Enabling and Disabling Ports" on page 127.

IOAx335E Unable to store the current data key in OSA/SF internal data

Explanation: An internal OSA/SF error has occurred during the condition described in the message text.

User response: Stop and restart OSA/SF. If the condition reoccurs, see "Reporting OSA/SF Problems to IBM" on page 143.

IOAx336E Enable of port failed

Explanation: OSA/SF was unable to enable the port specified in the Set Parameters command because the port was disabled externally or the port is not operational.

User response: Check the hardware master console (HMC) or processor control (PCE) for OSA port status and hardware errors. Re-attempt to enable the port if the port is disabled. Contact IBM Service if required.

IOAx340E Incorrect group size *n* specified

Explanation: An incorrect group size was specified in the OSA/SF Put Table command. Passthru device types should each have a group size of 2. Subchannel and SNA device types should each have a group size of 1.
n = group size that was specified

User response: Correct the group size and retry the command that received this message.

IOAx341W Not all *sss* entries stored successfully for CHPID *cc*

Explanation: During a Put OSA ADDRESS TABLE or INSTALL operation, some of the OAT/PVC (indicated by *sss*) entries might or might not have been written to the OSA.

cc = OSA CHPID number

User response: Review the message log for further messages. Each OAT/PVC entry that is not valid should have an explanation. If message IOAx887W is present, that OAT entry was stored to the OSA, but until the same image and UA are defined in the Channel Subsystem, you will not be able to use it for traffic. Issue the Query command to determine which OAT entries were stored on the OSA successfully. If some messages have reason codes associated with them, the codes could be the result of an internal OSA/SF error; reason codes are reserved for IBM use only. For further assistance, see “Reporting OSA/SF Problems to IBM” on page 143.

IOAx342E No sss entries stored successfully for CHPID cc

Explanation: During a Put OAT ADDRESS TABLE or INSTALL operation, none of the OAT/PVC (indicated by sss) entries were written to the OSA.

cc = OSA CHPID number

User response: Review the message log for further messages. Each OAT/PVC entry that is not valid should have an explanation. If some messages have reason codes associated with them, this could be the result of an internal OSA/SF error; reason codes are reserved for IBM use only. For further assistance, see “Reporting OSA/SF Problems to IBM” on page 143.

IOAx343E No OAT slot for this group of input is available

Explanation: This group of OAT entries was not written to the card because there are no free slots on the OSA for the entries specified.

User response: Using the GUI, OSA Configurations, delete some of the defined entries. If using the Put OAT command, delete even-odd pairs of entries that are not in use or set them to UNASSIGNED. Retry the command that resulted in this message.

IOAx345E PVC entry n has incorrect format

Explanation: The PVC data entry specified as n does not have the correct eye-catcher or the correct control block ID.

User response: An internal OSA/SF error occurred. Report the problem to the IBM Support Center.

IOAx346E ffff for PVC name nnnn is out of range

Explanation: One of the following fields as specified by ffff has a value that is not within the allowed range.

- Forward Peak Cell Rate (0-353207)
- Backward Peak Cell Rate (0-353207)
- Forward Max PDU size (64-9188)
- Backward Max PDU size (64-9188)

User response: Enter a value in the range shown for the field in error. The OSA/SF GUI checks these values

on input, if you are using the Set Parameters command, correct the value.

IOAx347E Incorrect image p with UA uu

Explanation: The image number, p, for the unit address (UA) uu is not valid.

User response: Check the OSA unit address and image numbers in the IODF (or IOCDS). Correct the image number and retry the command.

IOAx348E Must set image number to zero for this OAT entry

Explanation: This channel is not a shared channel; that is, it is not a EMIF channel. For a channel that is not shared, only image number 0 can be used for this channel in the command.

User response: Change the image number to 0 and retry the command.

IOAx349E CHPID cc is not online

Explanation: The CHPID cc was found to be offline.

User response: Issue the *D M=CHP(cc)* command to verify the status of the CHPID. If the CHPID is offline, issue the *CF CHP(cc),ONLINE* command to configure the OSA channel online and retry the command.

IOAx350E IP Address iiiiiiiiiiii already used by image p UA uu

Explanation: The IP Address (iiiiiiiiiiiii) specified in a Put OAT operation is already in use by another image.

iiiiiiiiiiiii = IP Address

p = image number

uu = Unit address

User response: If TCP/IP port sharing is desired, the IP addresses must be unique to each image (refer to the OSA publication for more information). Provide a unique IP address for each image and retry the command.

IOAx351W Portions of the Query command failed

Explanation: The Query command completed but not all of the data that was requested was returned.

User response: Explanations of why portions of the data were not returned are interspersed in the output data set from the Query command. Refer to messages in the command output for further information.

IOAx352E Query command failed, no data was returned

Explanation: The Query command did not complete successfully. No output data from the command was returned.

Messages

User response: If using the GUI, refer to the command output window for additional messages. If using the TSO interface, additional messages will be displayed in the query command output data set specified on the TSO command input. If the problem persists, see "Reporting OSA/SF Problems to IBM" on page 143.

IOAx353E Incorrect *ccccccc* target *tttt*

Explanation: The command target or port target for a Query command has an incorrect value.

ccccccc = either command or port

tttt = specified target in hexadecimal notation

User response: This message is issued from the API interface. The target is a field that is passed through the API; that is the target of the command being issued. This field indicates if the command is for: ONE (channel), ALL CHANNELS, or OSA/SF. Refer to the API interface documentation and control block section. Correct the command target or port target and retry the command used with the API interface.

IOAx359E Image *p* UA *uu* has a zero IP address for the default OAT entry

Explanation: The OAT entry specified by image *p* and unit address *uu* was specified as either a primary or secondary default entry. The default entry cannot have an IP address of all zeros.

p = image number

uu = unit address (UA)

User response: A non-zero IP address must be specified. Correct the IP address for the default entry. Reissue the Put OAT or Install command, whichever was used.

IOAx360E *nnn* entries were specified as default OAT entry for port *pp*

Explanation:

nnn number of entries

pp port number

A Put OAT command was issued and more than one OAT entry was specified as the primary or secondary default path for unknown IP packets.

A port can only have one of the following:

- No default entries
- One primary default entry
- Both a primary default entry and a secondary default entry.

User response: Correct the data being used for the Put OAT command. Reissue the Put OAT or Install command, whichever was used.

IOAx361E Current *ddd* default image (image *p* and UA *uu*) missing from input

Explanation: A Put OAT or Install command was issued to add or change OAT entries. The IOACMD EXEC determined that the primary or secondary default entry was missing on the input.

ddd = primary or secondary

p = image (image) number of default router

uu = unit address (UA) of the default router

A port can have one of the following:

- No default entries
- One primary default entry
- Both a primary default entry and a secondary default entry.

User response: Do either of the following:

- Include the missing primary or secondary default indicator to the OAT entry and then reissue the Put OAT or Install command.
- If you want to replace all OAT entries, reissue the Put OAT or Install command and answer Yes when asked if all entries should be replaced.

IOAx362E All *nnn* OAT entries for port *pp* must be specified with port sharing

Explanation: To use TCP/IP port sharing mode, all OAT entries with port *pp* must be specified in the OAT, and all entries must have non-zero Internet Protocol (IP) addresses.

nnn = number of entries

pp = port number

User response: Do the following:

- ___ 1. Include all the OAT entries associated with this port and verify that all entries are non-zero. Change zero IP addresses to valid non-zero IP addresses or delete the entries that contain zero IP addresses.
- ___ 2. If you are using the GUI, follow the instructions in Chapter 7 for TCP/IP Passthru mode and sharing OSA Ports.
- ___ 3. If you are using the REXX interface, issue the Put OAT command to rewrite the OAT.
- ___ 4. Configure the OSA offline and then online to all images.

IOAx365E Unable to clear the OAT table for CHPID *cc*

Explanation: During an Install command or during a Put Table command with the New Table option, OSA/SF attempted to clear the previous OAT table entries. A problem was encountered during the attempt to clear existing OAT table entries for CHPID *cc*.

User response: Check the following:

- ___ 1. Review the OSA GUI message log and command output windows for related messages

- ___ 2. Review the TSO screen for additional messages if using the TSO interface
- ___ 3. If using the API interface, examine the reason code data structure from this operation
- ___ 4. Check the console for error messages.

Retry the command. If the problem continues, see “Reporting OSA/SF Problems to IBM” on page 143.

IOAx366I Disk image loaded, config CHPID *cc* off/on before reissuing INSTALL

Explanation: The code image specified in the IOACFG data set was successfully written to the specified CHPID. The message is now prompting that the CHPID be configured online to activate the code image.

User response: The installation of an OSA mode has successfully progressed to this point. Configure the CHPID offline (CF CHP(nn),OFFLINE) in all images and then back online (CF CHP(nn),ONLINE) to activate the image just written.

IOAx367E *hh:mm:ss uuuuuuuu* on *ssssssss* not authorized to use FORCE option

Explanation: At the specified time, user ID *uuuuuuuu* on system *ssssssss* entered a command with the Force option, which this user ID is not authorized to use.

User response: Reissue the command without the Force option or contact your system administrator to obtain authorization to use the Force option.

IOAx372E Install command failed

Explanation: The Install command failed, or installation procedure failed during initialization of the OSA mode.

User response: Check the following:

- ___ 1. Review the OSA GUI message log and command output windows
- ___ 2. Review the TSO screen for additional messages if using the TSO interface
- ___ 3. If using the API interface, examine the reason code data structure from this operation and take the appropriate action.
- ___ 4. Check the console for error messages.

Retry the command. If the problem continues, see “Reporting OSA/SF Problems to IBM” on page 143.

IOAx373E Trace mask *tt* is out of range. Must be less than *nn*

Explanation: Internal error

User response: See “Reporting OSA/SF Problems to IBM” on page 143.

IOAx376W Unable to allocate file for channel data for CHPID *cc*

Explanation: An error occurred when OSA/SF attempted to dynamically allocate a data set to store the OSA channel file information for CHPID *cc*.

User response: The channel file data sets are built on the DASD volume pointed to by the IOADSN entry of the OSA/SF startup procedure. The OSA/SF Startup Profile is a data set that is pointed to from the DD card IOAPROF within the OSA/SF Started Procedure (task). See Chapter 3, “Setting Up OSA/SF on z/OS,” on page 55 for more information about the OSA/SF startup profile. Ensure that the pointer has not changed and that the DASD volume, pointed to by the VOLUME keyword, is operational. The channel file data sets must also be catalogued on the system.

If the channel file data set does not exist, use the VARY command to vary the OSAD device (X'FE') offline, then vary the OSAD device back online. When the OSAD device is brought back online, the channel file data set will be rebuilt. Then stop and start OSA/SF.

IOAx377E Input Value *dddd* for parameter ID *pppppppp* is out of range

Explanation: The decimal input data *dddd* for a Set Parameter command with hexadecimal parameter ID *pppppppp* is not in the valid range.

User response: Check the parameter and input data and retry this command.

IOAx378I OSA hardware has data value *sss...sss*

Explanation: This message is issued with a previous message, **IOAK308I**, that describes which item OSA/SF found to be mismatched with the channel hardware. Another message, **IOAK379I**, shows the value obtained from the internal OSA/SF data.

sss...sss = hexadecimal value received from the channel

User response: Using the values from messages IOAx308I, IOAx378I, and IOAx379I, determine which data value is correct. The data from the messages should provide help in determining whether the OSA device or the OSA/SF host data sets contain the correct information. If the card is determined to be correct, issue the Synchronize command to realign the OSA/SF data sets. If the OSA/SF data sets are determined to be correct, issue the Install command to put the parameters on the OSA. Refer to the Synchronize and Install commands as well as Chapter 11, “Servicing OSA-Express and OSA/SF,” on page 145.

Messages

**IOAx379I OSA/SF internal data has value
 sss...sss**

Explanation: This message is issued with a previous message, **IOAK308I**, that describes which item OSA/SF found to be mismatched with the internal data. Another message, **IOAK378I**, shows the value obtained from the OSA hardware data.

sss...sss = hexadecimal value received from the channel

User response: Using the values from messages IOAx308I, IOAx378I, and IOAx379I, determine which data value is correct. The data from the messages should provide help in determining whether the OSA device or the OSA/SF host data sets contain the correct information. If the card is determined to be correct, issue the Synchronize command to realign the OSA/SF data sets. If the OSA/SF data sets are determined to be correct, issue the Install command to put the parameters on the OSA. Refer to the Synchronize and Install commands as well as Chapter 11, "Servicing OSA-Express and OSA/SF," on page 145.

**IOAx381I OSA/SF has an OAT entry for CHPID *cc*
 image *pp* UA *uu*, but not the OSA.**

Explanation: The OAT entry exists as specified, but the corresponding OSA hardware is not installed. This message is issued as the result of the synchronize command. As the synchronize command processes the OAT, each time an entry in the OAT does not correspond to the OSA CHPID *cc*, this informational message is issued.

- *cc* - OSA CHPID in OAT
- *pp* - image identified in the OAT
- *uu* - Unit address that does not match the OSA

User response: The synchronize command continues to re-align the internal files with the OSA hardware information. Normal operation continues.

**IOAx382E Port *yy* on CHPID *xx* could not be
 enabled.**

Explanation: The specified port could not be enabled.

User response: Check the message log for additional information. Verify that the port is not disabled from the Hardware Management Console's Advanced Facilities. Try to enable the port from the hardware management console. If the port cannot be enabled, try unplugging the LAN cable from the OSA port and then enable the port. If you cannot enable the port, see "Reporting OSA/SF Problems to IBM" on page 143.

**IOAx383E Port *yy* on CHPID *xx* could not be
 disabled.**

Explanation: The specified port could not be disabled.

User response: Check the message log for additional information. Try to disable the port from the hardware

management console. If you still cannot disable the port, unplug the LAN cable from the OSA port and then try to disable it. If the problem persists, see "Reporting OSA/SF Problems to IBM" on page 143.

**IOAx386E Port *yy* on CHPID *xx* was enabled, but
 the OAT update failed**

Explanation: An internal OSA/SF error has occurred.

User response: Contact the IBM support center. See "Reporting OSA/SF Problems to IBM" on page 143.

**IOAx387E Port *yy* on CHPID *xx* was not disabled
 and the OAT updated failed**

Explanation: A failure occurred while updating the OAT for the specified port. The port state (enabled/disabled) is unchanged.

User response: Check the message log for additional information. If the problem persists, contact the IBM support center. See "Reporting OSA/SF Problems to IBM" on page 143.

**IOAx388E Error detected while writing
 non-volatile storage for CHPID *xx*.**

Explanation: An error was detected while updating non-volatile storage for CHPID (OSA) *xx*.

User response: Check for messages and errors on the hardware management console. If a hardware error is not found, retry the previous task. If the problem persists, see "Reporting OSA/SF Problems to IBM" on page 143.

**IOAx389E Incorrect buffer number *nn* for GET
 ATM TRACE**

Explanation: You entered an incorrect value for the ATM trace buffer.

User response: Valid values are 1–16. See "Reporting OSA/SF Problems to IBM" on page 143.

IOAx390E Not a valid command for CHPID *cc*

Explanation: The command issued cannot be issued against this CHPID because the command is not valid for this type of OSA feature.

User response: Check the command in Chapter 13, "OSA/SF Commands for REXX," on page 157 to see which OSA feature types use this command. Issue the Query command against the OSA if you are uncertain which hardware feature type it is.

IOAx391W Empty trace buffer was found for CHPID *cc*

Explanation: This error occurred because of an OSA SNA image error such that the SNA trace buffer was not created.

User response: Perform a single reinstall of the SNA image on the OSA. If the problem reoccurs after a reinstall, see "Reporting OSA/SF Problems to IBM" on page 143.

IOAx392W Empty message log buffer was found for CHPID *cc*

Explanation: This error occurred because of an OSA SNA image error such that the SNA message log buffer was not created.

User response: Perform a single reinstall of the SNA image on the OSA. If the problem reoccurs after a reinstall, see "Reporting OSA/SF Problems to IBM" on page 143.

IOAx393E OSA CHPID *cc* not set up for SNA

Explanation: A Set Parameter command specifying an SNA option was issued to OSA CHPID *cc* but the licensed internal code installed on this OSA does not support SNA mode.

User response: Install SNA mode on the OSA or correct the Set Parameter command so that SNA options are not specified.

IOAx394E Unknown device type *dd* found in OAT for CHPID *cc*

Explanation: A control block from an API interface contains an unknown device type.

dd - Unknown device type that was encountered

User response: Examine the API input control block. Refer to the control block section for information. Correct the device type entry and reissue the API.

IOAx396W Port data is set in OSA hardware but OSA/SF has different port type

Explanation: The port data specified in the **Set Parameter** command is set in the OSA hardware successfully but OSA/SF internal data shows this port has a different port type.

User response: Issue the Synchronize command to update the OSA/SF internal data. Refer to the Synchronize command for further information. If unable to resolve condition, see "Reporting OSA/SF Problems to IBM" on page 143.

IOAx397W Set command completed but LAN port is in disabled state

Explanation: The Set Parameters command completed, but since the LAN port is in the disabled state, no data transfer can be performed.

User response:

- ___ 1. Enable the port for LAN traffic. See "Enabling and Disabling Ports" on page 127.
- ___ 2. Invoke the REXX QUERY command or refresh the GUI for this port.

IOAx398E Input value for group address entry *nn* is incorrect

Explanation: The group address field is not correct for entry *nn*. This message follows a SET PARM command that has submitted data in which the group address is not valid.

User response: Retry the command specifying the group address according to the following rules.

- For a FDDI LAN attachment, set bits 0 and 1 of each group address to 1.
- For a token-ring LAN and token-ring ATM LAN emulation attachments, set bits 0 and 1 to 1; set bits 2–15 to 0; set bit 16 to 1.
- For an Ethernet LAN and Ethernet ATM LAN emulation attachments, set bits 0–5 to 0; set bits 6 and 7 to 1; set bits 8–15 to 0; set bit 23 to 1.
- For FENET bits 6 and 7 must be 1.

IOAx399I SNA image loaded, config CHPID *cc* off/on to activate loaded image

Explanation: The code image specified in the IOACFG data set was successfully written to the specified CHPID.

cc = CHPID

User response: Configure the CHPID offline in all images and then online to activate the image just written.

IOAx401E UA *uu* specified for image *p* is out of range

Explanation: The specified UA in the OAT entry is out of range. The valid ranges for LANRES configuration is 0 thru 210(X'00' - X'DB'). The valid range for HPDT MPC, HPDT ATM native, SNA and TCP/IP Passthru configurations is 0 thru 253(X'00' - X'FD') where:

uu = Unit Address

p = image Number

User response: Correct the unit address in the input data and reissue the command.

Messages

IOAx402E Write SNA Control Command failed.
Return code *nn*

Explanation: Internal error

User response: See “Reporting OSA/SF Problems to IBM” on page 143.

IOAx403E Input value for address *ssss* is incorrect

Explanation: The input data for a Set Parameter command for the address (*ssss*= functional or MAC) specified is not valid.

User response: Correct the input data and reissue the Set Parameter command. Contact the IBM Support Center for assistance (see “Reporting OSA/SF Problems to IBM” on page 143).

IOAx404E There is no corresponding data found in OSA/SF for this port

Explanation: When executing the Install command, OSA/SF host based data does not have data to correspond to a port on the OSA device. The Install command has found a mismatch between the number of ports on the OSA device and the number of ports for this OSA device as found in the host information data base. The Install command terminates.

User response: This message can be issued if OSA was replaced and now the Install command is being used to update the information on the new OSA. Refer to Chapter 11, “Servicing OSA-Express and OSA/SF,” on page 145.

If the condition can not be corrected, see “Reporting OSA/SF Problems to IBM” on page 143.

IOAx405W CHPID *cc* is shared, but image number is zero

Explanation: In a shared channel (port sharing) EMIF (ESCON Multiple Image Facility) environment, the image number cannot be zero. For OSA CHPID *cc* the image number is zero for one of the port shared entries in the OAT. This message can be issued by either the Put OAT or Install command.

cc = channel path id

User response: Correct any image values in the OAT that are specified as zero for all devices on shared CHPID *cc*. Reissue the Put OAT or Install command, whichever was used.

IOAx406W CHPID *cc* is dedicated, but image number is not zero

Explanation: If a channel is dedicated to a image, that is, the channel is not shared, then the image number for the devices associated with the channel in the OAT must be specified as zero. This message can be issued

by either the Put OAT or Install command.
cc = channel path id

User response: Specify zero as the image number for all device addresses in the OAT for CHPID *cc*. Reissue the Put OAT or Install command, whichever was used.

IOAx409I OAT updated. Config CHPID *cc* off/on to activate the changes

Explanation: The OAT in the IOACFG data set of the OSA/SF startup profile was successfully written to the OSA located on CHPID *cc*.

User response: Configure CHPID *cc* offline in all images, then back online to activate the OAT. Refer to Chapter 3, “Setting Up OSA/SF on z/OS,” on page 55 for more information about the OSA/SF startup profile and the IOACFG data set.

IOAx410E timerX value(*tttt* msec specified) must be *ccccccc* than timerY value (*tttt* msec specified)

Explanation: When setting the SNA timer values, timerX was found to have an incorrect value because of setting of timerY value.

timerX,timerY = Ti(SNA LLC Inactivity Timer),
T1(SNA LLC Response Timer), or T2(SNA LLC
Acknowledgment Timer).
ccccccc = greater or less
tttt = time unit in msec

User response: Correct the timerX value and re-issue the command.

IOAx411E OSA/SF does not support OSA processor code level of CHPID *cc*

Explanation: The OSA processor for CHPID *cc* is not at the correct level. OSA/SF will not be able to communicate with the OSA device correctly.

cc = CHPID

User response: Upgrade the code level for the OSA processor.

IOAx413E CHPID *cc* is not configured as ATM Native mode

Explanation: PVC entries are only for OSAs configured for ATM Native mode. This message should not be displayed if you are using the GUI.

User response: If you are using the OSA/SF commands, either delete the PVC entries for this OSA using the Set Parameter command or customize the OSA for HPDT ATM Native mode using Put OAT.

IOAx414E No PVC data was found in input for CHPID *cc*

Explanation: You attempted to use the set PVC command without supplying the associated PVC data.

User response: Retry the command using the appropriate input PVC data. If the problem persists, see “Reporting OSA/SF Problems to IBM” on page 143.

IOAx415E CHPID *cc* has *n* PVC entries and has reached the limit

Explanation: The maximum number of PVC entries for an OSA is 256.

User response: Delete PVC entries that are not needed.

IOAx416E Image *x* UA *y* is already used by image *x* UA *z* (group of 2)

Explanation: The unit address specified by *y* is already being used. The second image and unit address specified in the message has a group size of 2. This means that it is a TCP/IP Passthru entry which uses an even odd pair.

User response: Change the UA for one of the OAT entries.

IOAx417E *ssss* completed with reason *rrrrrrrr*

Explanation: In the process of an INSTALL/ACTIVATE command, image file *ssss* specified in the configuration completed with reason code *rrrrrrrr*.

ssss = specified image file
rrrrrrrr = reason code

User response: See the message that follows immediately for details and action needed.
If you are using the GUI, go to the Command Output Window.
If you are using the TSO REXX interface, go to the message log.

IOAx418E Image *p* UA *uu* completed with reason code *rrrrrrrr*

Explanation: In the process of an INSTALL/ACTIVATE command, an OAT entry specified in the configuration with image *p* and unit address *uu* completed with reason code *rrrrrrrr*.

p = image number
uu = Unit Address
rrrrrrrr = reason code

User response: See the message that follows immediately for details and action.
If you are using the GUI, go to the Command Output Window.
If you are using the TSO REXX interface, go to the message log.

IOAx419E Query for CHPID *cc* completed with reason code *rrrrrrrr*

Explanation: In the process of doing the QUERY command for CHPID *cc*, it completed with reason code *rrrrrrrr*.

cc = CHPID
rrrrrrrr = reason code

User response: See the message that follows immediately for details and action.
If you are using the GUI, go to the Command Output Window.
If you are using the TSO REXX interface, go to the message log.

IOAx420E Query for CHPID *cc* Device *dd* completed with reason code *rrrrrrrr*

Explanation: In the process of doing the QUERY command for CHPID *cc*, it completed with reason code *rrrrrrrr* when trying to obtain device information.

cc = CHPID
dd = Device number
rrrrrrrr = reason code

User response: See the message that follows immediately for details and action.

IOAx421E Current image *x*(image_NAME*x*), managing image *y*(image_NAME*y*) CHPID *cc* *rrrrrrrr*

Explanation: In the process of a START/STOP MANAGING command for CHPID *cc*, it completed with reason code *rrrrrrrr*.

x = current image number
image_NAME*x* = name of current image
y = managing image number
image_NAME*y* = name of managing image
cc = CHPID
rrrrrrrr = reason code

User response: See the message that follows immediately for details and action.

IOAx422E Operation on port *p* completed with reason code *rrrrrrrr*

Explanation: In the process of a command associated with port *p* it completed with reason code *rrrrrrrr*.

p = port number
rrrrrrrr = reason code

User response: See the message that follows immediately for details and action.

IOAx424E PVC operation for CHPID *cc* failed with reason code *rrrr*

Explanation: The Add, Modify, or Delete of a PVC entry failed.

Messages

User response: Look in the message log for more information. There should be a message following this one that contains more information. The reason code is for use by IBM in problem determination.

IOAx425E Specified OSAname and PORTname cannot be accessed

Explanation: This message is the result of an unsuccessful SNMP query.

An unsuccessful SNMP query is usually caused by mismatched PORTNAMEs which are specified both in the TCPIP profile and OSA/SF configuration.

For OSA Express ATM CHPIDs, the PORTNAME is defined in the DEVICE statement in the TCPIP profile and it has to match the one in the OSA/SF configuration.

```
*-----*
* TCP/IP profile sample OSA Express ATM CHPID EC
*-----*
DEVICE DEVEC ATM PORTNAME GANTZ;GANTZ is PORTNAME
LINK LNKEC ATM DEVEC      ;DEVEC is device name
```

For OSA Direct Express CHPIDs, the device name in the DEVICE statement defined in the TCPIP profile must match the PORTNAME in the TRLE statement in the VTAM definitions.

```
*-----*
* TCP/IP profile sample for CHPID F9
*-----*
DEVICE OSDF9P00 MPCIPA PRIROUTER;OSDF9P00 device
LINK OSDF9 IPAQGNET OSDF9P00 ;and also PORTNAME

*-----*
* VTAM definition sample for CHPID F9
*-----*
TRL36F9  TRLE  LNCTL=MPC,
              READ=590,
              WRITE=591,
              DATAPATH=(592),
              PORTNAME=OSDF9P00,
              MPCLEVEL=QDIO
```

For more about SNMP, see *IP Configuration Guide* (SC31-8513) in your Communication Server library.

User response: Look in the message log for more information. There should be a message following this one that contains more information. The reason code is for use by IBM in problem determination.

IOAx426E OAT entry nn has incorrect format

Explanation: When processing the OAT entries, OAT entry number *nn* has an incorrect format.
nn = OAT entry number

User response:

- If this failure occurs during a PUT_TABLE command, check the input OAT entry number.
- If this failure occurs during a QUERY or GET_TABLE command, an internal OSA/SF error has occurred.

Rename the OSA CHPID command file data set specified in the OSA/SF startup profile IOADSN statement. (Refer to Chapter 3, "Setting Up OSA/SF on z/OS," on page 55 for more information on the OSA/SF startup profile and IOADSN entry.) The IOADSN command file data set will be dynamically rebuilt after it is renamed. Call the IBM Support Center to arrange to send a copy of the renamed IOADSN data set to IBM for analysis.

IOAx427E CHPID cc hardware is not OSA-2 ATM

Explanation: The specified CHPID *cc* is not of type OSA-2 ATM.

User response: The function you requested is only valid on an OSA-2 ATM CHPID.

IOAx428E CHPID cc is not configured as mmm mode

Explanation: The specified CHPID *cc* is not configured as mmm mode for the SET_PARM command to complete successfully.
cc = CHPID number
mmm = SNA or ATM

User response: Configure the CHPID with the mmm mode and retry the command.

IOAx430I ATM image loaded, config CHPID cc off/on to activate loaded image

Explanation: The code image specified in the IOACFG data set was successfully written to the specified CHPID.
cc = CHPID

User response: Configure the CHPID offline in all images and then online to activate the image just written.

IOAx431W Image p and UA uu defines sharing of port x without an IP address

Explanation: The OAT entry for image *p* and unit address *uu* is specified as a passthru type entry for port *x*. There is also an SNA type entry that shares the same port. This means that an IP address must be specified with the passthru entry type to allow port sharing.

p = image number
uu = Unit address
x = Port number

User response: Do the following to specify an IP address from the OSA/SF GUI.

1. Display the Configuration window for the OSA.
2. Select **TCP/IP Passthru** from the **Configured Modes** listbox and then select **Change**.
3. Select the entry you want to change in the listbox and then select **Change**.
4. Enter the IP address for this image and unit address entry.

5. Select **Change** and then select **Set**.
6. Select **Configuration** from the menu bar of the Configuration window and then save the configuration.
7. Select **Configuration** from the menu bar and then select **Activate**.

IOAx432I *ssssss type image n UA uu defines sharing of port n*

Explanation: The entry specified defines port sharing. Another message follows indicating what is the problem. The *ssssss* can be 'Passthru', 'SNA', or 'MPC' (for MVS only).

User response: See the message that follows this one in the message log for more information.

IOAx433W *Image p UA uu voids passthru entries for port x with no IP address*

Explanation: The OAT entry for image *p* and unit address *uu* is specified as an SNA type entry for port *x*. However, there are existing passthru OAT entries with no IP address. By configuring this SNA entry, all the passthru devices that share this port without an IP address will not be functional.

p = image number

uu = unit address

x = port number

User response: Do the following to specify an IP address from the OSA/SF GUI.

1. Display the Configuration window for the OSA.
2. Select **TCP/IP Passthru** from the **Configured Modes** listbox and then select **Change**.
3. Select the entry you want to change in the listbox and then select **Change**.
4. Enter the IP address for this image and unit address entry. Select **Change** and the select **Set**.
5. Select **Configuration** from the menu bar of the Configuration window and then save the configuration.
6. Select **Configuration** from the menu bar and then select **Activate**.

IOAx434I *PT type image n UA xx defines sharing port y without IP address*

Explanation: You specified a port for port sharing but the IP address is all zeroes. An IP address of zero indicates no port sharing.

User response: You cannot share a port without a specific IP address on each OAT entry that wishes to use the port.

IOAx435E *VPI x and VCI y already used by PVC name ssss*

Explanation: The VPI and VCI combination specified for the PVC is already being used by another PVC. The combination of these two parameters must be unique for each PVC entry.

User response: Change the VPI or VCI so that it is unique for this PVC.

IOAx436E *Invalid tttt name nnnn*

Explanation: *tttt* is either PVC or OSA. *nnnn* is either the PVC name or OSA name. The PVC name or OSA name is not valid.

User response: Enter a name of 1 through 8 characters in the following format:

First Character - Any capital letter A through Z, @ # \$.

Remaining Characters - Capital letters A through Z, 0 through 9, @ # \$.

IOAx437E *ATM OSA mode ssssssss is corrupted. Reason = nnnnnnnn*

Explanation: The ATM image, *ssssssss* loaded on the card has been corrupted.

User response: Re-configure the card.

IOAx439E *PVC name ssssssss not found*

Explanation: Specified PVC name *ssssssss* cannot be found on this ATM card.

User response: Correct the name and retry the command. If the problem persists, see "Reporting OSA/SF Problems to IBM" on page 143.

IOAx440E *Image nn UA nn is already used by nn port nn*

Explanation: The image and UA in the OAT entry in the install process are already used by another port.

User response: This message is generated when configuring an OSA CHPID that has multiple logical ports. Change the OAT entry and retry the command.

IOAx441E *NetMask a.b.c.d for image x UA y is incorrect*

Explanation: The NetMask specified for OAT entry image *x* UA *y* is 255.255.255.255

User response: Change the NetMask and retry the command. See "Reporting OSA/SF Problems to IBM" on page 143.

Messages

IOAx444E Port type *tttttt* not supported on CHPID *cc* port *pp*

Explanation: The port type, *tttttt*, is not supported on the specified CHPID.

tttttt can be one of

- Token ring
- FDDI
- Ethernet
- Fast ethernet
- Gigabit ethernet
- ATM Native
- ATM LAN emulation

User response: None. This is an internal error.

See “Reporting OSA/SF Problems to IBM” on page 143.

IOAx446E Set of LAN port parameter ID *pppp* is invalid for port *nn*

Explanation: The input parameter is improper for the specified port type.

User response: Reenter the correct parameter or specify the correct port type. If the error persists, see “Reporting OSA/SF Problems to IBM” on page 143

IOAx448E No OAT entries were specified for port *pp*

Explanation: The OAT file specified in the master index (ioainx) contains no OAT entries for the port the install was directed to, where *pp* is the target port number.

User response: If OAT entries are necessary to configure this port, use the GUI configuration tool. If problem persists, see “Reporting OSA/SF Problems to IBM” on page 143.

IOAx449W OSA/SF not able to access channel file information for CHPID *cc*

Explanation: OSA/SF had a channel error during OSA/SF initialization. It is necessary to correct this error in order for OSA/SF to function properly. Messages IOAD499W and IOAD505W detail the error.

User response: Make sure a 70xx minidisk has been created and is available. If this is not a VM guest, then a channel file is missing or unable to be accessed. Processing can continue, but certain commands will not work.

IOAx450E Task not supported by SNA image level *xx* on CHPID *cc*

Explanation: The SNA firmware level to support the input command is not installed on the specified CHPID.

User response: Upgrade the SNA firmware level on the specified CHPID. If the error persists, call IBM service.

IOAx451I Indicators have been set in one or more channel blocks

Explanation: One of the following conditions was detected by the OSA/SF:

- Physical card mismatch
- No file information found for card
- The port type has not been set for this card
- Could not write file information for this card

User response: This is an internal OSA/SF error. See “Reporting OSA/SF Problems to IBM” on page 143.

IOAx455E The specified OSA mode file already known to OSA/SF

Explanation: During a Put File command, the file name specified was already known by OSA/SF and the Replace option was not selected.

User response: Retry the Put File command and specify the Replace option. If the problem persists, issue the Delete File command to first remove the file and then reissue the Put File command.

IOAx456E The specified OSA mode file not known by this copy of OSA/SF

Explanation: An internal OSA/SF error has occurred.

User response: See “Reporting OSA/SF Problems to IBM” on page 143.

IOAx457E The specified CHPID is managed by another image

Explanation: An OSA channel number, which was to be part of a set of OSA channels to be managed by a Start Managing operation, is already managed by another image.

User response: Either retry the command using the Force option or issue the Stop Managing command from the managing image currently managing the OSA.

IOAx459E The specified CHPID is not known by this copy of OSA/SF

Explanation: The CHPID number specified on the current command is not known by this copy of OSA/SF.

User response: Verify that the CHPID number specified is defined as an OSA channel in the IODF/IOCDS. Reissue the API or command that resulted in this message.

IOAx460E The specified port is not known by this copy of OSA/SF

Explanation: The port number specified does not match the allowed OSA port number range. For a FDDI port, only port number 00 is valid. On an OSA-1, port numbers 00 through 04 are valid for a token-ring or Ethernet port. On an OSA-2, port numbers 00 and 01 are valid for a token-ring or Ethernet port.

User response: Verify the OSA type. Check the port number range. Reissue the command. If problems continue, see “Reporting OSA/SF Problems to IBM” on page 143.

IOAx464W The system is currently in configuration mode

Explanation: OSA/SF has determined that the system is in configuration mode. The command may not be able to complete, or if OSA/SF was in the process of initializing, it might not be able to initialize successfully. Any data that is returned may not be correct.

User response: Take the system out of configuration mode. Retry the failing command.

IOAx466E The system is not running in EMIF mode

Explanation: The system on which OSA/SF is to run and on which an OSA is installed must support the ESCON Multiple Image Facility mode (EMIF mode). An attempt has been made to start OSA/SF on a system without EMIF firmware support.

User response: See the OSA publication for the hardware requirements for OSA. Multiple image facility mode support is a prerequisite requirement for OSA hardware devices and the OSA Support Facility software.

IOAx467E Incorrect code returned to OSA/SF

Explanation: OSA/SF has attempted to communicate with the channel subsystem and the communication has failed. An internal OSA/SF error has occurred.

User response: See “Reporting OSA/SF Problems to IBM” on page 143.

IOAx468E Service not available for this request

Explanation: OSA/SF has attempted to communicate with the channel subsystem and the communication has failed. An internal OSA/SF error has occurred.

User response:

- For the OSA CHPID that was the target of the command that received this message, configure the OSA CHPID offline in all images (CF CHP(nn),OFFLINE), then back online (CF CHP(nn),ONLINE).

- Stop and restart OSA/SF

If the problem persists, see “Reporting OSA/SF Problems to IBM” on page 143.

IOAx469E The specified CHPID *cc* in use - cannot complete command

Explanation: The OSA CHPID to which the last command was directed is in use either by another user or another image. The command that was issued did not execute.

User response: Wait a short period of time for the OSA CHPID to complete its current task. Then resubmit the command that received this message. If the condition continues, see “Reporting OSA/SF Problems to IBM” on page 143.

IOAx470E Channel is unlocked (query) or it must be locked (set)

Explanation: The OSA CHPID to which the last command was directed is in use either by another user or another image. The command that was issued did not execute.

User response: Wait a short period of time for the OSA CHPID to complete its current task. Then resubmit the command that received this message. If the condition continues, see “Reporting OSA/SF Problems to IBM” on page 143.

IOAx472E Could not access Channel Subsystem information

Explanation: OSA/SF could not access Channel Subsystem information.

User response: See “Reporting OSA/SF Problems to IBM” on page 143.

IOAx473E A parameter for a internal OSA/SF request is incorrect

Explanation: An internal OSA/SF error has occurred.

User response: See “Reporting OSA/SF Problems to IBM” on page 143.

IOAx474E The requested Channel Subsystem Command is not supported

Explanation: The Channel Subsystem Command (CHSC) is not supported on this processor. This support is a requirement for OSA and OSA/SF.

User response: Refer to the OSA publication for information on hardware requirements to attach OSA and to run OSA/SF. If all requirements are met, see “Reporting OSA/SF Problems to IBM” on page 143.

Messages

IOAx475I No channel sub-system physical information is available

Explanation: The Channel Subsystem Command (CHSC) attempted to obtain information from the channel subsystem and could not.

User response: Refer to the OSA publication for information on hardware requirements to attach OSA and run OSA/SF. If all requirements are met, see "Reporting OSA/SF Problems to IBM" on page 143.

IOAx476I Requested CHPID is not defined in the I/O configuration

Explanation: A command attempted to access a CHPID that is not defined in the IODF/IOCDS.

User response: Verify that the IODF/IOCDS has an entry for each OSA. Refer to the OSA publication for hardware and IODF/IOCDS requirements. Check that the command was issued to a valid OSA CHPID.

IOAx477I No device information available for this type CHPID

Explanation: An OSA CHPID in the IODF/IOCDS has no device information associated with it. Device and unit address values are required in the IODF/IOCDS for the OSA CHPID.

User response: Verify that the IODF/IOCDS has CNTLUNIT and IODEVICE information associated with each OSA CHPID. Refer to the OSA publication for hardware and IODF/IOCDS requirements.

IOAx478I No devices associated with this CHPID are applicable

Explanation: An OSA CHPID in the IODF/IOCDS has device information associated with it, but the device information is not valid for an OSA CHPID.

User response: Verify that the IODF/IOCDS CNTLUNIT and IODEVICE information associated with each OSA CHPID has valid OSA device information. Refer to the OSA publication for hardware and IODF/IOCDS requirements.

IOAx479I The requested image is not described in the I/O configuration

Explanation: The specified image is not defined in your IOCDS.

User response: Return to HCD and define image to system.

IOAx480W No image reconfig access for the requested CHPID

Explanation: OSA/SF attempted to access the internal image reconfiguration information for an OSA CHPID. The attempt failed.

User response: Refer to the OSA publication for information on hardware requirements to attach OSA and run OSA/SF. If all requirements are met, see "Reporting OSA/SF Problems to IBM" on page 143.

IOAx481E No reconfig access to image processing command

Explanation: OSA/SF attempted to access the internal image reconfiguration information for an OSA CHPID. The attempt failed.

User response: Refer to the OSA publication for information on hardware requirements to attach OSA and run OSA/SF. If all requirements are met, see "Reporting OSA/SF Problems to IBM" on page 143.

IOAx482E Image requesting information not authorized to get it

Explanation: OSA/SF attempted to access the internal image reconfiguration information for an OSA CHPID. The attempt failed.

User response: Refer to the OSA publication for information on hardware requirements to attach OSA and run OSA/SF. If all requirements are met, see "Reporting OSA/SF Problems to IBM" on page 143.

IOAx483E The field being set is not known by this copy of OSA/SF

Explanation: A Set Parm command was issued for a field which does not support the set function.

User response: Check "SET_PARAMETERS | SET_PARM | SET_PARMS" on page 172 for the fields supported by the command.

IOAx484E Lock handles do not match for a set or unlock operation

Explanation: An internal OSA/SF error has occurred.

User response: See "Reporting OSA/SF Problems to IBM" on page 143.

IOAx485I CHPID *cc* has been replaced. Physical information follows.

Explanation: An OSA device has been removed and a new OSA device has been installed in the same OSA cage card position. Message IOAx486 that follows will detail the current and previous physical information associated with each of the OSA devices. It will be necessary to update the hardware information from the

new OSA device to the OSA/SF file information about the OSA installed at this CHPID location.

User response: An Install sequence should be performed. Refer to Chapter 11, “Servicing OSA-Express and OSA/SF,” on page 145 for more information.

If the condition can not be corrected, see “Reporting OSA/SF Problems to IBM” on page 143.

IOAx486I *xxxxxxxxxxxxxxxxxxxxxx
dddddddddddddddddddddd*

Explanation: Displays the data in the format below:
xxxxxxxxxxxxxxxxxxxxxx = replaceable header containing either
 Current physical information:
 or
 Previous physical information:
dddddddddddddddddddddd = actual physical information

User response: This message is paired with message IOAx485I. Refer to message IOAx485I for instructions.

IOAx487E **Cannot put file to OSA without the associated host name**

Explanation: During a Put File command, the fully qualified input data set name was not specified.

User response: If this message was issued following a Put File command, then ensure the fully qualified input data set name was specified. If this message is issued during any other command, then an internal OSA/SF error has occurred; see “Reporting OSA/SF Problems to IBM” on page 143.

IOAx488W **File processing error for CHPID *cc* last ID: *aa* current ID: *bb***

Explanation: An internal OSA/SF error has occurred relating to the channel file data sets.

cc = CHPID
aa = last ID
bb = current ID

User response: The channel file data sets are built on the DASD volume pointed to by the IOADSN entry of the OSA/SF started procedure. (See Chapter 3, “Setting Up OSA/SF on z/OS,” on page 55). Ensure that the pointer has not changed and that the DASD volume, pointed to by the VOLUME keyword, is operational. The channel file data sets must also be catalogued on the system.

If the channel file data set does not exist, use the VARY command to vary the OSAD device (X'FE') offline, then vary the OSAD device back online. When the OSAD device is brought back online, the channel file data set will be rebuilt. Then stop and start OSA/SF.

If all OSA channel file data sets appear normal, see

“Reporting OSA/SF Problems to IBM” on page 143.

IOAx489W **Tried to add a duplicate *aaaaaa* to cache**

Explanation: OSA/SF tried to add item *aaaaaa* to the OSA/SF internal cache, but the item already exists in cache and it was not added.

aaaaaa = Channel, device, or file

User response: See “Reporting OSA/SF Problems to IBM” on page 143.

IOAx490E **OSA/SF must be migrated to the current release**

Explanation: This message is issued if a newer version of OSA/SF had been executed on the system, the newer version stopped, and now an older, down-level version of OSA/SF has been started.

User response: Cancel the older version of OSA/SF that was started and resume running with the latest version of OSA/SF.

IOAx491E **Cannot access channel file for command. See message log for name**

Explanation: The message log will contain message IOAx492E which will specify the channel file data set name that could not be accessed.

User response: Refer to the message log and locate message IOAx492E. Cross-check the channel file data set name with a VTOC list of the DASD volume. The DASD volume is specified in the IOADSN entry of the OSA/SF startup profile. The OSA/SF Startup Profile is a data set that is pointed to from the DD card IOAPROF within the OSA/SF Started Procedure (task). See Chapter 3, “Setting Up OSA/SF on z/OS,” on page 55 for more information about the OSA/SF startup profile. Ensure that the pointer has not changed and that the DASD volume, pointed to by the volume keyword, is operational. The channel file data set must also be catalogued on the system. Restart OSA/SF if the channel file data set name is verified.

If the channel file data set does not exist, use the VARY command to vary the OSAD device (X'FE') offline, then vary the OSAD device back online. When the OSAD device is brought back online, the channel file data set will be rebuilt. Then stop and start OSA/SF.

If all OSA channel file data sets appear normal, see “Reporting OSA/SF Problems to IBM” on page 143.

IOAx492E **Could not access file *ssssssss***

Explanation: This message is in response to message IOAx491E. It indicates which channel file data set could not be accessed.

User response: Refer to message IOAx491E for

Messages

further information and corrective action.

IOAx493E Input or output block pointer not correct on command

Explanation: An OSA/SF internal error occurred.

User response: See "Reporting OSA/SF Problems to IBM" on page 143.

IOAx494E ALL specified for command which is directed to one channel

Explanation: The "ALL" option was specified for a command that does not support the "ALL" option.

User response: If this message is issued for a TSO issued command, remove the "ALL" option. If the message is issued for another reason, see "Reporting OSA/SF Problems to IBM" on page 143.

IOAx495E Unknown field ID used on command. See message log for details

Explanation: An OSA/SF internal error occurred.

User response: Check the ID listed in message IOAD496E in the message log. If it is not a valid ID, correct it and reenter the command. ID values must be in the form of X'0000nnnn'. If it is a valid ID, see "Reporting OSA/SF Problems to IBM" on page 143.

IOAx496E Incorrect ID xxxxxxxx is being set for ssssssss field

Explanation: xxxxxxxx is the ID being set. ssssssss is replaced by one of the following: non-port type, FDDI, Token Ring, or Ethernet.

User response: See message ID IOAx495E for more information and instructions.

IOAx497E File open error xx on sss...sss

Explanation: The OSA channel file data set sss...sss could not be opened because of error xx. The value of xx could be any of the following:

- 07 - I/O buffer could not be allocated
- 08 - LRECL or BLKSIZE exceeds maximum allowable value
- 40 - Attempt was made to open a non-imageed data set as a PDS
- 41 - System level open failed
- 45 - Data set is already open
- 47 - Invalid input for data set name
- 49 - Cannot locate data set specified
- 50 - Cannot catalog new data set name used in rename routine
- 57 - Open mode string is invalid
- 61 - Error trying to define data set to system
- 63 - Error in control block
- 67 - Trying to open non-existent data set for READ

74 - Open parameters require "type=record" specified

79 - Data set was not opened as: "type=record"

86 - Open mode specified invalid for PDS member

87 - Data set characteristics specified do not match those of the existing data set

88 - Open mode specified invalid for device

91 - Unable to perform function due to failure of a system utility

92 - An I/O abend has been trapped

95 - Requested disk not accessed or data set not found

98 - Invalid RECFM for opening PDS member

113 - Bad data set descriptor

117 - Data set exists

121 - Invalid argument

These error numbers are found in the *IBM C/370 Programming Guide*.

User response: Because this condition relates to the OSA channel file data set, retry the command one more time. The OSA channel file data sets are pointed to by the IOADSN keyword in the OSA/SF startup profile.

Also, ensure that the OSA/SF startup profile IOADSN keyword is correct and that there is sufficient space on the DASD for the OSA channel file data sets. The channel file data set must also be catalogued on the system.

If the channel file data set does not exist, use the VARY command to vary the OSAD device (X'FE') offline, then vary the OSAD device back online. When the OSAD device is brought back online, the channel file data set will be rebuilt. Then stop and start OSA/SF. The OSA/SF Startup Profile is a data set that is pointed to from the DD card IOAPROF within the OSA/SF Started Procedure (task). See Chapter 3, "Setting Up OSA/SF on z/OS," on page 55 for more information about the OSA/SF startup profile.

If the condition continues, see "Reporting OSA/SF Problems to IBM" on page 143.

IOAx498W Channel file error. View message log for error

Explanation: An error has occurred during a file operation for a channel file data set. Additional information about the error can be found in the OSA/SF message log.

User response: Issue the Get Debug command to get a copy of the message log. (Refer to the command section for information about the Get Debug command.) Locate message IOAx498W in the message log. Then look back a few lines in the message log for addition channel file data set error messages. These messages will provide additional information.

IOAx499E Channel File Error. Do get_debug TRACE

Explanation: An internal OSA/SF error has occurred. The error relates to the channel file data sets.

User response: Do the following:

- ___ 1. Issue the Get Debug command to obtain a copy of the OSA/SF trace table.
- ___ 2. Reissue the Get Debug command to get a copy of the OSA/SF message log.
- ___ 3. See "Reporting OSA/SF Problems to IBM" on page 143.

IOAx500E CHPID in PVC and input block mismatch

Explanation: The CHPID number does not match on the OSA/SF data cache operation.

User response: Report the problem to the IBM Support Center.

IOAx501E Empty PVC block passed

Explanation: No data is passed to OSA/SF data cache component for the PVC operation.

User response: Report the problem to the IBM Support Center.

IOAx503E A Data Manager internal block was not found

Explanation: This is an internal error.

User response: Issue the Get Debug command, specifying Trace Table and send it to IBM. See "Reporting OSA/SF Problems to IBM" on page 143.

IOAx505E Bad return code *nn*. Get debug trace from OSA/SF

Explanation: The return code *nn* was received trying to do the requested function.

User response: Do the following:

- ___ 1. Issue the GET_DEBUG command, specifying TRACE_table.
- ___ 2. Forward this data to IBM service.
- ___ 3. See "Reporting OSA/SF Problems to IBM" on page 143.

IOAx506I The system channel type does not match the one currently in OSA/SF

Explanation: The current channel type (as determined by the channel subsystem information) is different from the channel type currently in the OSA/SF cache. The old channel file information will be removed from the

cache and replaced with information appropriate for the new channel type.

User response: None. This message is generated if you put in a new channel of a different type. For example, if the old channel type in cache is OSA-2 and the channel type from CHSC is OSA-Express.

IOAx507I Channel saved information not being used due to channel type mismatch

Explanation: The current channel type (as determined by the channel subsystem information) is different from the channel type saved in the channel files. The information from the channel files will not be used.

User response: None. This message is generated if you put in a new channel of a different type. For example, if the old channel type in cache is OSA-2 and the channel type from CHSC is OSA-Express.

IOAx508E Size mismatch for *ssssss*. ID is *xx*, size is *yy*

Explanation: This is an internal error.

User response: None

IOAx509E The CHPID type for CHPID *cc* is not valid for this command

Explanation: The command is not allowed for the type of CHPID targeted.

User response: Reissue the command against the correct type of CHPID.

IOAx510E Parameter length of *pp* not valid for port info structure

Explanation: Internal error. The size of the input structure to set the port type is incorrect.

User response: See "Reporting OSA/SF Problems to IBM" on page 143.

IOAx511W Number of ports not specified when setting port type

Explanation: Internal OSA/SF component did not set up parameters correctly.

User response: See "Reporting OSA/SF Problems to IBM" on page 143.

IOAx512I CHPID *cc*, specified in the STARTUP.PROFILE, does not exist

Explanation: You specified the CHPID number in the SYSINFO statement in the STARTUP.PROFILE, but the CHPID does not exist in the current system configuration.

User response: Check your system configuration to

Messages

see if you specified an incorrect CHPID number, and make the necessary corrections and restart OSA/SF.

IOAx513I Device *nn* from the STARTUP.PROFILE, does not exist on CHPID *cc*

Explanation: You specified the device number in the SYSINFO statement in the STARTUP.PROFILE but the device is not associated with the listed CHPID in the current system configuration.

User response: Check your system configuration to see if you specified an incorrect VM guest device number, make the necessary corrections and restart OSA/SF.

IOAx514E Virtual CHPID *nn* has been used multiple times in STARTUP.PROFILE

Explanation: You specified the same virtual CHPID for multiple real CHPIDS in the STARTUP.PROFILE.

User response: Update the STARTUP.PROFILE and restart OSA/SF.

IOAx515E Multiple real CHPIDs using the same virtual one in STARTUP.PROFILE

Explanation: You specified the same virtual CHPID for multiple real CHPIDS in STARTUP.PROFILE.

User response: Update the STARTUP.PROFILE and restart OSA/SF. See Chapter 3, "Setting Up OSA/SF on z/OS," on page 55.

IOAx516E Virtual device *nn* has been used multiple times in STARTUP.PROFILE

Explanation: You specified the same virtual device for multiple real devices in the STARTUP.PROFILE.

User response: Update the STARTUP.PROFILE and restart OSA/SF.

IOAx517E Multiple real device using the same virtual one in STARTUP.PROFILE

Explanation: You specified the same virtual device for multiple real devices in the STARTUP.PROFILE.

User response: Update the STARTUP.PROFILE and restart OSA/SF.

IOAx518E CHPID *cc* represented multiple times in OSA/SF internal info

Explanation: One of two situations may have occurred:

- ___ 1. The real CHPID specified in the message text is associated with multiple virtual CHPIDs in STARTUP.PROFILE.

- ___ 2. The virtual CHPID associated in the STARTUP.PROFILE to the real CHPID specified in the message text already exists as a real CHPID, as determined from CSS information.

User response: Update STARTUP.PROFILE to correct errors and restart OSA/SF.

IOAx519E Multiple CHPIDs assoc to same real CHPID in OSA/SF internal info

Explanation: One of two situations may have occurred:

- ___ 1. The real CHPID specified in the message text is associated with multiple virtual CHPIDs in STARTUP.PROFILE.
- ___ 2. The virtual CHPID associated in the STARTUP.PROFILE to the real CHPID specified in the message text already exists as a real CHPID, as determined from CSS information.

User response: Update STARTUP.PROFILE to correct errors and restart OSA/SF.

IOAx520E Device *nn* represented multiple times in OSA/SF internal info

Explanation: One of two situations may have occurred:

- ___ 1. The real device specified in the message text is associated with multiple virtual devices in STARTUP.PROFILE.
- ___ 2. The virtual device associated in the STARTUP.PROFILE to the real device specified in the message text already exists as a real device, as determined from CSS information.

User response: Update STARTUP.PROFILE to correct errors and restart OSA/SF.

IOAx521E Multiple devices assoc to the same real device in OSA/SF internal info

Explanation: One of two situations may have occurred:

- ___ 1. The real device specified in the message text is associated with multiple virtual devices in STARTUP.PROFILE.
- ___ 2. The virtual device associated in the STARTUP.PROFILE to the real device specified in the message text already exists as a real device, as determined from IOCDS information.

User response: Update STARTUP.PROFILE to correct errors and restart OSA/SF.

IOAx522E OSA/SF was not able to access channel file information for CHPID cc

Explanation: OSA/SF had a channel file error after initialization was completed. Messages IOAD499W and IOAD505W detail the error. You must resolve this error before issuing any other OSA/SF commands.

User response: Make sure a 70xx minidisk has been created and is available as described in the OSA/SF OSA publication. If this is not a VM guest, then a channel file is missing or unable to be accessed. Processing can continue, but certain commands will not work.

IOAx523E OSA/SF was not able to access channel file information for a CHPID

Explanation: OSA/SF had a channel file error after initialization was completed. Messages IOAD499W and IOAD505W detail the error. The actual CHPID number is in message log in message IOAD522E. You must resolve this error before issuing any other OSA/SF commands.

User response: Make sure a 70xx minidisk has been created and is available as described in the OSA/SF OSA publication. If this is not a VM guest, then a channel file is missing or unable to be accessed. Processing can continue, but certain commands will not work.

IOAx524W Virtual CHPID cc replaces real CHPID cc in OSA/SF internal info

Explanation: In the STARTUP.PROFILE, you specified a virtual CHPID that also exists as a real CHPID. The virtual CHPID is used and the real CHPID is not available.

User response: If you want to use this particular real CHPID number, change the STARTUP.PROFILE.

IOAx525E Size of ssss (ssd); constant size is sss

Explanation: A control block has changed in the OSA/SF internal data.

User response: You must upgrade to the most recent copy of OSA/SF.

IOAx526E Data block size mismatch. See message log for details

Explanation: This is an internal error.

User response: This error occurs when the data manager control blocks are updated incorrectly and are no longer the correct size. The message log contains complete details (IOAD508E/IOAD525E). Collect this information and contact IBM (see "Reporting OSA/SF Problems to IBM" on page 143).

IOAx527E Parameter error eeee when invoking channel subsystem command cc

Explanation: An internal error has occurred whereby invalid command parameters have been passed to the channel subsystem interface.

User response: Reissue the command you were using. If it still fails, then issue the GetDebug command, specifying to get the Trace information.

See "Reporting OSA/SF Problems to IBM" on page 143.

IOAx529I Some devices will not be shown because RMCHINFO is not specified

Explanation: The RMCHINFO setting allows you to see the actual devices defined on your system. Without this setting, you may see virtually attached devices.

User response: Add the RMCHINFO to your system set-up operations. For information about using the RMCHINFO option in the OPTION Directory Control statement, see "Decide whether to Specify RMCHINFO" on page 74.

IOAx530E OSA/SF is not authorized to obtain all required system information

Explanation: This message is placed into the message log after OSA/SF has failed to start. The following message will be presented on the system console: IOAC139E OSA/SF failed to start due to error 7 as a result of this situation. The messages indicate that OSA/SF does not have the proper authority to issue certain channel subsystem commands which are only used on a z990 machine.

Note: Normally the IOAMSG has the values "lxy" appended to what is in specified in IOAPROF. Since OSA/SF could not obtain the CSS and Image properly, the data is put into the IOAMSG as specified in the IOAPROF without any additional lxy appended to it.

User response: On the HMC or the SE, select the authorization switch for the partition that OSA/SF will run on. Select Customize Image Profiles and then the security tab. Check the box associated to the I/O Configuration Control.

See "Reporting OSA/SF Problems to IBM" on page 143.

IOAx601E Minidisk I/O problem. DevNum = 70xx, RC = yzzz

Explanation: A problem occurred when you tried to access the z/VM 70xx minidisk. **xx** for the **DevNum** virtual address represents the OSA CHPID.

RC = yzzz is a composite return code that indicates the error, where **y** is the **OSA/SF return code** and **zzz** is

Messages

the **CP return code**. **y** can be any one of the following values:

RC = 1

Unsuccessful Read/Write (R/W) link of minidisk. The minidisk is in use by another OSA/SF.

RC = 2

Unsuccessful Read/Read (R/R) link of minidisk. Probably the setup or the CHPID number is incorrect.

RC = 3

Incorrect cmd parameter. This is an internal error.

For example, if a minidisk is not properly defined to an existing userid (OSA/SF return code of 2), CP returns a return code of 107. RC=2107 is the return code from the message.

The CP LINK return codes are described in *VM CP Command and Utility Reference*.

User response: Check the return code (RC=yyyy) to determine the reason for the error, and correct the minidisk error.

IOAx602E Unable to link disk. Check OSA/SF service console for disk holder

Explanation: A userid has attempted to get the lock on the VM version of OSA/SF and another userid has linked in write mode to the disk associated with the CHPID.

User response: The user needs to check the OSA/SF server console to find the name of the userid that has access to the the disk and remove that disk access.

IOAx620E IOAN620E hh:mm:ss IOASNMP failed to start

Explanation: An error occurred while the IOASNMP load module was attempting to start threads or acquire memory required for proper execution.

User response: Check to determine if the port defined for the OSA SNMP task is the same port IOASRV is using. If that is not the case, then try to restart the IOASNMP product. If that fails, see See "Reporting OSA/SF Problems to IBM" on page 143.

IOAx638E No SNA connection data available for port pp

Explanation: No VTAM is actively using the OSA for Port *pp*.

User response: None. Check again after VTAM activity has started.

IOAx639W The Netview PPI module could not be loaded into memory

Explanation: The module containing the Netview Program to Program Interface (PPI) function could not be loaded into memory. An alertable condition was detected by OSA hardware. OSA/SF attempted to load the Netview PPI module into memory as part of the processing required to notify Netview of the alertable condition detected by the OSA hardware. The load of the module into memory failed.

User response: If the Netview product is not installed or Netview is not being used to record alertable conditions detected by OSA hardware, then this message may be ignored.

If the Netview product is installed and Netview is to be used to record alertable conditions detected by OSA hardware, then verify that the library containing the Netview PPI module is in the library search path specified when starting OSA/SF.

- For z/OS, verify that the Netview load module library is included in the list of libraries specified by the STEPLIB DD statement in the JCL procedure used to start OSA/SF.
- For VM, verify that the Netview load module library is included in the list of libraries specified on a GLOBAL LOADLIB command issued before OSA/SF was started.
- For VSE, verify that the Netview load module library.sublibrary is in the startup JCL for the OSA/SF job.

IOAx640E LEC port state is unchanged. Physical port on CHPID cc is disabled

Explanation: An attempt was made to enable a logical ATM port, but the associated physical port was disabled for LAN traffic.

User response: Enable the physical port for LAN traffic, then enable the logical port. See "Enabling and Disabling Ports" on page 127.

IOAx641E Netview PPI failed to send alert, PPI rc=xx.

Explanation: OSA/SF uses the NETVIEW program-to-program (PPI) interface to report alerts (messages describing a problem) to a Netview focal point. An attempt to use PPI failed. Return code xx was issued by the Netview program-to-program interface.

User response: Refer to the Netview Application Programming Guide to determine the cause of the PPI failure and perform corrective actions as indicated.

IOAx642E The Netview subsystem is not active or available

Explanation: OSA/SF uses the Netview program-to-program (PPI) interface to report alerts (messages describing a problem) to a Netview focal point. The PPI is used to query the program-to-program interface status before attempting to report an alert to Netview. This query indicated that the Netview PPI was not able to receive alerts.

User response: If the Netview product is not installed or Netview is not being used to record alertable conditions detected by OSA hardware, then this message may be ignored.

If the Netview product is installed and Netview is to be used to record alertable conditions detected by OSA hardware, then verify that the library containing the Netview PPI module is in the library search path specified when starting OSA/SF.

- For MVS, verify that the Netview load module library is included in the list of libraries specified by the STEPLIB DD statement in the JCL procedure used to start OSA/SF.
- For VM, verify that the Netview load module library is included in the list of libraries specified on a GLOBAL LOADLIB command issued before OSA/SF was started.
- For VSE, verify that the Netview load module library.sublibrary is in the startup JCL for the OSA/SF job.

Determine the state of the Netview PPI as described in NetView Operation. Perform the actions necessary to activate the PPI as described in Netview Operation.

IOAx643E Unknown adapter type reported by OSA/SF.

Explanation: OSA/SF identified an unknown adapter. OSA/SF can only forward alerts (messages describing a problem) to Netview for Token Ring, Ethernet, FDDI, and Fast Ethernet.

User response: See “Reporting OSA/SF Problems to IBM” on page 143.

IOAx644E OAT entry image *pp UA uu* was specified more than once in the input

Explanation: image number and Unit Address number was specified more than once in the Put OAT input data set.

User response: Correct the input data and reissue the command.

IOAx645E SNA Network Management device was specified more than once in the input

Explanation: For each OSA device operating in SNA mode, there can only be one SNA network management device.

User response: Correct the input data and reissue the command.

IOAx646I SNA Network Management device image *pp UA uu* already exists

Explanation: The existing SNA network management device with image number and Unit Address number is already defined.

User response: None.

IOAx647W No OAT entries specified in input for CHPID *cc*

Explanation: There are no OAT entries in the input file for Put OAT command. *cc* is the CHPID.

User response: Specify OAT entries in the input file for Put OAT command.

IOAx648I Command completed successfully. Config CHPID *cc* off/on to activate

Explanation: The requested action completed. A CHPID reset is required to activate the changes.

User response: Quiesce all traffic on the LAN ports on the associated OSA CHPID. Configure the CHPID offline and then online from all images.

IOAx649E LAN port parameter ID *xx* is not supported by port *nn*

Explanation: The input parameter is not valid for the specified port type.

User response: Re-enter the correct parameter or specify the correct port type or port number. If the error persists, call IBM service. See “Reporting OSA/SF Problems to IBM” on page 143.

IOAx650E Input not supported by firmware level // of CHPID *cc*

Explanation: The minimum firmware level to support the input is not installed on the specified CHPID.

User response: Upgrade the firmware level of the specified CHPID. If the error persists, call IBM service. “Reporting OSA/SF Problems to IBM” on page 143.

Messages

IOAx652E OSA configuration data has changed

Explanation: Changes have been made to OSA configuration information since the last command was entered. OSA/SF is responding to an alert status from the OSA. A SNMP may have accessed the OSA.

User response: Use the Query command to obtain the updated information on the OSA. Then resume the command sequence in progress when this message was issued.

IOAx653E Image ssssssssss is not compatible with OSA processor code level x

Explanation: A mismatch exists between the OSA mode image and the OSA processor code that is currently on the OSA features.

sssssssssss = label of the OSA mode image
x = high-level qualifier of the OSA processor code

User response: Make sure the machine is at the appropriate MCL level to support the OSA ATM feature.

IOAx654E Specified configuration file is not supported by this hardware type

Explanation: The IOACFG configuration file for this CHPID does not match the hardware definition.

User response: Create a new configuration that matches the hardware definition for the CHPID.

IOAx655E Specified configuration file is incorrect for this hardware type

Explanation: The configuration file specified in the IOACFG is not the correct one needed for the port type being configured.

User response: Configure the CHPID using a new configuration as specified in the OSA/SF documentation.

IOAx656E No data in OSA Configuration file for OSxx CHPID cc

Explanation: The install command was issued, but IOACFG did not contain any information for the specified CHPID. This may be because the target CHPID type is not the same as the one for which the install was initially issued.

OSxx can be OSA2, OSE, or OSD
cc is the CHPID number

User response: Set up the configuration and issue the install command.

If you are using the GUI:

1. Highlight the CHPID on the OSA-CHPIDs panel
2. Pull down **Selected** from the menu bar
3. Select **Configuration**→**Configuration list**

4. Create a new configuration using the **Add** button
5. Save and activate the configuration

If you are using REXX:

1. Copy the sample configuration from the IOA.SIOASAMP
2. Modify the configuration file and set up an OAT file, if applicable
3. Enter Configure OSA command from REXX

See “Reporting OSA/SF Problems to IBM” on page 143.

IOAx657E Configuration file version x is not supported

Explanation: OSA/SF and OSA firmware are not compatible.

User response: Either upgrade OSA/SF or OSA firmware. See “Reporting OSA/SF Problems to IBM” on page 143.

IOAx658E Incorrect configuration file specified for ssss port pp

Explanation: The specified configuration file for port pp is not the correct type for the port type or configuration file type shown in ssss.

User response: Correct the filetype in OSAS.CONFIG or use the GUI to set up the configuration file. If the problem persists, see “Reporting OSA/SF Problems to IBM” on page 143.

IOAx659E File not installed due to failure on the ssss file

Explanation: This configuration file was not written because the associated physical configuration file encountered a failure when writing to the OSA feature. ssss is the OSA port type.

User response: See the error message that is associated with the physical configuration file and take appropriate action. If the problem persists, see “Reporting OSA/SF Problems to IBM” on page 143.

IOAx660E ssss = xx and is out of range

Explanation: The specified configuration variable (ssss) entered in the configuration file was found to have a value (xx) that exceeds the valid range.

User response: Update the configuration file variable to fall within the valid range. If problem persists, see “Reporting OSA/SF Problems to IBM” on page 143.

IOAx661E Unable to open OSA configuration file

Explanation: An error has occurred while trying to open the OSA/SF configuration data set.

User response: Ensure the OSA configuration data set is cataloged to this image, is not in use by another user or another user in another image, and is properly pointed to by the IOADSN entry in the OSA/SF startup profile. The OSA/SF Startup Profile is a data set that is pointed to from the DD card IOAPROF within the OSA/SF Started Procedure (task). See Chapter 3, "Setting Up OSA/SF on z/OS," on page 55 for more information about the OSA/SF startup profile.

If OSA/SF is still running, it must be stopped. Then restart OSA/SF.

IOAx662E Incorrect parameter pointer passed to Install

Explanation: An internal OSA/SF error has occurred.

User response: See "Reporting OSA/SF Problems to IBM" on page 143.

IOAx663E Incorrect operation code passed to install

Explanation: An internal OSA/SF error has occurred.

User response: See "Reporting OSA/SF Problems to IBM" on page 143.

IOAx664E Incorrect parameter length passed to Install

Explanation: An internal OSA/SF error has occurred.

User response: See "Reporting OSA/SF Problems to IBM" on page 143.

IOAx665W Incorrect dataset name found in OSA configuration file

Explanation: A data set name, in a format which is not valid, was found in the OSA configuration data set (IOACFG).

User response: Examine the list of data set names found in the OSA configuration data set to find the data set name which is not valid. The OSA configuration data set is defined in the IOACFG entry of the OSA/SF startup profile. The OSA/SF Startup Profile is a data set that is pointed to from the DD card IOAPROF within the OSA/SF Started Procedure (task). See Chapter 3, "Setting Up OSA/SF on z/OS," on page 55 for more information about the OSA/SF startup profile.

IOAx666E Install output table overflow

Explanation: An internal OSA/SF error has occurred.

User response: See "Reporting OSA/SF Problems to IBM" on page 143.

IOAx667E No OSA mode file for CHPID cc in the OSA configuration file

Explanation: An Install of an OSA mode to an OSA was attempted. The OSA mode file and/or the OSA image and/or the OAT was (were) not loaded to the OSA device.

User response: If using the GUI, check the command output window and message log output window for further messages and information. If using the TSO interface, additional information should be displayed on the TSO screen. After corrections, retry the Install command. If problems persist, see "Reporting OSA/SF Problems to IBM" on page 143.

IOAx668W Incorrect data set name length

Explanation: A data set specified in the OSA/SF master index data set has an incorrect logical record length (LRECL) or an incorrect block size (BLKSIZE).

User response: The OSA/SF master index data set contains a list of OSA/SF data set names. One of the data sets in the list has a logical record length (LRECL) or a block size (BLKSIZE) that does not match the data sets in the list *of the same OSA/SF configuration type*. The OSA/SF master index data set is pointed to by the IOACFG parameter in the OSA/SF startup profile. The OSA/SF Startup Profile is a data set that is pointed to from the DD card IOAPROF within the OSA/SF Started Procedure (task). See Chapter 3, "Setting Up OSA/SF on z/OS," on page 55 for more information about the OSA/SF startup profile.

IOAx669W Incorrect member name length

Explanation: A member name associated with a data set name in the OSA/SF configuration data set has an incorrect length. Members in the configuration data set are referenced in the format:

MVSDATASETNAME(membername)

One of the member names is less than one character or greater than eight characters in length.

User response: Examine the OSA configuration data set to locate the member name that has the incorrect length. The incorrect member name can be located by browsing the data set itself. The OSA configuration data set is defined by the IOACFG entry in the OSA/SF startup profile. The OSA/SF Startup Profile is a data set that is pointed to from the DD card IOAPROF within the OSA/SF Started Procedure (task). See Chapter 3, "Setting Up OSA/SF on z/OS," on page 55 for more information about the OSA/SF startup profile.

Messages

IOAx670W Dynamic allocation failed with RC=aaaa, reason=bbbb

Explanation: Dynamic allocation failed for a data set specified in the OSA/SF configuration data set (IOACFG).

aaaa = return code from DYNALLOC macro
bbbb = reason code from DYNALLOC macro

User response: The OSA/SF configuration data set contains a list of data set names used by OSA/SF. These data sets are dynamically allocated. One of the data sets in the list could not be dynamically allocated. The OSA/SF configuration data set is pointed to by the IOACFG entry in the OSA/SF startup profile. The OSA/SF Startup Profile is a data set that is pointed to from the DD card IOAPROF within the OSA/SF Started Procedure (task). See Chapter 3, "Setting Up OSA/SF on z/OS," on page 55 for more information about the OSA/SF startup profile.

Check the return code from the DYNALLOC macro and take appropriate action. For return code and reason code information see the DYNALLOC macro in *Programming: Authorized Assembler Services Reference, Volume 1, GC28-1475*.

If problem persists, see "Reporting OSA/SF Problems to IBM" on page 143.

IOAx671W GETMAIN failure

Explanation: Unable to allocate storage for an OSA/SF operation. This could be the result of a storage constraint or an OSA/SF region size that is inadequate.

User response: Free up system storage resources. Also check the system console for error messages. Increase the OSA/SF region size. Stop then restart OSA/SF.

IOAx672W Dynamic de-allocation failed with RC=aaaa, reason=bbbb

Explanation: Dynamic de-allocation failed for a data set specified in the OSA configuration data set.

aaaa = return code from DYNALLOC macro
bbbb = reason code from DYNALLOC macro

User response: Check return code from DYNALLOC macro. The DYNALLOC macro documentation can be found in *Programming: Authorized Assembler Services Reference, Volume 1, GC28-1475*. Make corrections. Stop and restart OSA/SF.

IOAx673W Install did not complete successfully

Explanation: Unable to load application and/or OAT and/or image for this OSA CHPID. This message is frequently issued if an Install command is issued without the Force option. The application and/or OAT and/or image already installed on the OSA match what is being Installed.

User response: Additional messages should be displayed in the command output window if using the GUI or on the TSO screen if using TSO. Check these additional messages for further information and instructions. Reissue the Install command with the Force option if appropriate.

If problems persist, see "Reporting OSA/SF Problems to IBM" on page 143.

IOAx674W CHPID number found in OSA configuration data set is not valid

Explanation: A CHPID number in the OSA configuration data set was found to have an incorrect format. The correct format is:

OSAAnn ...where "nn" is the OSA CHPID number.

User response: Examine the OSA configuration data set and look for an incorrectly formatted OSAAnn CHPID number. The OSA configuration data set is pointed to by the IOACFG entry in the OSA/SF startup profile. The OSA/SF Startup Profile is a data set that is pointed to from the DD card IOAPROF within the OSA/SF Started Procedure (task). See Chapter 3, "Setting Up OSA/SF on z/OS," on page 55 for more information about the OSA/SF startup profile.

Make corrections. Then reissue the Install command.

IOAx677E Unable to open Master Index file

Explanation: OSA/SF was unable to open the master index data set specified in the IOAINX entry of the OSA/SF startup profile.

User response: Check that the data set name specified in the IOAINX entry of the OSA/SF startup profile exists and that it is cataloged to the system in this image. Also ensure that the data set is not in use by another user in this image or in any other image (such as a browse or edit function). Redo the Install procedure for this OSA mode to ensure the Install steps were all performed correctly (such as the copy from IOA.SIOASAMP). Refer to Chapter 3, "Setting Up OSA/SF on z/OS," on page 55 for more information on the IOAINX data set of the OSA/SF startup profile and the OSA mode install procedures.

IOAx678E OSA status register read failed

Explanation: An OSA/SF internal error occurred.

User response: See "Reporting OSA/SF Problems to IBM" on page 143.

IOAx679E Download dataset open failed

Explanation: OSA/SF was unable to open one of the data sets listed in the IOACFG or IOAINX data set. Possible causes include:

- MVS has the data set open

- Another user, even in another image, may have the data set open
- The data set has been deleted.

User response: Check that the data set names specified in the IOACFG and IOAINX entries of the OSA/SF startup profile exist and are all catalogued to the system in this image. Verify the data sets are not currently open by this system or any system in any image. If a data set has been deleted, then an SMP/E reinstall of OSA/SF is required. After the data sets have been replaced, an OSA/SF Install must be performed to the OSAs.

If the problem persists, see “Reporting OSA/SF Problems to IBM” on page 143.

IOAx680E OSA/SF release VxRxMx doesn't support hardware level of CHPID cc

Explanation: There is a co-dependency between the OSA hardware and the OSA/SF software level. For CHPID *cc* the co-dependency is not met.

User response: Refer to the OSA publication for a list of OSA device and OSA/SF mode co-dependencies. Obtain the correct level of OSA/SF that supports the OSA CHPID.

IOAx681W Code image xxxx wasn't written because it's already loaded on the OSA

Explanation: The code image *xxxx* was not written to the OSA. The name of the image that was requested to be written (installed) matches the name of the OSA mode image that is currently installed on the OSA device.

User response: To write (re-write) the same named OSA mode image *xxxx*, reissue the OSA/SF Install command with the Force option.

IOAx682E Unable to open data set fff...fff

Explanation: The data set could not be opened during the Install process.

fff...fff = name of the data set that could not be opened by OSA/SF

User response: The data set is either an OSA/SF image data set or a OSA/SF NLM data set. These data sets are restored by SMP/E when OSA/SF is installed. Check that:

- OSA/SF SMP/E installation completed successfully
- The data set exists on the volume where SMP/E installed it
- This image has the data set catalogued
- The data set is not used by another user, including another user in another image

Retry the Install command. If problem cannot be resolved, see “Reporting OSA/SF Problems to IBM” on page 143.

IOAx683E Unable to read data set (fff...fff)

Explanation: The data set could not be read during the Install process.

fff...fff = name of the data set that could not be read by OSA/SF

User response: Check that the OSA image data set name or NLM data set name as specified in the list of data set names contained in the IOACFG data set or the IOAINX data set:

- Exists and is catalogued in this image
- Is not currently open by a system task or another user in this or another image

The IOACFG and IOAINX data sets are pointed to by the OSA/SF startup profile. The OSA/SF Startup Profile is a data set that is pointed to from the DD card IOAPROF within the OSA/SF Started Procedure (task). See Chapter 2 for more information about the OSA/SF startup profile.

If the file has been deleted, then an SMP/E reinstall of OSA/SF must be performed to reload the data set.

If the problem persists, see “Reporting OSA/SF Problems to IBM” on page 143.

IOAx684E Configuration set up error

Explanation: The file type (image type) specified in the configuration data set (IOACFG entry of OSA/SF startup profile) is not valid for this OSA device.

User response: Check the configuration for this OSA. Then check the file type (column two) in the configuration data set (IOACFG). The configuration data set is specified by the IOACFG entry in the OSA/SF startup profile. Correct the configuration file, stop OSA/SF if it is still running, then restart OSA/SF. Refer to Chapter 3, “Setting Up OSA/SF on z/OS,” on page 55 for more information regarding the IOACFG data set.

IOAx686W This file not loaded because an Image file is not active

Explanation: Following an Activate or an Install sequence, the OSA must be configured offline in all images then configured back online. This message is issued because the I-files were not found on the OSA or the activation step (configure CHPID offline/online) did not complete. If you are using the GUI, the command output window will contain the name of the data set. If you are using the REXX interface, the data set name will be sent to the TSO screen.

User response: The Image files (I-files) are installed as part of the OSA/SF SMP/E installation sequence. Ensure that the SMP/E install of OSA/SF completed successfully. Configure the OSA CHPID offline in all images (CF CHP(nn),OFFLINE) and then back online (CF CHP(nn),ONLINE). This loads the configured image

Messages

file to the OSA. Then rerun the OSA mode Install sequence.

IOAx687E Incorrect Image type is specified for this OSA hardware type

Explanation: The image data set (I-file) that is identified in the configuration data set (pointed to by the IOACFG entry in the OSA/SF startup profile) for this OSA, contains an image that is not valid for this OSA.

User response: Verify the OSA type installed. Then verify the configuration matches the OSA hardware (for example FDDI, Token Ring, ATM, or Ethernet). See the OSA publication for more information on configurations and OSA hardware types. Double check that the OSA/SF SMP/E install completed successfully. If message issued as the result of using the API, or the configuration data sets have been altered, check the API control blocks and/or correct alterations.

If problem continues, see “Reporting OSA/SF Problems to IBM” on page 143.

IOAx688E Specified configuration is not supported by this OSA hardware type

Explanation: The image data set (I-file) that is identified in the OSA/SF configuration data set contains an image that is not valid for this OSA-1 device type.

User response: Verify the OSA type installed. Then verify the configuration matches the OSA-1 hardware (for example FDDI, Token Ring, or Ethernet). See the OSA publication for more information on configurations and OSA hardware types. Use the Activate sequence to load the configuration to the OSA. The OSA/SF configuration data set is pointed to by the IOACFG entry in the OSA/SF startup profile. The OSA/SF Startup Profile is a data set that is pointed to from the DD card IOAPROF within the OSA/SF Started Procedure (task). See Chapter 3, “Setting Up OSA/SF on z/OS,” on page 55 for more information about the OSA/SF startup profile.

If problems continue, see “Reporting OSA/SF Problems to IBM” on page 143.

IOAx689E Specified configuration is not supported by this OSA hardware type

Explanation: The image data set (I-file) that is identified in the configuration data set (IOACFG) contains an image that is not valid for this OSA-2 hardware type.

User response: Verify the OSA type installed. Then verify the configuration matches the OSA-2 hardware (for example Token Ring or Ethernet). See the OSA publication for more information on configurations and OSA hardware types. Use the Activate sequence to load the configuration to the OSA. The configuration data set is pointed to by the IOACFG entry in the OSA/SF

startup profile. The OSA/SF Startup Profile is a data set that is pointed to from the DD card IOAPROF within the OSA/SF Started Procedure (task). See Chapter 3, “Setting Up OSA/SF on z/OS,” on page 55 for more information about the OSA/SF startup profile.

If problems continue, see “Reporting OSA/SF Problems to IBM” on page 143.

IOAx690E Specified configuration is not supported by this OSA hardware type

Explanation: The image data set (I-file) that is identified in the configuration data set (IOACFG) contains an image that is not valid for this OSA-2 hardware type.

User response: Verify the OSA type installed. Then verify the configuration matches the OSA2-ATM hardware (for example Token Ring or Ethernet). See the OSA publication for more information on configurations and OSA hardware types. Use the Activate sequence to load the configuration to the OSA. The configuration data set is pointed to by the IOACFG entry in the OSA/SF startup profile. The OSA/SF Startup Profile is a data set that is pointed to from the DD card IOAPROF within the OSA/SF Started Procedure (task). See Chapter 3, “Setting Up OSA/SF on z/OS,” on page 55 for more information about the OSA/SF startup profile.

If problems continue, see “Reporting OSA/SF Problems to IBM” on page 143.

IOAx691E Unknown hardware model passed to install

Explanation: This is an internal OSA/SF error.

User response: See “Reporting OSA/SF Problems to IBM” on page 143.

IOAx692E Unable to read label for ssss

Explanation: In the process of an INSTALL/ACTIVATE command, OSA/SF is unable to read the label for the specified image file ssss. The possible cause could be a corrupted image file.

ssss = specified image file in the IOACFG

User response: Report to IBM service.

IOAx693E Install for CHPID cc not complete. See message log for details

Explanation: The INSTALL sequence for this CHPID (OSA) did not complete successfully. See the message log for more information.

cc = CHPID

User response: Read the message log. It may be necessary to do an ACTIVATE or INSTALL again.

IOAx694I Install for CHPID *nn* completed successfully

Explanation: The Install command was issued from either the GUI or REXX interface or from the operator Modify command. The installation operation was successful for OSA CHPID *nn*.

User response: Continue with the installation process.

IOAx695I Install for CHPID *nn* started

Explanation: An install operation was issued from the operator Modify command. The installation process has successfully started.

User response: Monitor the system and message log for additional messages that will state the success or failure of the installation. Processing continues.

IOAx696E Install for CHPID *cc* not complete. See command output for details

Explanation: The INSTALL sequence for this CHPID (OSA) did not complete successfully. See the command output window for more information if using GUI. If REXX, messages should be in user console that issued command.

cc = CHPID

User response: Read the command output window. It may be necessary to do an ACTIVATE or INSTALL again.

IOAx697E Incorrect CHPID *cc* was specified

Explanation: Incorrect CHPID (OSA) was specified with modify command.

cc = CHPID - must be alphanumeric from 00 through FF

User response: Correct the CHPID and retry the command

IOAx698E Busy installing CHPID *cc*. Retry command later

Explanation: OSA/SF is busy trying to install CHPID *cc*. This could be because OSA/SF is currently doing an install to another CHPID.

cc = CHPID - must be alphanumeric ranged from 00 through FF

User response: Retry the command when the INSTALL for CHPID *cc* is complete.

IOAx699E Incorrect option specified for CHPID *cc*

Explanation: An incorrect option was entered with the modify command for an OSA install. Valid options are FORCE and NOFORCE. The default is NOFORCE.

NOFORCE installs the OSA mode only when an image

does not already exist, or when the images are different.

FORCE installs the OSA mode regardless of any image already on the OSA feature.

Command Syntax: **F OSASF,INSTALL *cc*,FORCE** or **NOFORCE**

User response: Retry the command with the correct option.

IOAx700E Incorrect parameter *ssssss* specified

Explanation: An incorrect parameter was specified with the modify command for an OSA install. The only valid command is INSTALL. The only required parameter is the CHPID number. Optional parameters are FORCE or NOFORCE. The default is NOFORCE.

The syntax is **F OSASF,INSTALL *cc*,FORCE**; where OSASF is the started task name, and *cc* is the CHPID (OSA).

User response: Retry the command with the correct parameter or syntax.

IOAx701E An attempt was made to free a not valid internal region

Explanation: This is a internal OSA/SF error.

User response: See "Reporting OSA/SF Problems to IBM" on page 143.

IOAx702I Delete of unknown region at line *d* of *s*

Explanation: This is an internal OSA/SF error. OSA/SF will continue to run. An OSA/SF component attempted to free an internal storage area that was already free.

User response: OSA/SF will continue to run, but please contact IBM service if this message is displayed.

IOAx751E START not entered as the first operator command

Explanation: The OSA/SF task was not started by a Start command. OSA/SF can not be started though JCL submission. OSA/SF initialization has terminated.

User response: Start OSA/SF with a Start command. Batch job JCL submission or the use of the TSO SUBMIT command can not be used to start OSA/SF. OSA/SF must run as a started task.

IOAx752W ESTAE macro load failed with rc=*rrrrrrrr*

Explanation: Unable to execute ESTAE macro successfully. No OSA/SF recovery action will be taken upon any exception.

rrrrrrrr = return code from the ESTAE macro

User response: Investigate the return code from the

Messages

ESTAE macro found in *Programming: Authorized Assembler Services Reference, Volume 2, GC28-1476*. Make corrections. Then stop and restart OSA/SF. If unable to correct condition, see “Reporting OSA/SF Problems to IBM” on page 143.

IOAx756W IOASTADM load failed with rc=rrrrrrrr

Explanation: OSA/SF uses a recovery routine, IOASTADM, to handle errors. The recovery routine is LOADED when OSA/SF is started. OSA/SF was unable to load the OSA/SF recovery routine successfully. Therefore, no OSA/SF recovery action will take place for any exception conditions.

rrrrrrrr = return code from LOAD macro.

User response: Investigate the return code from the LOAD macro found in *Programming: Authorized Assembler Services Reference, Volume 3, GC28-1477*. Make corrections. Then stop and restart OSA/SF. If unable to correct condition, see “Reporting OSA/SF Problems to IBM” on page 143.

IOAx776E OSA/SF Abend =xxxx/yyyy. Failing PSW=pppp pppp

Explanation: Host application OSA/SF has abended.

xxxx = abend code

yyyy = reason code

pppp pppp = PSW content at time of abend

User response: Collect the dump dataset and restart OSA/SF. See “Reporting OSA/SF Problems to IBM” on page 143.

IOAx801E Region service failed with RC=rrrrrrrr

Explanation: An internal error has occurred in an OSA/SF memory allocation service routine.

rrrrrrrr = return code for IBM diagnostic use

User response: Additional storage resources are needed by OSA/SF. Check the OSA/SF region size and increase if required. Also check the system console for addition storage resource constraint messages. Free up system storage resource and retry the command that received this message.

If allocating additional storage for OSA/SF does not correct the situation, see “Reporting OSA/SF Problems to IBM” on page 143.

IOAx802E SCC name/token create failed with RC=rrrrrrrr

Explanation: Unable to create a Name/Token pair for an OSA/SF component. This is probably the result of an internal or OSA/SF error.

rrrrrrrr = return code from IEANTCR

User response: Check the IEANTCR return code in *Programming: Authorized Assembler Services Reference, Volume 2, form number GC28-1476* for

possible actions. If the condition can not be corrected, see “Reporting OSA/SF Problems to IBM” on page 143.

IOAx803E SCC name/token retrieve failed with RC=rrrrrrrr

Explanation: Unable to retrieve a Name/Token pair for an OSA/SF component. This is probably the result of an internal or OSA/SF error.

rrrrrrrr = return code from IEANTRT

User response: Check the IEANTRT return code in *Programming: Authorized Assembler Services Reference, Volume 2, form number GC28-1476* for possible actions. If the condition can not be corrected, see “Reporting OSA/SF Problems to IBM” on page 143.

IOAx804I SCC name/token delete failed with rc=rrrrrrrr

Explanation: Unable to delete a Name/Token pair for an OSA/SF component. This is probably the result of an internal or OSA/SF error.

rrrrrrrr = return code from IEANTDL

User response: Check the IEANTDL return code in *Programming: Authorized Assembler Services Reference, Volume 2, form number GC28-1476* for possible actions. If the condition can not be corrected, see “Reporting OSA/SF Problems to IBM” on page 143.

IOAx805E Register for ENF online event failed with rc=rrrrrrrr

Explanation: OSA/SF attempted to register with the Event Notification Facility for an online event. The register attempt failed.

rrrrrrrr = return code from ENF register attempt

User response: Ensure that the Event Notification Facility for the operating system is at the current maintenance level. If problems continue, see “Reporting OSA/SF Problems to IBM” on page 143.

IOAx806E Register for ENF offline event failed with RC=rrrrrrrr

Explanation: OSA/SF attempted to register with the Event Notification Facility for an offline event. The register attempt failed.

rrrrrrrr = return code from ENF register attempt

User response: Ensure that the Event Notification Facility for the operating system is at the current maintenance level. If problems continue, see “Reporting OSA/SF Problems to IBM” on page 143.

IOAx807I Delete of ENF online event failed with RC=rrrrrrrr

Explanation: OSA/SF attempted to delete (unregister)

with the Event Notification Facility for an online event.
The delete attempt failed.

rrrrrrrr = return code from ENF delete attempt

User response: Ensure that the Event Notification Facility for the operating system is at the current maintenance level. If problems continue, see “Reporting OSA/SF Problems to IBM” on page 143.

IOAx808I Delete of ENF offline event failed with RC=*rrrrrrrr*

Explanation: OSA/SF attempted to delete (unregister) with the Event Notification Facility for an offline event.
The delete attempt failed.

rrrrrrrr = return code from ENF delete attempt

User response: Ensure that the Event Notification Facility for the operating system is at the current maintenance level. If problems continue, see “Reporting OSA/SF Problems to IBM” on page 143.

IOAx809E Load of ENF listen module failed with RC=*rrrrrrrr*

Explanation: Unable to load the ENF (Event Notification Facility) event handler.

rrrrrrrr = return code from LOAD macro

User response: Investigate the return code from the LOAD macro found in *Programming: Authorized Assembler Services Reference, Volume 3, GC28-1477*. Make corrections. Then stop and restart OSA/SF. If unable to correct condition, see “Reporting OSA/SF Problems to IBM” on page 143.

IOAx820I CHPID *cc* is no longer managed by this image

Explanation: The OSAD device number with unit address X'FE' was varied offline, so OSA CHPID *cc* cannot be managed by OSA/SF in this image.

cc = CHPID

User response: No user action is needed if the OSAD device was knowingly varied offline to the system. Vary the OSAD device back online to the system. Message IOAx821I should then follow.

IOAx821I CHPID *cc* is now managed by this image

Explanation: The OSAD device for the CHPID was varied online and is now being managed by the OSA/SF in this image.

cc = CHPID

User response: When an OSAD device comes online to the system, OSA/SF will assume management control of the CHPID (if no other OSA/SF is currently managing the OSA). This informational message notifies the user; no user action is required.

IOAx822E ENF exit routine initialization failed with RC=*x*

Explanation: The Event Notification Facility routine for OSA/SF has failed to initialize. OSA/SF will continue to start up but there will be no automatic CHPID online notification.

User response: See “Reporting OSA/SF Problems to IBM” on page 143.

IOAx823E GETMAIN failed with rc = *dddd*.

Explanation: Unable to allocate storage successfully. Failing return code is indicated by *dddd*.

dddd = GETMAIN return code

User response: Investigate the return code from the GETMAIN macro found in *Programming: Authorized Assembler Services Reference, Volume 2, GC28-1476*. Make corrections. Then stop and restart OSA/SF. If unable to correct condition, see “Reporting OSA/SF Problems to IBM” on page 143.

IOAx824E BLDL macro failed with rc = *dddd*.

Explanation: Unable to execute BLDL macro successfully. Failing return code is indicated by *dddd*.

dddd = BLDL return code

User response: Investigate the return code from the BLDL macro found in *Programming: Authorized Assembler Services Reference, Volume 1, number GC28-1475*. Make corrections. Then stop and restart OSA/SF. If unable to correct condition, see “Reporting OSA/SF Problems to IBM” on page 143.

IOAx861E Specified PVC name *ssssssss* is not valid for ATM IP forwarding mode

Explanation: When running in ATM IP Forwarding mode, only PVC name WANPVC00 is allowed.

User response: Correct the PVC name in the input and retry the command.

IOAx862E Only one PVC is allowed when configuring ATM IP forwarding mode

Explanation: You specified more than one (1) PVC entry while configuring ATM IP forwarding.

User response: Fix the input file (GUI or REXX) and retry command.

IOAx863E More than *n* passthru entries with IP addresses specified for port *p*

Explanation: There are more than *n* TCP/IP entries with IP addresses defined in the OAT, where *n* is the limit for the CHPID type. You can only define a maximum of *n* IP addresses per port.

Messages

User response: Define only a maximum of *n* OAT entries with IP addresses for the specified port. See “Guidelines for Changing an OAT” on page 154 for information on limitations.

IOAx864E Primary default entry not removed; secondary (image *p* UA *uu*) exists

Explanation: A port can have one of the following:

- No default entries
- One primary default entry
- Both a primary default entry and a secondary default entry

This OAT entry was previously defined as the primary default entry for the associated port. Replacing this entry would cause the port to have a secondary default entry without a primary default entry. This is not valid. The secondary default entry currently defined has unit address *uu* for image *p*.

p = image number

uu = unit address

User response: Specify a replacement primary default entry or remove both the primary and secondary default entry.

IOAx865E Multi IP addresses not supported by OSA processor code level *x.yy*

Explanation: The multiple IP addresses protocol is not supported by the OSA processor code level *x.yy*. The minimum OSA processor code that supports this enhancement is as follows:

OSA2–6.2x

OSA2–ATM–5.9

OSA2–FENET–1.3

User response: Obtain the specified or higher level of OSA processor code and reissue the Put OAT command.

IOAx866E Secondary default entry (image *p* UA *uu*) specified without a primary

Explanation: A secondary default entry was specified without a primary default entry being on the port.

User response: Add a primary default entry to the input and reissue the Put OAT command.

IOAx867E Get configuration command not valid for new ATM CHPID *cc*

Explanation: A new ATM CHPID does not contain a configuration. This command will therefore not work correctly until the CHPID has been configured once.

User response: Use either the GUI configuration panels or the IOAATM2 SAMPLE file to configure this CHPID. Once you have configured the ATM CHPID

using either of these methods, this command will return valid data.

IOAx868E Duplicate IP addresses found for image *n* UA *uu*

Explanation: The specified OAT entry for image *p* unit address *uu* has multiple IP addresses and more than one IP address was found to have the same value.

User response: Fix the data being used for the PUT OAT command. Reissue the PUT OAT or Install command, whichever was used.

IOAx869E Data not consistent for image *p* UA *uu* & image *p* UA *vv* (Group of 2)

Explanation: OAT entries image *p* UA *uu* and image *p* UA *vv* combine to make one valid OAT entry with a group size of 2. The settable data for both entries (if specified in the input) must match.

p = image number

uu = unit address(even)

vv = unit address(odd)

For Passthru Type, check
port number
IP address(es)
NetMask(s) if applicable

For HPDT MPC Type
port number
OSA name

User response: Fix the data being used for the OAT input. Reissue the Put OAT or Install command, whichever was used.

IOAx870E Entry type *dd* is not supported for CHPID *cc*

Explanation: The specified device type *dd* is not supported on this OSA platform/configuration.

Where *dd* can be:

MPC

Passthru

SNA

SNA Network Management

User response: Fix the data being used for the OAT input. Reissue the Put OAT or Install command, whichever was used.

IOAx871E PVC name *ssss* already used by another PVC entry in the input

Explanation: The PVC name specified *ssss* is already used by another PVC entry in the input.

User response: Choose another PVC name for this entry or remove this PVC entry.

IOAx872E Entry type *dd* is not supported in *ssss* mode for CHPID *cc*

Explanation: The specified entry type *ssss* is not supported when the OSA is configured in *mmmm* mode.

Where *ssss* can be:

Passthru
SNA
SNA Network Management

Where *mmmm* can be:

HPDT Native
ATM(LE)

User response: Fix the data being used for the Put OAT command. Only MPC entry types are valid when the OSA is in HPDT Native mode. Only passthru and SNA entry types are valid in ATM (LE) mode.

IOAx873I *hh:mm:ss* CHPID *cc* port *pp* default entry image *IPV6.css.iid* CULA *u* UA *uu*

Explanation: All unknown IP packets received by port *pp* in CHPID (OSA) *cc* will be forwarded to image *u* UA *uu* per default OAT entry (or TCP/IP definitions for Gigabit Ethernet). This situation can occur under these conditions:

You reset the specified CHPID, and either the primary or secondary default OAT entry is now active.

No primary or secondary default OAT entry was originally defined, but now you have defined one and activated the new configuration.

Both primary and secondary default OAT entries were defined. Because of either an overt action on your part or because of an error on the primary, unknown packets are now being forwarded to image *n* UA *uu* as defined for the secondary default.

Where

cc = CHPID number
pp = port number
nn = image number
uu = unit address number
IPV6 = IPV4 or IPV6
CULA = Control Unit Logical Address (absent from the message if it is not supported)

The specified port on the CHPID (OSA) was previously identified as the default entry for forwarding IP packets and is no longer forwarding the packets.

This message is only displayed on the image where OSA/SF is running and where the CHPID is managed. The secondary image does not display the message if the primary manages the CHPID and fails, nor does the primary display the message when the secondary, or some other image, manages the CHPID.

User response: No action is necessary if you want unknown IP packets to be forwarded to the image/UA

specified in the message text. If you do not want unknown packets forwarded to this image/UA combination, do the following:

- Check that the OAT entries you specified as being the primary or secondary default OAT entries are on the CHPID.
- After this check, if you determine it is not what you want, remove the default OAT entry indicator from this image/UA OAT entry.
- After this check, if the image/UA specified is for the secondary default OAT entry and you want unknown packets going to the primary default OAT entry, then verify that TCP/IP is active on this combination. This may require problem determination as to why the primary default originally failed.

IOAx874W CHPID *cc* port *pp* is no longer forwarding unknown packets

Explanation: The specified port on the CHPID (OSA) was previously identified as the default entry for forwarding IP packets and is no longer forwarding the packets.

Where

cc = CHPID number
pp = port number

User response: This message may require you to take action.

If there was a primary or secondary default OAT entry on the specified CHPID/port forwarding unknown packets, one or both of these entries are no longer available.

Check that TCP/IP is active on the specified image/UA designated as the primary and/or secondary default OAT entry.

This message is only displayed on the image where OSA/SF is running and where the CHPID is managed. The secondary image does not display the message if the primary manages the CHPID and fails, nor does the primary display the message when the secondary, or some other image, manages the CHPID.

IOAx875E Empty Application Dump area for CHPID *cc*

Explanation: The CHPID you issued the GET_DEBUG command to does not have an active SNA application. For OSA2-ATM, there can be two application segments, one for the SNA application and one for the ATM application.

This message can be issued if:

The OSA2-ATM CHPID is not configured for any mode.

The OSA2-ATM CHPID is configured in HPDT ATM Native or IP forwarding mode. In either of these modes, the SNA application is not active.

User response: To configure the OSA mode, refer to

Messages

Chapter 8, “Configuring OSA-Express Modes,” on page 111.

IOAx876E Incorrect data returned from CHPID *cc*

Explanation: The data returned from CHPID *cc* is not valid. This is an internal error probably in the OSA firmware.

User response: See “Reporting OSA/SF Problems to IBM” on page 143.

**IOAx877E An internal OSA/SF error occurred.
Reason code *cccc***

Explanation: An internal OSA/SF error occurred. The reason code is used by IBM to determine where the failure occurred.

User response: See “Reporting OSA/SF Problems to IBM” on page 143.

IOAx878E Port state on CHPID *c* Port *p* is not valid

Explanation: The specified port has indicated an unarchitected state to OSA/SF.

User response: Change the LAN Traffic state to disabled and back to enabled (for OSA-2, disable and enable the Hardware State). See “Enabling and Disabling Ports” on page 127.

See “Reporting OSA/SF Problems to IBM” on page 143.

**IOAx879E Unable to enable physical port
associated with port *pppp***

Explanation: This message is generated when you attempt to enable a physical port and an error occurs enabling the associated physical port.

User response: Follow local procedures for enabling port.

**IOAx880E Target port *pp* is not in current
configuration for CHPID *cc*.**

Explanation: This message is returned whenever you issue a command against a specific port type that is not configured on the OSA feature.

User response: Determine desired action (either reconfigure the card or issue the correct parm ID for the currently configured type) and reissue command.

**IOAx881E image *css.iid CULA u UA nnn* had an
OSA OAT reject code of *xxxx***

Explanation: The image/UA combination indicated had an error described by the reject code *xxxx*. See “OSA Reject Codes” on page 246 for an explanation of the reject codes.

User response: Fix the problem as described in “OSA Reject Codes” on page 246 and try again.

**IOAx882I Action complete. Configure CHPID *cc*
off/on to activate the changes**

Explanation: The action you started is complete. Configure the CHPID offline in all images and then online to activate the change.

User response: None.

IOAx883E "SSAP *nn*, DSAP *nn*, DMAC *nn*"

Explanation: This message contains the information that could not fit into message IOAx312I.

User response: Same as IOAx312I.

**IOAx884E *ttttttt ssssssss* alert received for CHPID
cc port *p***

Explanation: An ATM alert was received from the CHPID and port referenced in the message. The alert can be one of the following:

- Mismatched frame size
- Operation and Maintenance (OAM) loopback timeout
- Mismatched ELAN type

Message IOAC885I contains more information on this alert.

User response: Fix the cause of the problem and continue.

See “Reporting OSA/SF Problems to IBM” on page 143.

IOAx885I Expected *ssssssss* was *rrrrrrrr*

Explanation: This is information associated with message IOAC884E. *ssssssss* will be one of the following:

- Frame size
- LAN emulation type

The information in *rrrrrrrr* depends on which of the above appears in the message.

For frame size it can be one of:

- 1516
- 4544
- 9234
- 18190

For LAN emulation type it can be:

- Ethernet
- Token Ring

User response: Make the necessary changes and rerun the operation.

IOAx886I *ttttttt ssssssss alert received for CHPID cc port p*

Explanation: An ATM alert indicating OAM loopback established has been received from the OSA. This is an informational message only.

User response: None.

IOAx887W **image *x* UA *y* is not defined in the Channel Subsystem**

Explanation: The specified OAT entry is defined in the OSA address table but not defined in the Channel Subsystem. The OSA can only flow traffic if the image/UA combination is defined in both the Channel Subsystem and in the OAT.

User response: Define the devices in the Channel Subsystem and retry the process. If you are installing OAT entries for a Channel Subsystem other than on the one you are currently running OSA/SF, you need to make that Channel subsystem active in order to make traffic flow.

IOAx888I *ssssssssss for CHPID dddd*

Explanation: The command completed before the port completely entered the enabled or disabled state.

ssssssssss = Port is in enabling state or Port is in disabling state
dddd = OSAD CHPID

User response: Issue the Query command from IOACMD or refresh the GUI and check the LAN traffic enabled field to determine the state of the port.

IOAx889E **Logical port *pp* is in use by image *nn* UA *xxxx***

Explanation: A command was issued to disable the port, but one or more devices associated with this port are in use.

pp = Port ID
nn = image
aaaa = Unit Address

User response: Stop the programs that are using the devices. Retry the command.

IOAx890E **Configuration parameter *aaaa* not supported for CHPID *cc***

Explanation: The parameter specified in the message is not valid for this hardware model.

User response: Correct your configuration file and reissue the command.

IOAx891W **Port type *pppp* not supported on OSD CHPID *cccc* port *nn***

Explanation: This message is presented when the port type received from the OSA is not supported on this CHPID type. This situation will occur if the target OSA CHPID was dynamically changed from one CHPID type to another and the CHPID has not been reconfigured.

Message variables are:

pppp is port type of **HPDT ATM Native** or **Emulated Token Ring**
cccc is target CHPID number
nn is target port number

User response: Issue the REXX Configure OSA CHPID or the GUI activate command for the target CHPID.

IOAx892W **The port type of CHPID *cccc* is not supported by this version of OSA/SF**

Explanation: OSA/SF detected an OSA CHPID whose port type could not be determined. This is probably due to a newly available CHPID type, which your version of OSA/SF does not support.

User response: Upgrade to the latest level of OSA/SF.

IOAx893E **CHPID *cc* port *pp* reports excessive port state changes**

Explanation: CHPID *cccc* has most likely experienced a hardware error which is causing port *pp* to move repeatedly from the enabled state to the disabled state. After this error is reported, all other port state change messages will be suppressed for 30 minutes. At that time, if the condition still persists, additional port state change messages will be presented, followed again by this message. This pattern will continue until the port is disabled externally or the hardware condition is corrected.

User response: Disable the port or find the cause of the hardware error.

IOAK894E **Data length mismatch on CHPID *xx*. Please retry command.**

Explanation: This error will occur if two users issue the command to query extended multicast or IP address information at the same instant. Retrying the command should clear up the problem.

User response: Retry the command and verify that this correctly completes.

Messages

IOAK895E Port type does not support specified configuration file type\n

Explanation: There is an entry in the OSAS.CONFIG file which indicates a port type which is not the port type specified for the current command. If the user has modified the OSAS.CONFIG file, check to make sure that an error has not been introduced. If not, then this is most likely an internal error.

User response: Check the OSAS.CONFIG file for errors.

See "Reporting OSA/SF Problems to IBM" on page 143.

IOAx897E OSAD device not found on logical control unit 0 for CHPID xx

Explanation: The OSAD device must be defined on logical control unit 0 when configuring devices for the system. This message only applies to OSD CHPID types.

User response: Update the system configuration to include an OSAD device for the specified CHPID on logical control unit 0.

IOAC898W mm:dd:yy CHPID cc port pp s1 s2 has no active default router

Explanation: The specified port on the CHPID (OSA) was previously identified as the default entry for forwarding IP packets and is no longer forwarding packets.

The following apply to this message:

mm:dd:yy

is the current timestamp

cc

is the affected CHPID

pp

is the affected port

s1

is the indication of whether the IP address is IPV4 or IPV6 format

s2

is either blank or a VLAN (virtual LAN) indicator

User response: This message may require you to take action. If there was a primary or secondary default OAT entry on the specified CHPID/port which was forwarding unknown packets, one or both of these entries is no longer available.

Check that TCP/IP is active on the specified image/UA designated as the primary and/or secondary default OAT entry.

This message is displayed on the image only if OSA/SF is running in the same image that is managing the CHPID. The secondary image does not display the message if the primary manages the CHPID and fails, nor does the primary display the message when the secondary, or some other image, manages the CHPID.

IOAx951W Not valid or closed pipe

Explanation: This is an internal OSA/SF error.

User response: Stop and restart OSA/SF to attempt a recovery. If the condition continues, see "Reporting OSA/SF Problems to IBM" on page 143.

IOAx952W Failed to open pipe communications

Explanation: This is an internal OSA/SF error.

User response: Stop and restart OSA/SF to attempt a recovery. If the condition continues, see "Reporting OSA/SF Problems to IBM" on page 143.

IOAx953E Failed to drain pipe

Explanation: This is an internal OSA/SF error.

User response: Stop and restart OSA/SF to attempt a recovery. If the condition continues, see "Reporting OSA/SF Problems to IBM" on page 143.

IOAx954E Pipe full

Explanation: This is an internal OSA/SF error.

User response: Stop and restart OSA/SF to attempt a recovery. If the condition continues, see "Reporting OSA/SF Problems to IBM" on page 143.

IOAC955W Unknown error while writing to pipe

Explanation: This is an internal OSA/SF error.

User response: Stop and restart OSA/SF to attempt a recovery. If the condition continues, see "Reporting OSA/SF Problems to IBM" on page 143.

IOAC956E Pipe communication error dd

Explanation: An internal communication error occurred within OSA/SF.

User response: Stop and restart the Attention Server (IOANMAIN). If the problem persists, contact the IBM support center.

IOAx998I sssssssssssssssss

Explanation: This message is presented when OSA/SF has system error information to communicate. The message is only presented in the OSA/SF message log.

ssssssssssssssss is the text of the message.

User response: Take appropriate steps based on the text of the message..

**IOAx999I Configuration mode for CHPID_{cc} is
mmmmmmmm**

Explanation: This is an informational message to indicate what configuration mode the specified CHPID is running with.

mmmmmmmm is one of the following or a valid combination of the following.

HPDT MPC
HPDT ATM
ATM(LE)
TCP/IP Passthru
SNA
LANRES

User response: None.

SNMP Subagent Messages

IOB000I Starting OSA SNMP subagent

Explanation: The OSA Direct SNMP subagent has been started and is going through initialization

User response: None.

**IOB001I OSA Subagent: Using loopback to
connect to agent**

Explanation: The OSA subagent is using the local address LOOPBACK to connect to. This was done since a host address was not supplied on the invocation.

User response: None

**IOB002I Could not obtain handle from agent.
Retrying**

Explanation: During initialization, the subagent needs to connect to the SNMP agent to process any commands. The connection could not be established.

User response: Check the following:

1. The SNMP agent (normally OSNMPD) is running
2. The correct port is being specified on invocation
3. The correct stack is being specified on invocation

See page 243 for more detailed problem determination information.

IOB003E Need community name

Explanation: The OSA subagent was started without a valid community name.

User response: When the OSA subagent was started, the -c option was used, but there was no corresponding name specified, -OR- the parameter specified was not valid.

IOB004E Need stack name

Explanation: The OSA subagent was started with the -s option, but no stack name was supplied.

User response: Specify a valid stack name when starting the OSA subagent with the -s parameter.

IOB005E Need port number

Explanation: The OSA subagent was started with the -p option but a valid port number was not specified.

User response: Provide a valid port number when starting the OSA subagent if you specify the -p option.

IOB006E Need debug level

Explanation: The OSA subagent was started with the -d option, but a valid value was not entered

User response: Enter a valid debug level (0 or higher) when starting the OSA subagent with the -d option

**IOB007E DPI rc received from Agent --> n.
Exiting**

Explanation: The OSA Subagent received the indicated rc from the SNMP agent. This rc was not expected and indicates that the subagent cannot continue processing.

User response: Check the output job to see if any errors that can be corrected are noted. If not, check the SNMP agent, normally started as OSNMPD, which may indicate the cause of the unexpected rc.

See "Reporting OSA/SF Problems to IBM" on page 143.

IOB008E Received NULL hdr from Agent. Exiting

Explanation: The OSA subagent received a NULL response from the SNMP Agent. It was expecting a command or response.

User response: Re-start the OSA subagent and retry the command.

See "Reporting OSA/SF Problems to IBM" on page 143.

IOB009E Unexpected DPI packet type nn

Explanation: The OSA subagent received a request from the Agent that it did not understand. The value received was 'n'.

User response: Re-start the OSA subagent and retry the command.

See "Reporting OSA/SF Problems to IBM" on page 143.

Messages

IOB010E Bad RC X received from OSA on ssss

Explanation: The OSA returned a request with a non-zero return code of X. The OSA in question is device ssss.

User response: None.

See "Reporting OSA/SF Problems to IBM" on page 143.

IOB011E The input OID matches one already in the list

Explanation: The OID received from an OSA init request is already in the list maintained by the OSA subagent.

User response: Re-start the OSA subagent.

IOB012E Could not allocate storage for interface nn

Explanation: The OSA subagent attempted to allocate memory to communicate with interface nn and it could not be obtained.

User response: Check your system resources to make sure there is enough free memory for the OSA subagent job. Re-starting the subagent may alleviate the problem.

See "Reporting OSA/SF Problems to IBM" on page 143.

IOB013E Could not make socket to talk to OSA

Explanation: IOBSNMP is not running in an APF authorized address space.

User response: Re-start IOBSNMP in an APF authorized address space.

IOB014E hdr_p->error_code not DPI_noError for unregister

Explanation: The OSA subagent did not receive a successful return code when it attempted to unregister an OID with the SNMP Agent.

User response: Re-start the OSA subagent

IOB015E Could not open connection to agent

Explanation: The OSA subagent attempted to start communications with the SNMP agent and it failed.

User response: Check that the SNMP agent is running and is not issuing error messages. Check that the SNMP Agent and the OSA subagent are being started with the same port number if you are using the -p option.

IOB016E Could not send open packet to agent

Explanation: The OSA subagent was not able to send an open packet request to the SNMP Agent.

User response: Make sure the SNMP Agent is running and has not indicated any errors. Make sure the port used for the SNMP Agent and the OSA subagent are the same if using the -p option.

IOB017E Did not receive answer from agent

Explanation: The OSA subagent expected a response from the SNMP Agent and it never arrived.

User response: Check that the SNMP Agent is still running and has not reported any errors. Re-start the OSA subagent.

IOB018E Received NULL hdr from Agent. Exiting

Explanation: The OSA subagent received a NULL response from the SNMP Agent. It was expecting a command or response.

User response: Re-start the OSA subagent and retry the command.

See "Reporting OSA/SF Problems to IBM" on page 143.

IOB019E Did not receive SNMP response from agent

Explanation: The OSA subagent expected a response from the SNMP Agent and it never arrived.

User response: Make sure the SNMP Agent is up and running and has not reported any errors. Re-start the OSA subagent.

IOB020E OSA SNMP Subagent: Internal error XX

Explanation: The OSA SNMP subagent had an internal error that prevents it from functioning.

User response: Re-start OSA subagent.

IOB021I OSA SNMP Subagent initialization complete

Explanation: The OSA SNMP subagent is now ready to accept requests from the SNMP Agent.

User response: None

IOB022E OSA SNMP Subagent: duplicate subagent identifier error

Explanation: The OSA Subagent attempted to connect to the SNMP Agent. It got back an error indicating a duplicate subagent identifier. Check for errors from the SNMP Agent

User response: Try re-starting the SNMP Agent, then

re-starting the OSA subagent.

IOB023I Using default stack name ssss in INET environment

Explanation: The OSA subagent was able to connect to stack ssss in an INET environment.

User response: None

IOB024E Could not establish affinity with ssss

Explanation: The OSA subagent attempted to establish affinity to stack ssss and it could not be completed successfully.

User response: Make sure the stack name specified is correct. Make sure the stack is up and functioning.

IOB025E Exiting due to bad RC from last function

Explanation: The OSA subagent tried to send a message to the SNMP Agent and got back a return code it did not understand or expect.

User response: None.

See "Reporting OSA/SF Problems to IBM" on page 143.

IOB026E Could not initialize list

Explanation: The OSA Subagent could not initialize its internal lists.

User response: Check that there is enough memory available for the OSA subagent. Make sure there are no system problems preventing storage allocation.

See "Reporting OSA/SF Problems to IBM" on page 143.

IOB027E Debug level specified must be greater than 0

Explanation: The -d option was entered when the OSA subagent was invoked, but the value received was less than 0. Valid values are 0 or higher.

User response: Re-start the OSA subagent with a proper debug value.

IOB028E Using stack name ssss

Explanation: The OSA subagent is connected to stack ssss.

User response: None. If you are having trouble getting data from the OSA subagent, check this stack name vs. the one you are trying to get data for and make sure they are the same.

IOB029E Could not obtain memory

Explanation: The OSA subagent attempted to allocate memory and there was none available.

User response: Check that there are enough resources available for the OSA subagent to allocate memory.

See "Reporting OSA/SF Problems to IBM" on page 143.

IOB030E OSA Direct Subagent is already active on stack ssssssss

Explanation: A copy of the OSA Direct SNMP Subagent is already running on the specified stack.

User response: None.

IOB031I OSA SNMP subagent has ended

Explanation: The OSA Direct SNMP subagent has finished running and is no longer active.

User response: None. This occurs when the user has issued the MVS stop command from the console.

IOB032I mm/dd/yyyy time

Explanation: This shows the date and time which corresponds to messages that follow this one in the OSA Direct SNMP job output.

User response: Check the messages following this one to see what was logged. If needed, take corrective action. The date and time are recorded to indicate when the corresponding message(s) were recorded.

See page 243 for more detailed problem determination information.

Technical Hints (for messages IOB032I and IOB002I):

Messages

The IOBSNMP SNMP subagent issues one of the following two messages:

- IOB002I *date time* Could not obtain handle from agent. Retrying
- IOB002I *date time* Could not obtain handle from agent. Exiting

This may occur when starting IOBSNMP or after IOBSNMP has been running successfully for some time. This message may be accompanied by the following message:

IOB032I *date time* Disconnecting from SNMP Agent w/ RC -5

There are several reasons why either of the above problems could occur. To troubleshoot the problem, use the following checklist.

1. Determine if the problem is occurring at startup or if IOBSNMP runs successfully for some time before the message is issued. If the problem occurs at startup, go to step 2. Otherwise, go to step 7.
2. Ensure that the SNMP agent is active.
3. Verify that the community name being used by IOBSNMP is consistent with the SNMP agent's community name configuration. To do this, first determine what community names and IP addresses are configured for the SNMP agent. If the agent being used is the one shipped with the z/OS CommServer product, check the agent's pw.src file (or the snmpd.conf file if that is being used) for the community name information. Details on these configuration files are in Chapter 24 of the *z/OS Communications Server: IP Configuration Reference*: pw.src, and snmpd.conf. Note that if an snmpd.conf file exists, any pw.src file configuration is not used.

Once the correct community name being used by the SNMP agent has been determined, check the IOBSNMP subagent to determine what community name it is using to connect to the SNMP agent. This will be configured in the JCL used to start IOBSNMP by the '-c' parameter:

```
//IOBSNMP PROC P='-c public -p 161 -s TCPIP -d 0'
//IOBSNMP EXEC PGM=IOBSNMP,TIME=1440,REGION=4096K,
//          DYNAMNBR=5,PARM='&P'
//*
//SYSPRINT DD  SYSOUT=*
//SYSUDUMP DD  SYSOUT=*
```

If no '-c' parameter exists, the default of 'public' is used. Note that the community name is case sensitive, and any inconsistency between the community names used by IOBSNMP and the SNMP agent causes an error. If you are using the SNMP agent shipped with the z/OS CommServer product, you can verify that an incorrect community name is being used by activating an SNMP agent trace at level 72. The trace will write a message indicating that a failure occurred with return codes -14 and SNMP_RC_NOT_AUTHENTICATED. This indicates that an SNMP subagent or manager has attempted to access the SNMP agent with a bad community name or from the wrong IP address.

4. If the community name is correct, ensure that the SNMP agent is listening on the port specified by the '-p' parameter in IOBSNMP's started procedure.

```
//IOBSNMP PROC P='-c public -p 161 -s TCPIP -d 0'
//IOBSNMP EXEC PGM=IOBSNMP,TIME=1440,REGION=4096K,
//          DYNAMNBR=5,PARM='&P'
//*
//SYSPRINT DD  SYSOUT=*
//SYSUDUMP DD  SYSOUT=*
```

If no '-p' parameter is specified in IOBSNMP's started procedure, it uses 161 as the default. Verify on which port the SNMP agent is listening by issuing a NETSTAT command from either SDSF or the operator's console. In this example, a stack named TCPIP3 is used:

```
d tcpip,tcpip3,n,conn
:
:
OSNMPD3  00000020 UDP
LOCAL SOCKET:  :...161
:
:
END OF THE REPORT
```

If the port numbers do not much, alter the '-p' parameter for IOBSNMP to cause IOBSNMP to use the correct port.

5. If running in a CINET (multiple stack) environment, ensure that the stack name specified by the '-s' parameter in IOBSNMP's started procedure is the same stack to which the SNMP agent is bound.

```
//IOBSNMP PROC P='-c public -p 161 -s TCPIP -d 0'
//IOBSNMP EXEC PGM=IOBSNMP,TIME=1440,REGION=4096K,
//          DYNAMNBR=5,PARM='&P'
//*
//SYSPRINT DD SYSOUT=*
//SYSUDUMP DD SYSOUT=*
```

6. If the problem continues to occur despite verifying that the correct configuration is being used, use the '-d 2' option to obtain the IOBSNMP trace and contact OSA level 2 support. This option is specified in the procedure used to start IOBSNMP.

```
//IOBSNMP PROC P='-c public -p 161 -s TCPIP -d 2'
//IOBSNMP EXEC PGM=IOBSNMP,TIME=1440,REGION=4096K,
//          DYNAMNBR=5,PARM='&P'
//*
//SYSPRINT DD SYSOUT=*
//SYSUDUMP DD SYSOUT=*
```

Note that the output of this trace is sent to IOBSNMP's joblog. If you are using the SNMP agent shipped with the z/OS CommServer product, it is also beneficial to activate a level 72 trace with the following MODIFY command:

```
/MODIFY OSNMPD,TRACE,LEVEL=72
```

where OSNMPD is whatever jobname under which your SNMP agent runs. The output from this trace is written to the SYSLOG daemon. Additional information about tracing the SNMP agent is in Informational APAR II13477, and additional information on SYSLOGD is in Informational APAR II12021.

7. If the IOB002I message is not issued at startup, the IOBSNMP subagent is most likely getting disconnected from the SNMP agent due to a timeout condition. Ideally, it is best to obtain an IOBSNMP level 2 trace and--if you are using the z/OS CommServer's SNMP agent--an SNMP agent level 72 trace. Information on these two traces is in step 6. The SNMP agent trace shows the following messages:

```
.. select() timed out
cDPIpacket: Major=2, Version=2, Release=0, Id=3541, Type=SNMP_DPI_CLOSE
cDPIClose: close reason_code=7 (timeout)
IDSTMOE.I0493373.SOURCE.S@AGV123(2638):
Sent Subagent packet on fd 8
# Dump of 9 byte outgoing Subagent packet, count 9703
00 07 02 02 00 0d d5 09 07
EZZ6229I Closing DPI UNIX socket connection, fd=8
```

However, given the unpredictable nature of this type of problem, tracing is often difficult. As such, there are two additional suggestions (steps 7 and 8) that you can try to resolve the problem without tracing.

8. Try increasing the timeout value the SNMP agent uses for the IOBSNMP agent. Whenever an SNMP subagent connects to an SNMP agent, it specifies timeout values the agent should use when sending queries for values supported by that subagent. By default, some of the values specified by IOBSNMP are three seconds. Depending on what values are being queried, IOBSNMP may require more than three seconds to respond, causing the SNMP agent to timeout the connection with the subagent.

The method used to increase the timeout value used by the SNMP agent varies, depending on which SNMP product you use. If you are using z/OS CommServer's SNMP agent, you can use an SNMP manager to issue a SET command to increase the value of the following objects:

```
saTtimeout.1.3.6.1.2.1.10.7.2.0
saTtimeout.1.3.6.1.4.1.2.6.188.1.1.0
saTtimeout.1.3.6.1.4.1.2.6.188.1.3.0
saTtimeout.1.3.6.1.4.1.2.6.188.1.4.0
saTtimeout.1.3.6.1.4.1.2.6.188.1.8.0
```

Messages

An example of doing this using the `osnmp` command line interface (also shipped with the z/OS CommServer product) follows. Note that *commname* should be replaced with the appropriate community name set up for your system. In this example, the timeout values are increased to ten seconds.

```
osnmp -c commname set saTimeout.1.3.6.1.2.1.10.7.2.0 10
osnmp -c commname set saTimeout.1.3.6.1.4.1.2.6.188.1.1.0 10
osnmp -c commname set saTimeout.1.3.6.1.4.1.2.6.188.1.3.0 10
osnmp -c commname set saTimeout.1.3.6.1.4.1.2.6.188.1.4.0 10
osnmp -c commname set saTimeout.1.3.6.1.4.1.2.6.188.1.8.0 10
```

Note that you can also display the current timeout values for the different MIB subtrees by issuing the following command through the `osnmp` command line interface:

```
osnmp -v -c commname walk saTimeout
```

Also note that this change would have to be made every time the IOBSNMP subagent is restarted. This includes any time that IOBSNMP is disconnected from the agent, as the timeout value will be reset to the default when the subagent reconnects.

9. Another possibility, particularly if the IOB002I message seems to be issued during periods of increased system workload, is that the IOBSNMP subagent is not getting enough CPU time. As a result, when the SNMP agent sends a query to IOBSNMP, IOBSNMP cannot obtain enough CPU time to fulfill the query before exceeding the timeout value.

To prevent this, try increasing IOBSNMP's dispatching priority. This increases the likelihood that IOBSNMP is dispatched more often and helps it obtain enough CPU time to fulfill the SNMP agent's queries. Note that on systems where heavy CPU workloads are experienced, this still may not prevent the error.

10. If none of these suggestions provides a resolution, attempt to gather a trace. If a trace cannot be collected, contact OSA level 2 support.

OSA Reject Codes

Any of the following OSA return codes can be included in a message displayed by host programs other than OSA/SF. The message description for the other application directs you to this section.

- | | |
|-------------|--|
| E003 | An invalid LAN type was detected. Ensure that the LAN type defined in your configuration matches the actual LAN type being used. |
| E004 | An invalid LAN number was detected. Check the LAN port number specified in your setup. |
| E005 | An IP address was received by the OSA port that duplicates an IP address already in use by another MPC (HPDT MPC mode) or LCS (TCP/IP Passthru mode) session attached to the port.

Change one of the IP addresses.

Refer to the issuing message documentation for information on any other appropriate action to take. |
| E006 | The IP address table is full. Remove some of your TCP/IP addresses. See Table 30 on page 263 for the limits of each OSA type. |
| E010 | The primary default image has already been defined. |
| E00A | An IP address was received by the OSA port that duplicates an IP address being used by another IP connection in the IP network. Change one of the IP addresses in the network. |
| E00B | Invalid frame type detected. Check that the frame type specified in your setup is correct. |
| E00C | Unsupported LAN type. |

- E053** The MAC address specified for a Layer 3 Virtual MAC is not valid. Check the address specified in the TCP/IP profile
- E054** A Duplicate MAC address was detected for the Layer 3 Virtual MAC being assigned. This MAC address is already in use by another stack. Change one of the Layer 3 Virtual MAC addresses being used.
- E056** The Virtual MAC address table is full. Remove some of the Layer 3 Virtual MAC addresses and try again.
- E057** The Layer 3 Virtual MAC being used is the same as the currently assigned OSA universal MAC address. Change either the Layer 3 Virtual MAC or the OSA assigned universal MAC address.
- E080** A LAN connection could not be made, possibly for one of the following reasons:
 - The cable may not be present
 - The LAN may not be functioning
 - The port may have been disabled from the Support Element (SE) of the server
 - This may be seen the first time any stack is brought up after the OSA has been taken out of Link Aggregation mode. This occurs due to the OSA dropping light to any attached switch when it was removed from the Link Aggregation. The starting of a new stack causes OSA to re-enable light to the switch. Shortly after this code is posted, it should be followed by the stack initialization message. This is normal operation. (If the stack does not complete initialization after seeing this code, then follow the normal error reporting procedures.)

Fix the error as explained above. Then, depending on the error, restart the device or restart TCP/IP.

Internal Errors

The following return codes indicate internal errors and should be reported to IBM:

E001 or E100

The communication to the OSA port cannot be successfully started. This is most likely due to an error in the LINK statement defined in TCP/IP (for example, the port number or the LAN type specified is not correct) or the state of the OSA port cannot support traffic at this time.

If the failure is due to a misconfiguration in the LINK statement, correct the error and start the device again. If the error is due to something else, investigate the state of the specific port to make sure that it is enabled and operational, and then reissue the command. If neither of these options resolves the problem, report the problem to IBM.

- E002** Invalid MTU size was detected.
- E007** A LAN port state error was detected.
- E008** A start LAN command was not received.
- E009** The Set IP command was already received.
- E012** Invalid Set Routing indicator.
- E00D** Invalid IP version specified.
- E00E** Unsupported ARP assist command received.

- E055** Sequence error. The commands sent to OSA from the attached host are in the wrong order.

OSA Network Traffic Analyzer Error Codes

- 0003** An attempt was made to enable OSA-Express Network Traffic Analyzer (OSAENTA) tracing for a specified OSA, but the current authorization level does not permit it. To change the authorization that allows OSAENTA to be used on this specified OSA, refer to *Support Element Operations Guide* (SC28-6860).
- 0005** An attempt was made to enable OSA-Express Network Traffic Analyzer tracing for a specified OSA that already has either OSAENTA or OSA Lan Analyzer tracing enabled elsewhere on the system for this OSA. Only one instance of active tracing (either OSAENTA or OSA Lan Analyzer) for a specified OSA is permitted on the system at any one time.

OSA IDX Failure Return Codes

- 0x17** An attempt was made to activate an OSA-Express feature with device addresses defined in the IDX command that are not consistent with those defined in the IODF. Ensure all device addresses defined in the IDX command are defined in the IODF, defined for the correct CHPID, and all with channel path type OSD
- 0x19** An attempt was made to establish a connection on a device that has been put into "exclusive use" mode. z/VM uses "exclusive use" for devices that are part of a link aggregate group on a virtual switch. If you are running OSA/SF, you can query the OSA to find out which VSWITCH is currently using it.

Part 3. Appendixes

Appendix A. Physical Connection Information

Physical Ports and LEDs

Each OSA-Express feature has a set of LEDs for each physical port. One set indicates OSA status, the other indicates status of the PCI bus, through which the OSA communicates with the network. The number of PCI LEDs depends on the OSA-Express feature type. Figure 54 on page 252, Figure 55 on page 254, and Figure 56 on page 256 show the relative positions of the physical ports and LEDs on the various OSA-Express features. Table 20 on page 252 through Table 28 on page 257 explain how to read the LEDs.

When determining status from the PCI LEDs it is important to note that on OSA features with more than 1 port, the port 1 (bottom) set of LEDs is reversed due to the way the PCI card is mounted on the OSA-Express feature.

OSA-Express

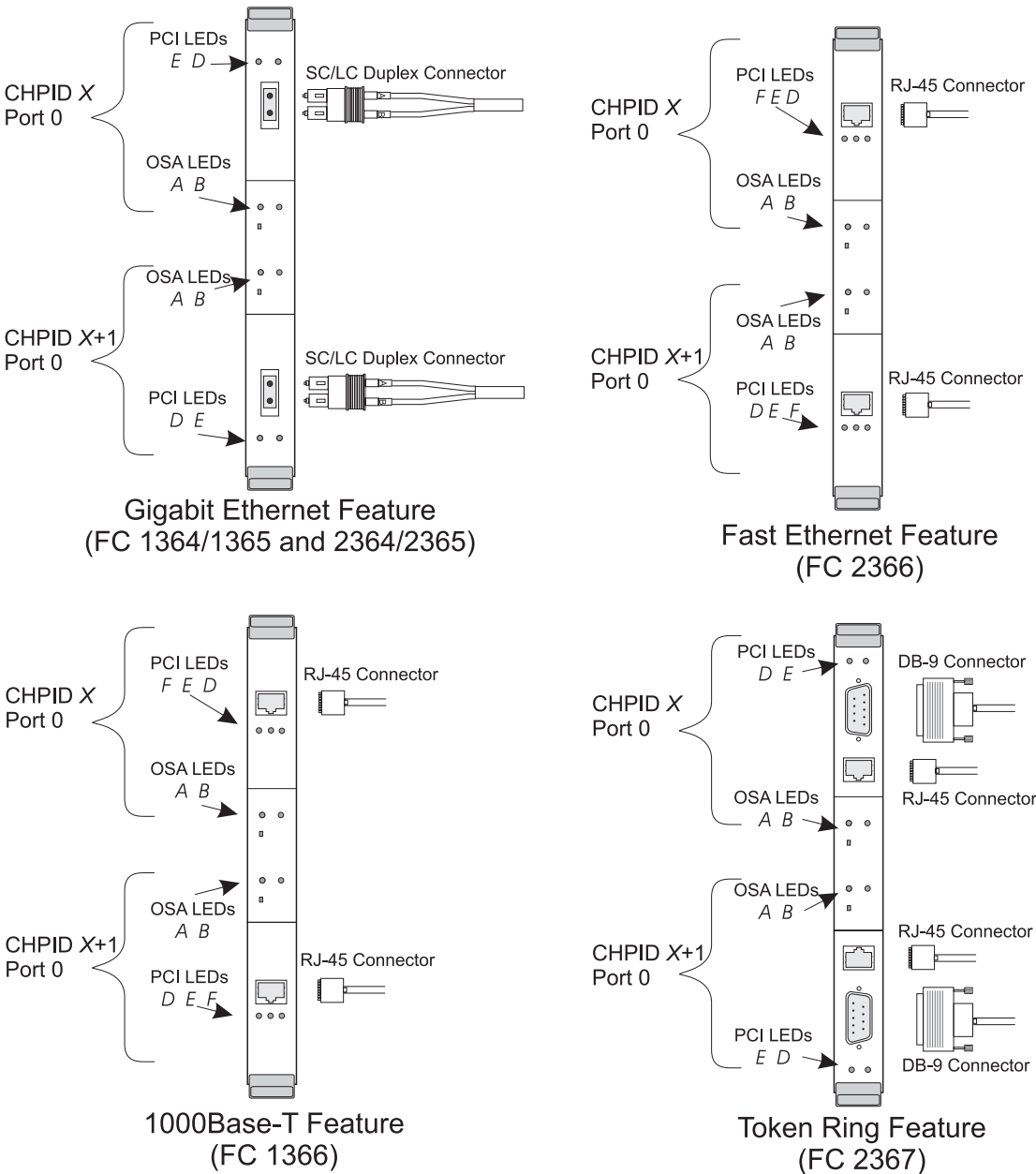


Figure 54. OSA-Express Connections and LEDs

Depending on which OSA-Express feature is installed, up to four additional LEDs may be found for each physical port on the bezel. These indicate PCI bus status.

Table 20. PCI LEDs - Number of LEDs differs by OSA-Express Feature (Gbe)

Feature	D (Amber)	E (Green)	F (Amber)	G (Amber or Green)
GbE	ON = Transmitting or receiving	ON=Port Active	Unused	Unused

Table 21. PCI LEDs - Number of LEDs differs by OSA-Express Feature (FENET)

Feature	D (Amber)	E (Green)	F (Green)
FENET	ON = Transmitting or receiving	ON = 100Mb/ps OFF = 10Mb/ps	ON=Full duplex OFF=half duplex

Table 22. PCI LEDs - Number of LEDs differs by OSA-Express Feature (1000Base T)

Feature	D (Amber or Green)	E (Green)
1000Base-T	AMBER ON = 1000Mb/ps Full duplex only GREEN ON = 100Mb/ps OFF = 10Mb/ps	ON=Link BLINKING=Activity OFF=No activity

Table 23. PCI LEDs on Token Ring Feature

D (Amber)	E (Green)	Meaning
On	On	Adapter reset — only on until microcode runs
Off	On	Diagnostics failed; adapter check; fatal error
On	Off	Adapter open; adapter OK
Off	Off	No power, initialization in progress
Blinking	On	Not used
Blinking	Off	Awaiting open; adapter OK
On	Blinking	Beaconing; hard error
Off	Blinking	Wire fault; auto removal; open failed
Blinking	Blinking	Awaiting initialization; Diagnostics not yet started

OSA-Express2

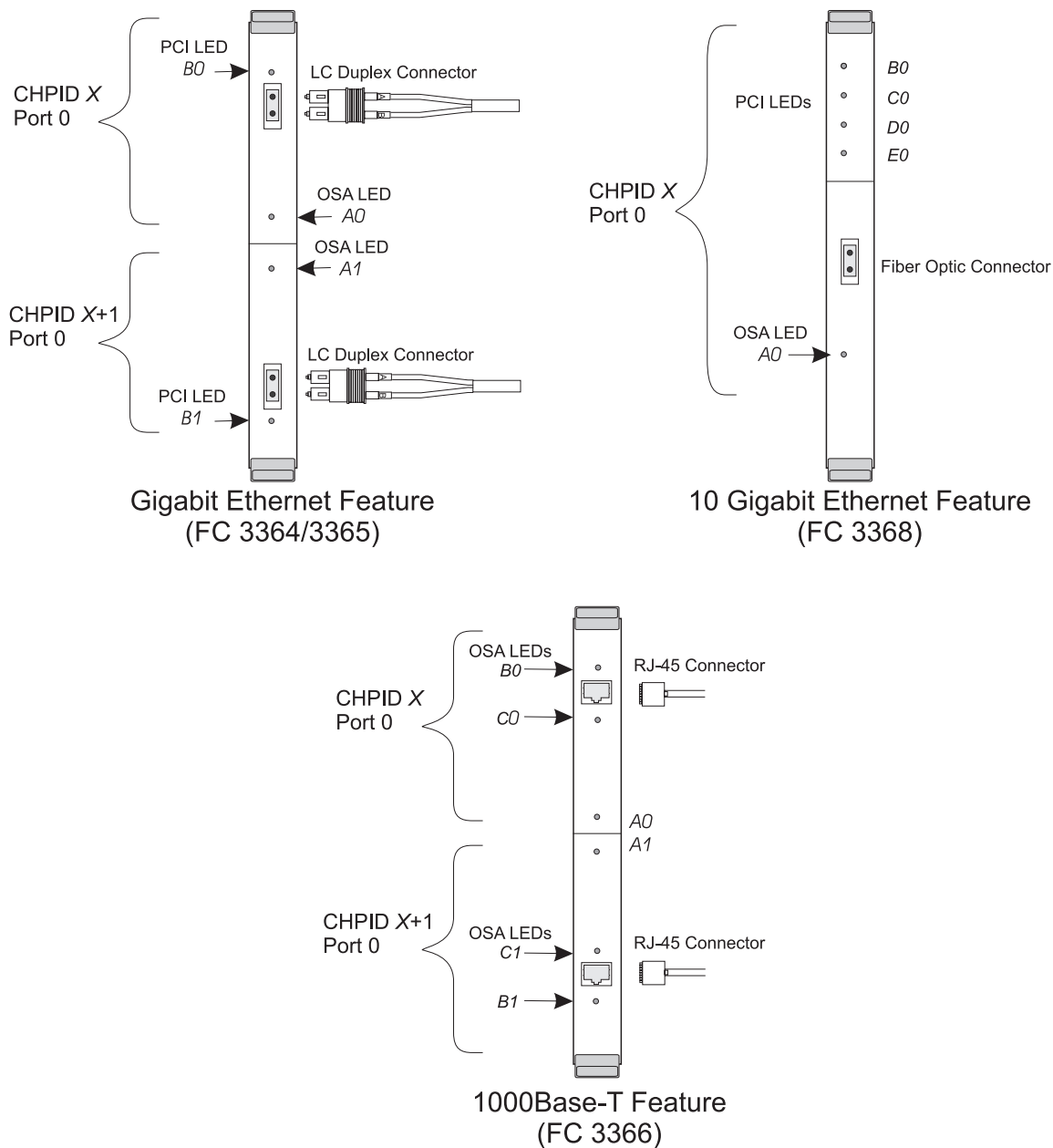


Figure 55. OSA-Express2 Connections and LEDs

Depending on which OSA-Express feature is installed, up to four additional LEDs may be found for each physical port on the bezel. These indicate PCI bus status.

Table 24. PCI LEDs - Number of LEDs differs by OSA-Express Feature (Gbe)

Feature	A (Green)	B (Green)
GbE	ON=Port Active	Blinking = Transmitting or receiving

Table 25. PCI LEDs - Number of LEDs differs by OSA-Express Feature (10 Gbe)

Feature	B (Green)	C (Green)	D (Green)	E (Unused)
10 GbE	ON = Transmitting or receiving	ON = Receiving	ON = Connecting to link partner	Unused

Table 26. PCI LEDs - Number of LEDs differs by OSA-Express Feature (1000Base T)

Feature	C (Amber or Green)	B (Green)	A (Green)
1000Base-T	AMBER = 1000Mb/ps Full duplex only GREEN = 100Mb/ps OFF = 10Mb/ps	BLINKING = Link activity OFF = No activity	ON = Power on, offline, reset pending, or processor frozen OFF = Non- functional, no power, or processor frozen BLINKING = Ready, online

OSA-Express3

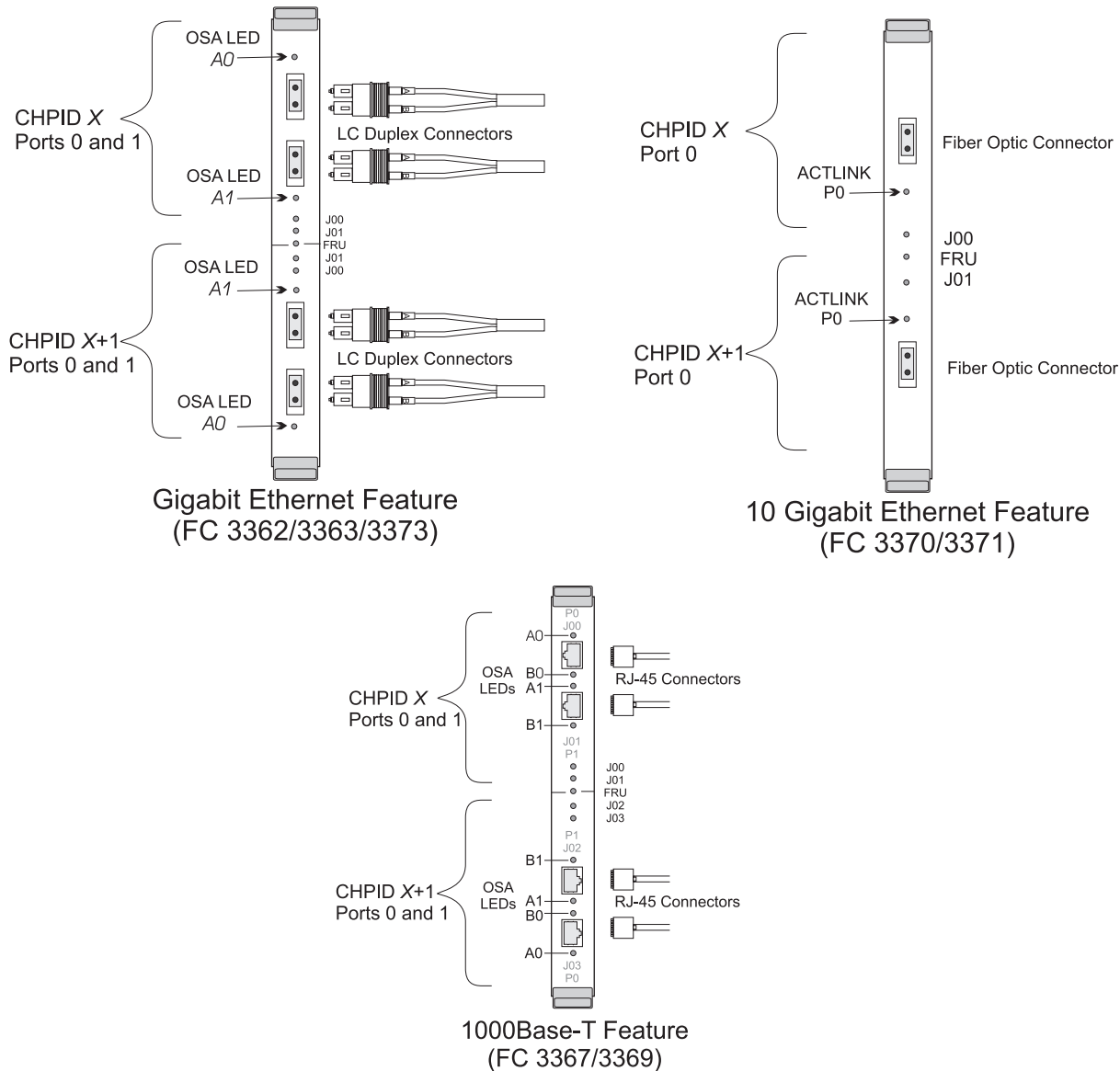


Figure 56. OSA-Express3 Connections and LEDs

Depending on which OSA-Express feature is installed, up to four additional LEDs may be found for each physical port on the bezel. These indicate PCI bus status.

Table 27. PCI LEDs - Number of LEDs differs by OSA-Express Feature (Gbe)

Feature	A0/A1 (Green)	FRU	J0/J1
GbE	OFF=No link/No Activity	OFF=Default	OFF=Default
	ON=Link/No Activity	ON=Ready for replace cable or identifies position	ON=Ready for replace cable or identifies position
	Flashing=Link/Activity	Blinking=Diagnostic or isolation in progress	Blinking=Diagnostic or isolation in progress

Table 28. PCI LEDs - Number of LEDs differs by OSA-Express Feature (10Gbe)

Feature	ACTLINK P0 (Green)	FRU	J0/J1
10GbE	OFF=No link	OFF=Default	OFF=Default
	ON=Link	ON=Ready for replace cable or identifies position	ON=Ready for replace cable or identifies position
	Flashing=Link	Blinking=Diagnostic or isolation in progress	Blinking=Diagnostic or isolation in progress

Table 29. PCI LEDs - Number of LEDs differs by OSA-Express Feature (1000Base T)

LED A	LED B	Description
Green	Off	10 megabit half or full
Green	Green	100 megabit half or full
Green	Amber or orange	1000 megabit full duplex

Fiber Optic Cabling

OSA-Express cabling must follow the standards for the LAN type being installed and must have physical connections as follows:

Gigabit Ethernet (1Gbps) SX

uses duplex SC/LC connector for multimode fiber

Gigabit Ethernet (1Gbps) LX

uses duplex SC/LC connector for MM or SM fiber

10 Gigabit Ethernet (10Gbps) LR

uses 9 micron single mode fiber only. This cabling typically has yellow cladding.

Fiber Optic Attachment Options For Gigabit Ethernet

The following table lists maximum unrepeat distance and link budget for Gigabit Ethernet fiber links. Longer distances are possible using repeaters, switches, or channel extenders.

Note: The OSA-Express Gigabit SX and LX features cannot communicate directly, regardless of mode conditioning or cable length, because their receivers are tuned for different wavelengths.

Fiber	Connector	Bit Rate	Fiber Bandwidth	Maximum Distance	Link Loss
-------	-----------	----------	-----------------	------------------	-----------

Cabling

MM* 62.5 micron 1000BaseSX	SC/LC duplex	1.25 Gb/s	160 MHz-km 200 MHz-km	220 meters 275 meters	2.6dB*
MM* 50.0 micron 1000BaseSX	SC/LC duplex	1.25 Gb/s	500 MHz-km*	550 meters	3.6 dB*
SM 1000BaseLX	SC/LC duplex	1.25 Gb/s	N/A	5 Km	4.6dB
MM w/MCP ** 62.5 micron 1000BaseLX	SC/LC duplex	1.25 Gb/s	500 MHz-km	550 meters	2.4dB
MM w/MCP ** 50.0 micron 1000BaseLX	SC/LC duplex	1.25 Gb/s	500 MHz-km	550 meters	2.4dB

Notes:

1. Minimum fiber bandwidth requirement to achieve the distances listed is applicable for multimode (MM) fiber only. There is no minimum bandwidth requirement for single mode (SM) fiber.
2. Bit rates given below may not correspond to effective channel data rate in a given application due to protocol overheads and other factors.
3. SC/LC duplex connectors are keyed per the NCITS Fiber Channel Standard specifications.
4. MCP denotes mode conditioning patch cable, which is required to operate some links over MM fiber.
5. As light signals traverse a fiber optic cable, the signal loses some of its strength (decibels (dB) is the metric used to measure light loss). The significant factors that contribute to light loss are: the length of the fiber, the number of splices, and the number of connections. All links are rated for a maximum light loss budget (i.e., the sum of the applicable light loss budget factors must be less than the maximum light loss budget) and a maximum distance (i.e., exceeding the maximum distance will cause undetectable data integrity exposures). Another factor that limits distance is jitter, but this is typically not a problem at these distances.
6. Unless noted, all links are long wavelength (1300 nm) and the link loss budgets and fiber bandwidths should be measured at this wavelength. For planning purposes, the following worst-case values can be used to estimate the total fiber link loss. Refer to the references listed and contact the fiber vendor, if possible, for specific values that may be different for your configuration:

Link loss at 1300 nm

= 0.50 db/Km

Link loss per splice

= 0.15 db/splice (not dependent on wavelength)

Link loss per connection

= 0.50 db/connection (not dependent on wavelength)

7. Deviations from these specifications (longer distances or link budgets) may be possible. They are evaluated on an individual basis by submitting a Request for Price Quote (RPQ) to IBM.
8. * Indicates channels which use short wavelength (850 nm) optics; all link budgets and fiber bandwidths should be measured at this wavelength.

9. ** A Mode Conditioning Patch cable is required for an LX card in a multimode fiber environment.

Connecting a Singlemode OSA-Express Gigabit Ethernet Feature to a Multimode Cable

This section contains instructions for the IBM Mode Conditioning Patch Cable (MCP) kits.

DO NOT MIX DIFFERENT TYPES OF MULTIMODE FIBER IN THE SAME LINK.

These adapter kits allow the interconnection of a single adapter card used on FICON, Gigabit Ethernet, and other channel types with multimode fiber optic cable. The purpose of these kits is to allow customers to continue using their existing 50 micron or 62.5 micron multimode fiber optic cable at reduced distances with singlemode link adapter cards. There are four versions of these kits; all of the kits are terminated with an SC or LC Duplex connector which plugs into the adapter card, and different female adapter types which attach to the cable plant:

Feature code	Part Number	Description
0103	21L4174	9μ SM SC-Duplex to 50μ MM ESCON-Duplex MCP cable
0104	21L4172	9μ SM SC-Duplex to 50μ MM SC-Duplex MCP cable
0105	21L4173	9μ SM SC-Duplex to 62.5μ MM SC-Duplex MCP cable
0106	21L4175	9μ SM SC-Duplex to 62.5μ MM ESCON-Duplex MCP cable
0108	05N6771	9μ SM LC to 50μ MM SC-Duplex MCP cable
0109	11P4658	9μ SM LC to 62.5μ MM SC-Duplex MCP cable
0111	11P4150	9μ SM LC to 62.5μ MM ESCON MCP Cable

The mode conditioning patch cable assembly contains a combination of singlemode and multimode fiber, signified by the yellow and orange cable jackets respectively, and a small box located just behind the SC or LC duplex connector which contains the mode conditioning apparatus. The ST connectors on the mode conditioning patch cables (21L4169) are assembled to the corresponding "A" and "B" ST ports on the ST-ESCON adapter (73F5419) or the ST-SC adapter (54G3381). **IT IS NOT NECESSARY TO SEPARATE THESE TWO CONNECTIONS IN ORDER TO USE THE ADAPTER KIT.**

To use the adapter kit simply insert the kit between a singlemode optical transceiver receptacle and a multimode cable on both ends of a link. Two kits are required for each duplex link, one at either end. When these kits are used with multimode fiber, the maximum available link distance and link budget will be less than if singlemode fiber had been used. For example, a singlemode FICON link supports a maximum distance of 10 km with a 7 dB link budget; a multimode FICON link using these kits supports a maximum distance of 550 meters with a 5 dB link loss. Be sure to verify that the application you are using supports MCPs at the appropriate distance and

link budgets. Maintenance and optical power measurement on links using this adapter kit are described in *Maintenance Information for S/390 Fiber Optic Links*, SY27-2597.

Cabling for OSA-Express 10 Gigabit Ethernet Feature

You can use single-mode fiber with a 9.0 micron core diameter and a SC fiber optic connector for the 10 GbE Ethernet feature. The maximum wavelength is 10 kilometers.

The adapter must be connected to a compatible link partner (for example, an IEEE 802.3ae-compliant 10-gigabit switch), which is operating at the same laser wavelength as the adapter. 10 GbE adapters with SC connectors utilize a 1310 nanometer laser wavelength.

Cabling for Fast Ethernet (FENET) and 1000Base-T Ethernet

You can use the RJ-45 Cabling cabling for (FENET) and 1000Base-T.

FENET: The OSA-Express FENET attaches to the System z9 or zSeries through the appropriate Ethernet networking equipment to either a 100 Mbps or 10 Mbps Ethernet LAN and operates in either half- or full-duplex mode. A FENET OSA-Express supports auto-negotiation.

Attach an OSA-Express FENET feature using an EIA/TIA category 5 unshielded twisted pair (UTP) cable that does not exceed 100 m (328 ft). Attach the FENET OSA-Express RJ-45 connector to networking equipment that is appropriate for the LAN speed.

1000Base-T: The OSA-Express 1000Base-T Ethernet CHPID must be connected to a compatible link partner, preferably set to auto-negotiate speed and duplex. This CHPID automatically accommodates either MDI or MDI-X connections, which allow you to directly connect two CHPIDs together without using a cross-over cable.

Use twisted pair, RJ-45 network cable type as follows:

- For 1000Base-T (1000 Mbps), use Category 5 or better (must be 4-pair wiring). Make sure you use Category 5 cable that complies with the TIA-568 wiring specification. For more information on this specification, see the Telecommunications Industry Association's web site:
www.tiaonline.org
- For 100Base-TX (100 Mbps), use Category 5 wiring or better.
- For 10Base-T (10 Mbps), use Category 3 wiring or better.

If you use less than 4-pair cabling, you must manually configure the speed and duplex setting of the adapter and the link partner. In addition, with 2- and 3-pair cabling, the adapter can only achieve speeds of up to 100Mbps. If you want to use this adapter in a residential environment at any speed, use Category 5 or better wiring.

If the cable runs between rooms or through walls and ceilings, it should be plenum-rated for fire safety. In all cases the length is limited to 100 meters.

Cabling for Token Ring

Attach the OSA-Express Token Ring (TR) feature using an EIA/TIA category 5 unshielded twisted pair (UTP) cable that does not exceed 100 m (328 ft), or a shielded twisted pair (STP) cable with DB-9 D Shell connector. Attach the OSA-Express to a Token Ring Multistation Access Unit (MAU or MSAU) router or switch that is appropriate for the LAN speed.

Autosensing the LAN speed: At initialization, the OSA-Express Token Ring feature autosenses and conforms to the speed of the token ring (4 Mbps, 16 Mbps, or 100 Mbps) and whether communications are in full- or half-duplex. If no carrier is sensed on the ring, the OSA enters the ring at the speed of its last successful entry.

For half-duplex communications:

- Attach the port to a half duplex 4 Mbps, 16 Mbps, or 100Mbps token ring LAN that conforms to the IEEE 802.5 (ISO/IEC 8802.5) standard.
- Between images (image-to-image data transfer) on the same CPC, either attach this connector to a LAN or cover it with a wrap plug.

For image-to-image communications, the port must be defined to both images. Port-sharing must be defined for the OSA mode, which is to say access to the port must be defined through OSA/SF to be shared between the two images in this mode.

For full-duplex communications:

- Attach the port via a full-duplex switch, such as the 8270 N Ways Token Ring switch, to a 4 Mbps, 16 Mbps, or 100Mbps token ring LAN that conforms to the IEEE 802.5 (ISO/IEC 8802.5) standard.
- image-to-image communications are not supported.
- Set the switch for full duplex communications.

Cabling: Installation-dependent factors determine the cabling requirements for the Token Ring RJ-45 connector to the customer's token ring Multistation Access Unit (MAU or MSAU). The RJ-45 connector supports either a standard shielded twisted pair (STP) cable or an unshielded twisted pair (UTP) cable. For more information on these cables, refer to *Token Ring Network Introduction and Planning Guide*, which is listed in the bibliography (page xiii).

To attach the RJ-45 connector to an alternate connector type, you can use:

- IBM P/N 60G1063 (RJ-45 to ICS data connector)
- IBM P/N 60G1066 (RJ-45 8-pin to a 9-pin subminiature "D" shell receptacle)

Wrap plug: Token Ring wrap plug, P/N 08J5792, is provided.

Appendix B. OSA-Express Functional Limits and LAN Transmission Summary

The following tables summarize the capabilities and functional limits of each OSA-Express feature type. To determine your OSA licensed internal code (LIC) level for z/OS, issue `D NET,TRL,TRLE=trle statement name` when TCP/IP is active. (You can also use the OSA/SF GUI to obtain the same information from the options menu bar on the main window.) For information about licensed internal code upgrades, contact your IBM service representative.

Table 30. OSA-Express Functional Limits

OSA-Express Functional Limits		Number
IP	Home IPs (IPv4+IPv6)	2,048
	ARP Table Size *	8,192
	Multicast Addresses (IPv4 + IPv6)	1,024
	# PUs	4,096
OSE	# Devices	240
	# IP Stacks	120
OSD	# Devices	480
	# IP Stacks	160
VLANs	LINUX	4,096

Note: * The ARP Table and Multicast Addresses are obtained from the same storage pool. The capacity limits for both tables are the sum of the IPv4 Home Addresses, plus the IPv6 Home Addresses, plus the IPv4 Multicast Addresses, plus the IPv6 Multicast Addresses, and the IPv4 Remote Addresses.

Table 31. OSA-Express2 and OSA-Express3 Functional Limits

OSA-Express2 and OSA-Express3 Functional Limits		Number
IP (prior to z196)	Home IPs (IPv4+IPv6)	4,096
	ARP Table Size (see Note 1 on page 264)	16,384
	Multicast Addresses (IPv4 + IPv6) (see Note 1 on page 264)	2,048
	# PUs	4,096
IP for z196	Home IPs (IPv4+IPv6)	4,096
	ARP Table Size (see Note 2 on page 264)	16,384
	Multicast Addresses (IPv4 + IPv6) (see Note 2 on page 264)	2,048
	# PUs	4,096
OSE	# Devices	240
	# IP Stacks	120
OSD	# Devices	480
	# IP Stacks	160

Function/Mode Summary

Table 31. OSA-Express2 and OSA-Express3 Functional Limits (continued)

OSA-Express2 and OSA-Express3 Functional Limits		Number
OSD (when defined for 640 TCP/IP Stacks)	# Devices	1,920
	# IP Stacks	640
OSN	# of 3745 Devices	180
	# of OSN Devices	480
VLANs	LINUX	4,096

Notes:

1. The ARP Table and Multicast Addresses are obtained from the same storage pool. The overall capacity limit for both tables is the sum of the IPv4 Home Addresses, plus the IPv6 Home Addresses, plus the IPv4 Multicast Addresses, plus the IPv6 Multicast Addresses, and the IPv4 Remote Addresses. While the maximum number of multicast addresses is 2,048, if there are many other addresses that make up the same storage pool, the number of multicast addresses might be less than 2,048. Keep in mind that some operating systems generate a multicast address for each IPv6 address specified.
2. For z196, the multicast and ARP_cache entries no longer share a table. The limits specified are for each individual pool limit specified in the table.

OSA-Express Speed/Mode Configuration Information

The various OSA-Express Ethernet features support different LAN speeds and configurations. Some settings are user settable, others are not. The table below summarizes the different features and what they are capable of supporting:

Table 32. OSA-Express Feature-LAN Transmission Matrix

OSA NIC port type	OSA NIC Configuration (via Advanced Facilities or OSA/SF)	Partner NIC Configuration
Copper	Autonegotiate	Autonegotiate
Copper	Forced speed X and mode Y where X and Y are the SAME for both partner ports	Forced speed X and mode Y where X and Y are the SAME for both partner ports
Fiber	N/A – Fiber features are not user changeable	Autonegotiate or Forced

- Speed X: 10, 100, 1000 Mbps.
- Mode Y: Half duplex / Full duplex

Choosing Autonegotiate or Forced Speed and Mode:

Ethernet autonegotiation addresses more than just Speed and Mode. Other specifications such as Flow control and Pause frame behavior are examples of other functions that rely on the Ethernet negotiation process to be correctly achieved. 'Forced' settings typically do not lead to other Ethernet functions, or the established link cannot use those functions. For OSA-Express features, the parameters outside of speed and mode are not user-changeable.

The IEEE standards fully define link establishment and behavior when Copper ports are linked to their partner port in a 'same-to-same' fashion (for example, Autonegotiation-to-Autonegotiation, 10HDX-to-10HDX, 100FDX-to-100FDX, and so on).

Copper ports often establish links to partners configured in an unlike way, but the results and performance can vary greatly, including the possibility that they may not function at all. Having the OSA configured differently than its partner may result in no connection and no data transfer.

Fiber ports, which are not user-configurable on OSA, can connect to partner ports that are in Force or Autonegotiate mode. If running to a switch that is in Forced mode, you may lose some of the Flow control and Pause frame type negotiated parameters.

IBM recommends specifying the OSA parameters and partner parameters as Autonegotiate.

Operating Modes and Frame Sizes Supported by OSA-Express Features:

The following table shows the different operating modes and frame sizes supported by the various OSA-Express features:

Table 33. OSA-Express Feature-LAN Transmission Matrix

OSA-Express Feature	Operating Mode	Frame Size
Gigabit Ethernet	1000 Mbps: full duplex	802.3: 1492
		DIX: 1492
		jumbo: 8992
10 Gigabit Ethernet	10Gbps: full duplex	802.3: 1492
		DIX: 1492
		jumbo: 8992
Fast Ethernet	10 Mbps: full/half duplex	802.3 1492
	100 Mbps: full/half duplex	DIX: 1492
1000Base-T Ethernet	10 Mbps: full/half duplex	802.3 1492
	100 Mbps: full/half duplex	DIX: 1492
	1000 Mbps: full duplex	1000 Mbs QDIO Jumbo: 8992
		1000 Mbs non-QDIO Jumbo: not supported
Token Ring	4Mbps: full/half duplex	4 Mbps: 4550
	16Mbps: full/half duplex	16/100 Mbps: 18200
	100Mbps: full duplex	

Function/Mode Summary

Notices

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

IBM may not offer the products, services, or features discussed in this document in other countries. Consult your local IBM representative for information on the products and services currently available in your area.

Any reference to an IBM product, program, or service is not intended to state or imply that only that IBM product, program, or service may be used. Any functionally equivalent product, program, or service that does not infringe any IBM intellectual property right may be used instead. However, it is the user's responsibility to evaluate and verify the operation of any non-IBM product, program, or service.

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

IBM Director of Licensing
IBM Corporation
North Castle Drive
Armonk, NY 10504-1785
USA

Licensees of this program who wish to have information about it for the purpose of enabling: (i) the exchange of information between independently created programs and other programs (including this one) and (ii) the mutual use of the information which has been exchanged, should contact:

IBM Corporation
Mail Station P300
2455 South Road
Poughkeepsie, NY 12601-5400
USA
Attention: Information Requests

Such information may be available, subject to appropriate terms and conditions, including in some cases, payment of a fee.

The licensed program described in this document and all licensed material available for it are provided by IBM under terms of the IBM Customer Agreement, IBM International Program License Agreement or any equivalent agreement between us.

For license inquiries regarding double-byte (DBCS) information, contact the IBM Intellectual Property Department in your country or send inquiries, in writing, to:

IBM World Trade Asia Corporation
Licensing
2-31 Roppongi 3-chome, Minato-ku
Tokyo 106, Japan

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

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

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

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

If you are viewing this information softcopy, the photographs and color illustrations may not appear.

Programming Interface Information

This publication does not document intended Programming Interfaces that allow the customer to write programs to obtain the services of an Open Systems Adapter, the Open Systems Adapter Support Facility, or any of the programs that interface with them.

Trademarks

The following terms are trademarks of the IBM Corporation in the United States or other countries, or both.

Enterprise Systems Connection	Resource Link
ESCON	RMF
@server	RS/6000
IBM	S/390
IBM eServer	TCP/IP
IBMLink	Tivoli
IBM S/390 Parallel Enterprise Server Generation 5	VM/ESA
MVS	VSE/ESA
NetView	VTAM
Operating System/2	z/OS
OS/390	zSeries
RACF	z/VM

The following terms are trademarks of other companies:

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

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

Pentium is a registered trademark of Intel Corporation in the United States and/or other countries.

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

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

Index

Numerics

- 10 Gigabit Ethernet
 - description 9
- 1000Base-T Ethernet
 - description 9
- 1000Base-T Fast Ethernet
 - configuring with GUI 115
 - configuring with REXX command interface 112
- 640 TCP/IP stacks 20

A

- address resolution protocol (ARP) 7, 27, 130
- address, MAC 128
 - maximum number of 128
- authorization requirements 64, 75
- auto-negotiation 10, 11
- availability 27

B

- backup paths, SNA mode 120
- bezel 251
- bibliography xi
- broadcast 6, 106

C

- cable
 - 1000Base-T 260
 - FENET Ethernet 260
 - fiber optic 257
 - Gigabit Ethernet 257
 - requirements 257
 - token ring 261
- canonical 129
- channel memory dump 140
- channel types 5
- clear debug command 159
- command
 - syntax diagrams 158
- command interface 85
- commands
 - clear debug 159
 - configure OSA 161
 - convert OAT 162
 - get config 163
 - get debug 164
 - get OSA address table 166
 - install 167
 - query 169
 - set parameters 172
 - shutdown 174
 - start managing 175
 - stop managing 177
- communications protocol
 - TCP/IP 89

- Concurrent LIC Update 20
- config OSA command 161
- configuration file 60
 - for OSA-Express features 112
- configuration file - OSA/SF 61
- configuring OSA/SF 55
- convert OAT command 162
- customizing OSAs - using GUI 111
- customizing OSAs - using REXX command interface 112

D

- debug data sets 139
- Dedicated CHPID - OAT entry setup 155
- default OAT 153
- device limits 263
- DHCP 3, 18
- Direct SNMP query support 131
- Direct SNMP Support 131
- Direct SNMP trap and set support 132
- disabling ports 127
- dump 77
- dump indicator 140
- dump titles 138
- duplex mode
 - FENET 260
 - token ring 261
- duplex support, full 261

E

- enabling ports 127
- end system identifier 128
- enterprise extender 30
- error messages 179
- ESI 128
- Ethernet
 - 1000Base-T 9
 - FENET 9

F

- FDX 261
- FE device 33
- FENET Ethernet
 - configuring with GUI 115
 - configuring with REXX command interface 112
 - description 9
- full duplex communications 261
- functional summary 263

G

- get config command 163
- get debug command 164
- get OAT command 166

- Gigabit Ethernet
 - description 8
 - device definition 48, 50
- group address 129
- guest
 - OS/390 or z/OS 71
 - requirements 71
 - RMCHINFO option 71
 - VSE/ESA 71
- guest of VM 61
- GUI
 - See OSA/SF Java-based GUI

H

- HCD 37
- host definitions
 - IP 105
 - QDIO 104
 - SNA 106
- host operating system
 - considerations 69
- host program
 - definitions for Linux 103
 - definitions for VSE/ESA 103
 - definitions for z/OS 101
 - definitions for z/VM and VM/ESA 102
 - TCP/IP Passthru profile 105
- host system, accessing in the GUI interface 97

I

- image 5
- image to image communication 10, 11
- image-to-image communication
 - TR 261
- indicator, dump 140
- install
 - OSA/SF in VM 73
- install command 167
- installing OSA modes using REXX command
 - interface 112
- ioacfg 82
- IOACMD EXEC 87
- IOACMD.EXEC - set up 85
- ioainx - setting up 80
- ioajava
 - downloading for OSA/SF Java-based GUI 93
 - file for OSA/SF Java-based GUI 92
- ioamain - setting up 81
- ioamsgxx 82
- IOAxnnns messages 180
- IOBxnnns messages 241
- IP addresses 27, 154
- IP host definitions 105
- IPv6 17

J

- Java
 - files for OSA/SF Java-based GUI 92

- Java (*continued*)
 - Java run time files 92
 - JavaHelp files for OSA/SF Java-based GUI 92

L

- LAN
 - supported 3
- Layer 2
 - description 14
- LCSS (logical channel subsystem)
 - on the z990 processor 3
- limits, functional 263
- Linux 18
 - host program definitions 103
- load balancing, SNA mode 120, 121
- local MAC address
 - See MAC
- LP
 - See image
- luname 59

M

- MAC
 - active 128
 - canonical vs. noncanonical 128
 - local 120, 128
- MAC address
 - group 129
- master index 61, 80
- master index file 60
- mau
 - multistation access unit 261
- MCP 259
- message log 137
- messages 179
- migrating
 - to the OSA/SF Java-based GUI 145
 - VM 149
 - z/OS 146
- minidisk 73
- mode conditioning patch cable 259
- multicast 18, 106
- multiple channel subsystem
 - See MCSS (multiple channel subsystem)
- multistation access unit (MAU) 261

N

- network protocol, supported 3
- noncanonical 129

O

- OAT 151
 - default 153
- OAT templates 114
 - for OSA-Express features 112

- operating system
 - z/OS 55
- operating system, VM 69
- operating system, VSE 79
- OS/390
 - enhanced SNA availability 120
 - starting OSA/SF 67
 - stopping OSA/SF 67
- OSA/SF interface
 - Java-based GUI 96
- OSA
 - dump 77
- osa address table - see OAT 151
- OSA NCP 24
- OSA-Express
 - definition 3
 - features 3, 5
- OSA/SF
 - dump 77
 - server virtual machine 73
 - span of control 33
 - trace 77
- OSA/SF interface
 - IOACMD EXEC 87
 - types 85
- OSA/SF Java-based GUI
 - defining CLASSPATH 92
 - downloading ioajava 92
 - Host Open window 96
 - migrating 145
 - platforms for 32
 - setting up 89, 96
 - using 96
 - using on different hosts 97
- OSA/SF messages 180
- OSA/SF setup
 - VSE 79
- OSAD device 33
- OSAMAINT ID 73
- OSD vs OSE channel types 5
- OSN CDLC 7
- overflow limit, SNA mode 120
- overflow option, SNA mode 120

P

- partitions - defining 80
- port connection 251
- port enabling and disabling 127
- port sharing
 - IP addresses 154
- prd2.osasf 82
- primary/secondary routing 27
- priority tagging, VLAN 17
- problems
 - reporting 143
- proc for OSA/SF 60
- ptf effecting only OSA/SF 145

Q

- QDIO 3, 6, 7
 - device definition 48, 50
 - host definitions 104
- query command 169
- Query support 131
- queued direct I/O 3, 6

R

- RACF 64, 75, 78
- recovery 27
- redundancy and overflow, SNA 120
- redundant path, SNA mode 120
- reporting problems 143
- resource measurement facility 142
- REXX command interface 85
- REXX command interface - using for customizing OSAs 112
- REXX, using to configure
 - group MAC 130
 - local MAC 130
- RMCHINFO option 71
- RMF 142

S

- SAF 64, 75, 78
- sample started procedure 60
- samples - OAT 114
- security
 - OSA/SF commands 64, 75, 78
- Segmentation Offload (Large Send) 19
- server virtual machine 73, 75, 78
- service for OSA/SF 145
- session delay, SNA mode 120
- set parms command 172
- setting up OSA/SF 55
- shutdown command 174
- SNA mode
 - backup paths 120
 - enhanced availability 120
 - load balancing 120, 121
 - overflow and redundancy 120
 - overflow option 120
 - redundancy 120
 - session availability 120
 - SWNET major node 108
 - VTAM resource definitions 106
 - XCA major node 107
- SNMP 31, 64, 131
- SNMP subagent messages 241
- SNMP Trap and set support 132
- start managing command 175
- started procedure 56
- started procedure for MVS 60
- starting OSA/SF 67
- startup profile 59
- stop managing command 177
- stopping OSA/SF 67

SWNET major node 108
syntax diagrams
 how to read 158
system authorization facility (SAF) 64, 75

T

task for MVS 60
TCP/IP
 communications protocol 89
TCP/IP network, protocol 3
TCP/IP Passthru mode 7, 105
 default OAT 153
templates - OAT 114
token ring
 configuring with GUI 117
 configuring with REXX command interface 112
 description 11
 full duplex TR support 261
token ring LAN
 duplex modes 261
token ring OSA cable 261
TPF 6
trace table 138
trace, OSA/SF 77
TSO - using for customizing OSAs 112

U

unicast 106

V

verifying OSA/SF started 67
VIPA 29
Virtual IP Addressing 29
virtual machine 73, 75, 78
VLAN priority tagging 17
VM
 enhanced SNA availability 120
 minidisk 73
 OSA/SF server virtual machine 73
VM - z/OS guest 61
VM/ESA
 host program definitions 102
VSE
 OSA/SF setup 79
VSE/ESA
 host program definitions 103
VTAM resource definitions 106

W

workload balancing, SNA 120

X

XCA major node 107

Z

z/OS
 enhanced SNA availability 120
 host program definitions 101
 starting OSA/SF 67
z/VM 18
 considerations 69
 guest requirements 71
 host program definitions 102
z/VM guest
 OS/390 or z/OS 71
 RMCHINFO option 71
 VSE/ESA 71

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

**zEnterprise 196, System z10, System z9 and @server zSeries
Open Systems Adapter-Express
Customer's Guide and Reference**

Publication No. SA22-7935-11

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

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

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

Comments:

Thank you for your support.

Submit your comments using one of these channels:

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

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

Name

Address

Company or Organization

Phone No.

Email address



Cut or Fold
Along Line

Fold and Tape

Please do not staple

Fold and Tape



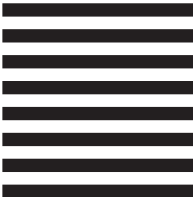
NO POSTAGE
NECESSARY
IF MAILED IN THE
UNITED STATES

BUSINESS REPLY MAIL

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

POSTAGE WILL BE PAID BY ADDRESSEE

IBM Corporation
Department 55JA, Mail Station P384
2455 South Road
Poughkeepsie, NY
12601-5400



Fold and Tape

Please do not staple

Fold and Tape

Cut or Fold
Along Line



Program Number: 5694-A01, 5647-A01, 5655-G52, 5654-A17, 5739-A03,
5686-066, 5690-VSE

Printed in USA

SA22-7935-11

