

# **AS/400 Network Management Guide**

Document Number GG24-4154-00

August 1994

International Technical Support Organization  
Raleigh Center

**Take Note!**

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

**First Edition (August 1994)**

This edition applies to Operating System/400 Version 2 Release 3 and to NetView Version 2 Release 3 for MVS/ESA.

Order publications through your IBM representative or the IBM branch office serving your locality. Publications are not stocked at the address given below.

An ITSC Technical Bulletin Evaluation Form for reader's feedback appears facing Chapter 1. If the form has been removed, comments may be addressed to:

IBM Corporation, International Technical Support Organization  
Dept. 985, Building 657  
P.O. Box 12195  
Research Triangle Park, NC 27709-2195

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

© **Copyright International Business Machines Corporation 1994. All rights reserved.**

Note to U.S. Government Users — Documentation related to restricted rights — Use, duplication or disclosure is subject to restrictions set forth in GSA ADP Schedule Contract with IBM Corp.

---

## Abstract

Operating System/400 provides certain basic network management functions. This document describes how these functions can be effectively extended by the use of the following products:

- SMAO/400 (Systems Management Automation Offering/400)
- NetView Remote Operations Manager and NetView Remote Operations Agent/400
- AUTOMATION CENTER/400
- NetView to AS/400 Bridge PRPQ

This document is intended for anyone with a need to manage AS/400 systems and/or AS/400 networks. Some general communications knowledge is assumed.

(311 pages)



---

# Contents

<b>Abstract</b>	iii
<b>Special Notices</b>	xvii
<b>Preface</b>	xix
How This Document is Organized	xix
Related Publications	xx
International Technical Support Center Publications	xx
Acknowledgments	xx
<b>Chapter 1. Introduction</b>	1
1.1 SystemView Introduction	6
1.1.1 SystemView Benefits	7
1.1.2 SystemView Structure	7
1.2 Operations Management Discipline	9
1.2.1 Problem Management	11
1.2.2 Remote Operation	12
1.3 Entry Points and Focal Points	12
1.4 Alerts Introduction	13
1.4.1 Transporting Alert Data	14
1.4.2 Routing Alert Data	15
1.5 Management Services Introduction	17
1.5.1 Subarea Networking and NMVTs (Network Management Vector Transport)	17
1.5.2 APPN Networking and Management Services	17
1.5.3 MS Architecture and Terminology	17
1.6 NetView Remote Operations for AS/400 Overview	18
1.7 Systems Management Automation Offering (SMAO)	18
1.8 IBM AUTOMATION CENTER/400	19
1.8.1 Overview of IBM AUTOMATION CENTER/400	19
1.8.2 IBM OMEGAMON/400	19
1.8.3 IBM AUTOMATED FACILITIES/400	19
1.8.4 IBM OMEGAVIEW/400	19
<b>Chapter 2. Alert Support Implementation and Downstream Information</b>	21
2.1 AS/400 Alert Support Implementation	21
2.1.1 Alert Content	21
2.1.2 Implementation Tasks	31
2.1.2.1 Setting up the Communications Network	31
2.1.2.2 Changing the Network Attributes	36
2.1.2.3 Message Files	41
2.1.2.4 Alert Tables	52
2.1.2.5 Manual Processing of Alerts	57
2.1.2.6 Implementation and Use of Alert Filters on AS/400	62
2.1.2.7 Filter Components	63
2.2 AS/400 Downstream Information	73
2.2.1.1 5494 Remote Control Unit	74
2.2.2 RS/6000 Running AIX	85
2.2.2.1 RS/6000 Running AIX AS/400 Connection Program/6000 Version 2	85
2.2.2.2 RS/6000 Running TCP/IP Using TELNET Command	90

2.2.2.3 RS/6000 Running AIX NetView Service Point Program	94
2.2.2.4 IBM 3174 Establishment Controller	104
2.2.2.5 PS/2 Running OS/2 Communications Manager/2	113
2.2.2.6 PS/2 Attached via Token-Ring Network Using LAN Network Manager V1.1	120
2.2.2.7 PS/2 Attached via TRN Using OS/400 LAN Network Manager	128
<b>Chapter 3. Remote Operation</b>	135
3.1 Introduction	135
3.2 AS/400 as a Focal Point	135
3.2.1 AS/400 Connected via SystemView System Manager/400 V2	135
3.2.2 AS/400 as a Focal Point using an AS/400 RUNCMD	139
3.2.2.1 AS/400 as a Focal Point using an AS/400 RUNCMD to an OS/2 CM/2	139
3.2.2.2 AS/400 as a Focal Point using RUNCMD to LAN Network Manager	148
3.2.2.3 AS/400 as a Focal Point Using RUNCMD to RS/6000 and NetView/6000	150
3.2.2.4 AS/400 as a Focal Point Using RUNCMD to AS/400	150
3.3 NetView as a Focal Point for AS/400	150
3.3.1 Using SMAO	151
3.3.2 Using the NetView Remote Operations Product	151
3.3.3 NetView Remote Operations for AS/400	151
3.3.3.1 Scenario to Vary On a Control Unit	152
3.3.4 SMAO/400 Remote Operations	155
3.3.4.1 SMAO/400 Remote Command Facility	155
3.3.4.2 The SMAO/400 OPC/ESA Interface	160
<b>Chapter 4. Remote Monitoring</b>	165
4.1 NetView Remote Operations for AS/400 Monitoring	165
4.1.1 Scenario to Check Subsystem Status	165
4.1.1.1 CLIST to set NetView Timer	165
4.1.1.2 CLIST to Check AS/400 Subsystem	165
4.1.2 Executing the Scenario	166
4.2 SMAO/400 Remote Subsystem Monitoring	168
4.2.1 Function Overview	169
4.2.2 AS/400 Setup	169
4.2.2.1 Work with Message Table (WRKMSGTBL)	169
4.2.2.2 Start the Message Server (STRMSGSRV)	171
4.2.3 Scenario	173
<b>Chapter 5. Automation</b>	177
5.1 AUTOMATION CENTER/400	177
5.2 NetView Remote Operations for AS/400 Automation	185
5.2.1 Scenario to Reset Operator Profile	185
5.2.1.1 Automation Table Entry	185
5.2.1.2 FNAARSTP Sample CLIST	186
5.2.2 Executing the Scenario	187
5.3 NetView Remote Operations Using RODM Method	188
5.3.1 Understanding RODM	188
5.3.2 Scenario	188
5.4 Sending an Alert Using OS/400 APIs	189
5.4.1 Alert Generation Application Description	190
5.5 Processing an Alert Sent to a Data Queue	194
5.5.1 Alert Data Queue Application Description	195

<b>Appendix A. SNA Generic Alerts</b>	201
A.1 Generic Alert Code Points	201
A.1.1 Default Code Points	202
A.2 SNA Alert Format	202
A.3 Detailed Formats of the RUs for SNA Alerts	203
A.4 SNA Generic Alert Code Points	209
A.4.1 Alert Type	210
A.5 Alert Description Code	210
A.6 Probable Cause Code Point	212
 <b>Appendix B. Management Services</b>	 215
B.1 Introduction to Management Services	215
B.1.1 Problem Management	215
B.2 Management Services Transport Introduction	215
B.2.1 MS Transport Implementations	216
B.3 Data Flow over the MS Transport	216
B.4 Management Service Formats	217
 <b>Appendix C. IBM AUTOMATION CENTER/400</b>	 219
C.1 IBM AUTOMATION CENTER/400 as a SystemView Product	219
C.2 IBM AUTOMATION CENTER/400 in a Stand-Alone Environment	219
C.3 IBM AUTOMATION CENTER/400 in a Network	219
C.4 How You Could Use IBM AUTOMATION CENTER/400	220
C.5 Configuration Requirements	221
C.5.1 Hardware	221
C.5.1.1 For IBM OMEGAMON/400 and IBM AUTOMATED FACILITIES/400	221
C.5.1.2 For IBM OMEGAVIEW/400	221
C.5.2 Software	221
 <b>Appendix D. NetView Remote Operations for AS/400</b>	 223
D.1 Features of NetView Remote Operations Manager MVS/ESA	223
D.2 Features of NetView Remote Operations Agent/400	224
D.3 Planning for NetView Remote Operations Manager MVS/ESA	225
D.3.1 Hardware and Software Requirements	225
D.3.2 Storage Requirements	225
D.4 Installation of NetView Remote Operations Manager MVS/ESA	225
D.4.1 Installing the AS/400 Command Tree at the Workstation	225
D.5 Customizing the Command Tree/2 Interface	226
D.6 Customizing NetView Remote Operations Manager	234
D.7 Using NetView Remote Operations Manager	234
D.7.1 OPSMGMT Command List	234
D.7.2 FNAINIT Command List	235
D.7.3 FNAGVARS Command List	235
D.7.4 FNASETV Command List	235
D.7.5 FNADSPV Command List	235
D.8 Planning for NetView Remote Operations Agent/400	235
D.8.1 Hardware and Software Requirements	235
D.8.2 Storage Requirements	235
D.9 Installing NetView Remote Operations Agent/400	235
D.9.1 Customizing NetView Remote Operations Agent/400	236
D.9.2 Starting or Ending the Request File Journal	236
D.9.3 Modifying the Job Descriptions	236
D.9.4 Security Provided	236
D.10 Samples	237

D.10.1 FNAINIT Sample . . . . .	237
D.10.2 FNADSPV Sample . . . . .	238
D.10.3 FNASETV Sample . . . . .	240
D.10.4 FNAGVARS Sample . . . . .	249
<b>Appendix E. Systems Management Automation Offering (SMAO)</b> . . . . .	253
E.1 Functional Description . . . . .	254
E.1.1 Centralized Monitoring of an AS/400 Network . . . . .	254
E.1.2 Problem Notification . . . . .	254
E.1.3 Enterprise Reporting . . . . .	255
E.1.4 Central Accounting of Distributed Resources . . . . .	255
E.1.5 Automated Enterprise Job Scheduling and Tracking . . . . .	255
E.1.6 Operations Automation . . . . .	256
E.2 Operational Environment . . . . .	257
E.2.1 AS/400 . . . . .	257
E.2.2 SMAO/400 Commands and Menus . . . . .	260
E.2.3 NetView Commands and Panels . . . . .	266
E.2.4 SLR/400 Sample Reports . . . . .	271
<b>Appendix F. NetView to AS/400 Bridge PRPQ</b> . . . . .	275
F.1 Installation . . . . .	275
F.1.1 Installation Procedures . . . . .	275
F.1.2 Other Considerations . . . . .	276
F.1.3 PRPQ Implementation Scenario . . . . .	276
F.1.3.1 NetView Customization. . . . .	276
F.1.3.2 Configuring VTAM . . . . .	277
F.1.3.3 Configuring the AS/400 . . . . .	278
F.1.4 Scenario Showing Alert Flow . . . . .	278
<b>Appendix G. Alert Automation Applications</b> . . . . .	285
G.1 Automating The Generating and Sending of an Alert . . . . .	285
G.2 Processing Alert Sent to Data Queue . . . . .	288
<b>Appendix H. AS/400 RUNCMD Program Listing</b> . . . . .	291
<b>List of Abbreviations</b> . . . . .	303
<b>Index</b> . . . . .	305



## Figures

1.	Hierarchical Flow of Alerts (Downstream)	2
2.	Hierarchical Flow of Alerts (Upstream)	5
3.	Remote Operations Scenario	12
4.	An Example of Alert Routing in a Network	16
5.	Work with Alerts - Panel	22
6.	Display Alert Detail Panel - Panel 1 of 2	22
7.	Display Alert Detail Panel - Panel 2 of 2	23
8.	Display Alert Detail Menu - Panel	24
9.	Display Product Identification - Panel 1 of 3	25
10.	Display Product Identification - Panel 2 of 3	25
11.	Display Product Identification - Panel 3 of 3	26
12.	Display Processing Nodes - Panel	27
13.	Display Alert in Hexadecimal - Panel 1 of 4	28
14.	Display Alert in Hexadecimal - Panel 2 of 4	29
15.	Display Alert in Hexadecimal - Panel 3 of 4	29
16.	Display Alert in Hexadecimal - Panel 4 of 4	30
17.	Alert Flags Display - Panel	30
18.	Work with Sphere of Control - Panel	32
19.	Displaying New Focal Points	34
20.	Display Sphere of Control Status	34
21.	Adding a System to the Sphere of Control	35
22.	Change the Network Attributes for Alert Support - Panel 1 of 2	36
23.	Change the Network Attributes for Alert Support - Panel 2 of 2	37
24.	Display Message Attributes - Panel	42
25.	Work with Message Descriptions	42
26.	Message Detail Display Menu	43
27.	Display Formatted Message Text - Panel	44
28.	Display Message Attributes - Panel	45
29.	Work with Alert Descriptions - Panel	45
30.	Display Alert Detail - Panel	46
31.	Display Alert Recommended Actions - Panel	46
32.	Displaying the Text of a System Message	47
33.	Displaying the Attributes of a Message	47
34.	Add a Message Description - Panel 1 of 2	48
35.	Add a Message Description - Panel 2 of 2	49
36.	Adding Additional Parameters to a Message Description	50
37.	Relationship Between Message Files and Alert Tables	52
38.	Work with Alert Tables - Panel	54
39.	Change Alert Table - Panel	54
40.	Create Alert Table - Command Prompt	55
41.	Add Alert Description - Panel 1 of 3	55
42.	Add Alert Description - Panel 2 of 3	56
43.	Add Alert Description - Panel 3 of 3	57
44.	Create User Profile for Alerts - Panel	58
45.	Displaying Message Queue for User Profile Processing Alerts	58
46.	Working with a Subset of Alerts	60
47.	WRKALR Subset Display	62
48.	Using CHGNETA Command to Specify Alert Filter	63
49.	Conceptual Operation of AS/400 Alert Filter	64
50.	Displaying a Selection Entry in the AS400NET Filter	65
51.	Displaying an Action Entry in the AS400NET Filter	65

52.	Adding a Selection Entry to an Alert Filter	66
53.	Adding a Selection Entry	67
54.	Work with Filter Action Entries - Panel	71
55.	Adding an Action Entry to a Filter - Panel 1 of 2	71
56.	Adding an Action Entry to a Filter - Panel 2 of 2	72
57.	Hierarchy of Control in a Network - Conceptual View	73
58.	5494 APPC Controller Description Panel	77
59.	5494 APPC Device Description Panel	77
60.	Remote Workstation Controller Description	78
61.	Dependent Workstation Device Description	78
62.	Trace of 5494 Controller Session Setup	79
63.	Status of 5494 APPC Device	80
64.	Status of 5494 QRMTWSC Mode	80
65.	Detail of SNASVCMG Mode for 5494	80
66.	Detail of QRMTWSC Mode for 5494	81
67.	Status of SNASVCMG and QRMTWSC Modes for 5494	81
68.	APPN Jobs	82
69.	5494 Sessions Using QRMTWSC	82
70.	5494 BIND with Mode QRMTWSC	83
71.	Trace Showing NMVT When 5494 Device Powered Off	84
72.	SNA Flow when 5494 Device is Powered On	85
73.	FMH-7 Showing Sense Code 08640000	88
74.	Trace Showing NMVT Information Sent to NetView	89
75.	AS/400 Alerts Shown on NetView's Alerts-Dynamic Panel	90
76.	NetView Recommended Action for the Special Event	90
77.	TCP/IP Protocol During Failure of a TELNET Session	92
78.	The SNA Attachment Profile	95
79.	SNA Token-Ring Logical Link Profile	95
80.	SNA Token-Ring Physical Link Profile	96
81.	SNA LU 6.2 Local Logical Unit Profile	96
82.	SNA LU 6.2 Logical Connection Program	96
83.	SNA Mode Description Profile	97
84.	SNA Mode List Profile	97
85.	SNA LU 6.2 Transaction Program Profile	98
86.	SNA Transaction Program List Profile	98
87.	SNA Remote Transaction Program Profile	98
88.	SNA Remote Transaction List Profile	99
89.	SNA Control Point Profile	99
90.	Selections Made to Define Service Point Profile	99
91.	Sphere of Control Information - RS/6000 Service Point	100
92.	Trace AIX NetView Service Point Program	102
93.	Sense Code Description Received from the RS/6000	104
94.	3174 Remote Workstation Controller Description Panel	107
95.	3174 Display Device Description Panel	107
96.	Extract of Trace Showing NOTIFY and LUSTAT Generated by 3174	108
97.	Message CPF2677 Generated by AS/400	108
98.	CHGMSGD Command to Make an OS/400 Message Alertable	109
99.	Work with Alerts Display	109
100.	Alert Detail - Panel 1 of 2	110
101.	Alert Detail - Panel 2 of 2	111
102.	Trace of NMVT Sent to NetView	112
103.	NPDA Alerts-Dynamic Display Panel	112
104.	NPDA Recommended Action Display Panel	113
105.	3174 Operator-generated Alert NMVT	113
106.	Trace Data of an Alert Transmitted from PS/2 to AS/400	116

107.	MDS-MU Relevant Fields	117
108.	MDS-MU Header Containing an ALERT	118
109.	Alert Major Vector	119
110.	Display Management Service CM/2	119
111.	LAN Network Manager Alert Displayed with WRKALR Command	124
112.	LAN Network Manager Alert on NetView's MOST RECENT EVENT Display	124
113.	LAN Network Manager Alert on EVENT DETAIL in NetView	125
114.	LAN Network Manager Alert Recommended Action in NetView	125
115.	LAN Network Manager Alert Recommended Action AS/400 Panel	126
116.	NetView's EVENT DETAIL MENU	127
117.	LAN Network Manager Alert in NetView's LINK CONFIGURATION	127
118.	AS/400 Alert Display Detail Menu	128
119.	AS/400 Display LAN LINK Connection Data	128
120.	The Display Adapter Profile Panel	132
121.	Display Token-Ring Status Panel	133
122.	The Display Adapter Profile Panel	134
123.	SystemView System Manager/400 Problem and Change Management	136
124.	Work with Alerts Panel	136
125.	Work with Problem Panel	137
126.	Display Problem Results Analysis Panel	137
127.	Display Problem Analysis Detail Panel	138
128.	Service Point Application Router Startup	140
129.	Remote Operation Service Startup	140
130.	Service Point Application Router Window	141
131.	Remote Operation Service Window	141
132.	Parameters for the RUNCMD Program	141
133.	DIR *.NDF RUNCMD Example	142
134.	MDS-MU for RUNCMD Request	143
135.	MDS-MU for RUNCMD Response	144
136.	SNA Trace for RUNCMD	145
137.	CMLINKS RUNCMD Example	147
138.	CMNETB RUNCMD Example	148
139.	LAN Network Manager Adapter Query RUNCMD Example	149
140.	LAN Network Manager Network Status RUNCMD Example	149
141.	Basic Software Configuration Scenario for SMAO/400 Remote Command Facility	155
142.	SMAO Remote Command Facility Panel	156
143.	HELP Panel for AS/400 Command Syntax	157
144.	Retrieved Command Syntax for the Vary Configuration Command	157
145.	Waiting for the AS/400 to Respond	158
146.	Command Completed	158
147.	The SMAO Command Processing Job is CMDSRV	159
148.	OPC/ESA JCL Sample for an AS/400 Job	160
149.	This Application Intermixes AS/400 Jobs and an MVS Job	161
150.	OPC Job that has Ended in Error is Colored Red	162
151.	Detailed Job Information	162
152.	Error Handling of JCL that has Ended Abnormally	163
153.	Editing the AS/400 Command	163
154.	AS/400 Job Server	164
155.	Basic Software Configuration for SMAO/400 Remote Subsystem Monitoring	168
156.	SMAO Main Menu	169
157.	SMAO Command WRKMSGTBL	170
158.	SMAO Command ADDMSGTBLE	170

159.	String Search of Message Description is Enabled by Prompt Support	171
160.	Add Message Table Entry with the Retrieved Prompt Information	171
161.	Start of Message Server Job that will Monitor the QSYSOPR Queue	172
162.	The Single Point of Control SDF Screen	173
163.	SDF Detailed Information of Monitored AS/400s	173
164.	Immediate Ending of the QSNADS Subsystem	174
165.	SDF Second Level Information	174
166.	Follow-up on Local Automation	175
167.	OMEGAMON/400 Main Menu	177
168.	OMEGAMON/400 Work with Situations Panel	178
169.	OMEGAMON/400 Create Situation - Panel 1 of 2	178
170.	OMEGAMON/400 Create Situation - Panel 2 of 2	179
171.	OMEGAMON/400 Main Menu	179
172.	Work with Policies - Panel 1 of 2	180
173.	Work with Policies - Panel 2 of 2	180
174.	Create Policy Panel	180
175.	Work with Activities Panel	181
176.	Add Activity Panel	182
177.	Work with Activities Panel	183
178.	Add Activities Panel	183
179.	Work with Activities Panel	184
180.	Add Activities Panel	184
181.	Work with Policies Panel	185
182.	RODM Scenario	189
183.	Text of Message CPF0A02	190
184.	Alert Table Entry for Message CPF0A02	190
185.	WRKACTJOB Showing Jobs Running in QCTL	191
186.	Joblog of Process to Send Alert Using APIs	192
187.	WRKALR Panel Showing Alert Sent by QALGENA and QALSNDAs APIs	192
188.	Display Alert Detail Panel of API-Generated Alert - Panel 1 of 2	193
189.	Display Alert Detail Panel of API-Generated Alert - Panel 2 of 2	194
190.	Selection Entry in AS400NET Alert Filter	194
191.	Action Entry in AS400NET Alert Filter	195
192.	Creation of Data Queue for Automated Alert Processing	195
193.	WRKACTJOB Showing Jobs Running in QCTL	196
194.	Work With Alerts Panel Showing Application-Generated Alert	196
195.	Detail of Application-Generated Alert - Panel 1 of 2	197
196.	Detail of Application-Generated Alert - Panel 2 of 2	197
197.	QSYSOPR Message Queue Showing Application-Generated Message	198
198.	Application-Generated Message: Additional Information	198
199.	Work with Active Jobs Panel	199
200.	Job Log for Alert Data Queue Application	199
201.	Format of the NMVT Management Services RU	217
202.	Format of the CP-MSU Management Services GDS Variable	217
203.	Overview of a Management Services Major Vector	218
204.	CT/2 Panel to Select Administrator Version	226
205.	CT/2 Open Variable Set (Panel 1 of 2)	227
206.	CT/2 Open Variable Set (Panel 2 of 2)	227
207.	CT/2 Panel With Variable Set Opened	228
208.	Add Command to CT/2 Variable Set (Panel 1 of 2)	229
209.	Add Command to CT/2 Variable Set (Panel 2 of 2)	230
210.	Command Added to CT/2 Variable Set	231
211.	Command Ready to Send to NetView	231
212.	Changing Command Destination in CT/2 (Panel 1 of 4)	232
213.	Changing Command Destination in CT/2 (Panel 2 of 4)	233

214. Changing Command Destination in CT/2 (Panel 3 of 4)	233
215. Changing Command Destination in CT/2 (Panel 4 of 4)	234
216. Typical SMAO/400 Environment	253
217. SMAO NetView Filter	254
218. Jobs in SMAO/400 Subsystem AMO	257
219. Second Level Job Information in SDF	258
220. Performance Data Supplied by the SNDPFRDTA Command to SDF	259
221. SMAO/400 Main Menu	260
222. Work with Message Automation Table Panel	260
223. SLR/400 Main Menu	261
224. Start SLR Server Job	262
225. Message AMO8001 is Sent to the QHST Log	262
226. Start SLR/400 Data Capturing (STRSLR400)	263
227. SMAO Supplied Commands	263
228. Work with SMAO Installation Panel	264
229. Add SMAO/400 Node Entry - Panel 1 of 2	265
230. Add SMAO/400 Node Entry - Panel 2 of 2	265
231. The Single Point of Control SDF Screen	267
232. SMAO Help Function in NetView	268
233. AMONESTA Command Displays the Status Screen	269
234. Scheduling Information - SMAO/400	270
235. Most Frequent Messages in the QHST Log	271
236. SLR/400 Accounting Report Sample	272
237. SLR/400 Configuration Report Sample	273
238. SLR/400 Performance Report Sample	274
239. NetView Member BNJMBDST	276
240. NetView Member EPVALPRM	277
241. NetView Task Definition	277
242. VTAM Application LU Definition	277
243. VTAM LU Definition	277
244. Create PRPQ Device Description	278
245. Create PRPQ Mode Description	278
246. Change Network Attributes for PRPQ	278
247. Network Attribute Display for RALYAS4B	279
248. Network Attribute Display for RALYAS4A	279
249. Alerts Generated by RALYAS4B	280
250. Alert Data Flow from RALYAS4B to NetView	280
251. Alerts Dynamic NPDA Display Panel	281
252. Alert Flow from PRPQ to AS/400 RALYAS4A	282
253. Alerts Received by RALYAS4A from PRPQ	283
254. Source for QPFRMONCHK Control Language Program	285
255. Source for QALSNDCLP Control Language Program	286
256. Source for CPYSPLF File to Receive CPYSPLF Output	286
257. Source for Logical File LCPYSPL over CPYSPLF	286
258. Source for RPG Program QALSND - Panel 1 of 2	287
259. Source for RPG Program QALSND - Panel 2 of 2	288
260. Source for RCVDTAQ Control Language Program	289



---

## Tables

1.	SystemView Structure and Application Dimension Disciplines . . . . .	8
2.	Systems that Support Alerts . . . . .	15
3.	OS/400 Alert Logging Status Summary . . . . .	59
4.	Database Files Used for OS/400 Alert Support . . . . .	59
5.	OS/400 TRN Manager Compared to LAN Network Manager V1.1 . . . .	129
6.	Mapping of LAN Commands for OS/400 V2R3 and V2R2 TRN Commands . . . . .	130
7.	Format of SNA Alerts . . . . .	203
8.	SNA Alert Variables . . . . .	206
9.	AUTOMATION CENTER/400 Functions Matrix . . . . .	220
10.	AUTOMATION CENTER/400 Hardware and Software Requirements . .	222
11.	Prerequisites for the Different Functions of SMAO . . . . .	274





---

## Special Notices

This publication is intended to help in planning or implementing network management of an AS/400 system. The information in this publication is not intended as the specification of any programming interfaces that are provided by the Operating System/400 product. See the PUBLICATIONS section of the IBM Programming Announcement for the Operating System/400 for more information about what publications are considered to be product documentation.

References in this publication to IBM products, programs or services do not imply that IBM intends to make these available in all countries in which IBM operates. Any reference to an IBM product, program, or service is not intended to state or imply that only IBM's product, program, or service may be used. Any functionally equivalent program that does not infringe any of IBM's intellectual property rights may be used instead of the IBM product, program or service.

Information in this book was developed in conjunction with use of the equipment specified, and is limited in application to those specific hardware and software products and levels.

IBM may have patents or pending patent applications covering subject matter 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 the IBM Director of Licensing, IBM Corporation, 500 Columbus Avenue, Thornwood NY 10594 USA.

The information contained in this document has not been submitted to any formal IBM test and is distributed AS IS. The information about non-IBM (VENDOR) products in this manual has been supplied by the vendor and IBM assumes no responsibility for its accuracy or completeness. The use of this information or the implementation of any of these techniques is a customer responsibility and depends on the customer's ability to evaluate and integrate them into the customer's operational environment. While each item may have been reviewed by IBM for accuracy in a specific situation, there is no guarantee that the same or similar results will be obtained elsewhere. Customers attempting to adapt these techniques to their own environments do so at their own risk.

The following terms, which are denoted by an asterisk (\*) in this publication, are trademarks of the International Business Machines Corporation in the United States and/or other countries:

Advanced Peer-to-Peer Networking	AIX
AIX/6000	AIXwindows
Application System/Entry	Application System/400
APPN	Advanced Peer-to-Peer Networking
AS/400	AT
ES/9000	Extended Services
Extended Services for OS/2	IBM
MVS/ESA	MVS/XA
NetView	OPC
Operation, Planning and Control	Operating System/2
Operating System/400	OS/2
OS/400	Personal System/2
PS/2	RISC System/6000
RT	S/390
SAA	SQL

Structured Query Language	SQL/400
System/36	System/38
System/370	System/390
Systems Application Architecture	SystemView
VTAM	400

The following term, which is denoted by a double asterisk (\*\*) in this publication, is trademark of other company:

AUTOMATION FACILITIES	Candel Corporation
Microsoft, Windows	Microsoft Corporation
OMEGAMON	Candel Corporation
OMEGAVIEW	Candel Corporation

---

## Preface

This document describes various network management techniques. It is intended to provide the reader with an insight into the different types of information available to the AS/400 for the purposes of network management. It also highlights some of the considerations for AS/400 coexistence with other network management products.

---

### How This Document is Organized

The document is organized as follows:

- Chapter 1, "Introduction"  
This chapter introduces network management concepts and some of the network management products available today.
- Chapter 2, "Alert Support Implementation and Downstream Information"  
This chapter describes the type of information the AS/400 can collect from a downstream network.
- Chapter 3, "Remote Operation"  
This chapter describes remote operations using the AS/400 as a focal point for a downstream network and then using the AS/400 as an intermediate focal point to a host.
- Chapter 4, "Remote Monitoring"  
This chapter describes remote monitoring using the AS/400 as a focal point for a downstream network and then using the AS/400 as an intermediate focal point to a host.
- Chapter 5, "Automation"  
This chapter describes automation from a management point of view. We have provided scenarios using NetView Remote Operations for AS/400.
- Appendix A, "SNA Generic Alerts"  
This appendix provides details on alert support as a supplement to what was provided in Chapter 2.
- Appendix B, "Management Services"  
This appendix discusses the SNA MS Transport.
- Appendix C, "IBM AUTOMATION CENTER/400"  
This appendix describes the AUTOMATION CENTER/400 product.
- Appendix D, "NetView Remote Operations for AS/400"  
This appendix describes the NetView Remote Operations Manager NetView Remote Operations Agent in detail.
- Appendix E, "Systems Management Automation Offering (SMAO)"  
This appendix describes SMAO in detail.
- Appendix F, "NetView to AS/400 Bridge PRPQ"  
This appendix describes the NetView to AS/400 bridge PRPQ.
- Appendix G, "Alert Automation Applications"

This appendix provides the source code for two user-written alert automation applications used in Chapter 5, “Automation” on page 177.

- Appendix H, “AS/400 RUNCMD Program Listing”

This appendix provides the RUNCMD program used in Chapter 3, “Remote Operation” on page 135.

---

## Related Publications

The publications listed in this section are considered particularly suitable for a more detailed discussion of the topics covered in this document.

- *Application System/400 Communications and Systems Management Guide (Alerts and Distributed Systems Node Executive)*, SC41-9661
- *SMAO/400 Installation and Operations Guide*, SH19-5016
- *NetView Remote Operations Manager MVS/ESA NetView Remote Operations Agent User's Guide*, SC31-7177
- *Systems Network Architecture Management Services Reference*, SC30-3346
- *SNA Formats*, GA27-3136
- *NetView Customization: Writing Command Lists*, SC31-6135

---

## International Technical Support Center Publications

- *AS/400 Automation Using NetView and the SNA MS Transport*, GG24-3841
- *IBM Extended Services for OS/2 Communications Manager New Features and Enhancements*, GG24-3876
- *LAN Network Manager V1.1, LAN Station Manager Entry V1.0 and LAN Station Manager V1.0*, GG24-3942
- *Communications Manager/2 Version 1.0 New Features*, GG24-3958
- *Communications Manager/2 Version 1.1 Enhancements*, GG24-4142

A complete list of International Technical Support Center publications, with a brief description of each, may be found in:

*Bibliography of International Technical Support Organization Technical Bulletins*, GG24-3070.

---

## Acknowledgments

The advisor for this project was:

Fernand Biname  
International Technical Support Organization, Raleigh Center

The authors of this document are:

Graham Armstrong  
ISM South Africa

Peter Aurell  
IBM Sweden

Oliver Fortuin  
ISM South Africa

Bernd Freitag  
IBM Germany

Ger Roovers  
IBM The Netherlands

Dirk Van Der Merwe  
ISM South Africa

This publication is the result of a residency conducted at the International  
Technical Support Organization, Raleigh Center

Thanks to the following people for the invaluable advice and guidance provided  
in the production of this document:

Claude Bechard  
Franchesca Collins  
Ray Collins  
Barry Nusbaum  
David Shogren  
George Steinborn  
International Technical Support Organization, Raleigh Center

Per Akerstrom  
IBM Sweden

Tracy Fletcher  
IBM Research Triangle Park

Mary Garbutt  
IBM United Kingdom

Chris Lennon  
IBM Research Triangle Park

Mark McKelvey  
IBM ITSO Rochester

Hiroyoshi Nishihara  
IBM ITSO Rochester



---

## Chapter 1. Introduction

The AS/400\* system provides several network management functions. It is not always easy to decide what combination of these should be used to effectively manage a network, particularly when the AS/400 is attached to a heterogeneous network consisting of multiple hardware and software platforms. This publication will examine the network management products and functions which are applicable to the AS/400 in two broad contexts:

1. AS/400 as an alert focal point in the network
2. AS/400 as an intermediate focal point forwarding alerts to a NetView\* focal point.

This publication is organized to follow as closely as possible the hierarchical flow of alerts through a Systems Network Architecture (SNA) network. The alert flow and processing is conceptually illustrated in Figure 1 on page 2 and Figure 2 on page 5. The rest of this chapter contains an introduction to the main components of the alert process shown in these two figures. Detailed discussions of these components follow later, as indicated.

In Figure 1 on page 2, the reference numbers in parentheses indicate the section of this publication which covers the particular part of the process:

- 1** Please see Chapter 2, "Alert Support Implementation and Downstream Information" on page 21 for details on the data which is available to the AS/400 for network management processes.
- 2** The implementation of alert support on the AS/400 is covered in detail in 2.1.2.2, "Changing the Network Attributes" on page 36.
- 3** The creation and use of alert filters on the AS/400 to process downstream information received by the AS/400 is covered in 2.1.2.6, "Implementation and Use of Alert Filters on AS/400" on page 62.
- 4** The automated processing on the AS/400 of alerts which have been received and logged, can be implemented using user-written applications or a product such as AUTOMATION CENTER/400. Examples of user-written applications can be found in 5.4, "Sending an Alert Using OS/400 APIs" on page 189 and 5.5, "Processing an Alert Sent to a Data Queue" on page 194. Please see 5.1, "AUTOMATION CENTER/400" on page 177 for details of AUTOMATION CENTER/400.
- 5** The manual processing of alerts on the AS/400 is covered in 2.1.2.5, "Manual Processing of Alerts" on page 57.

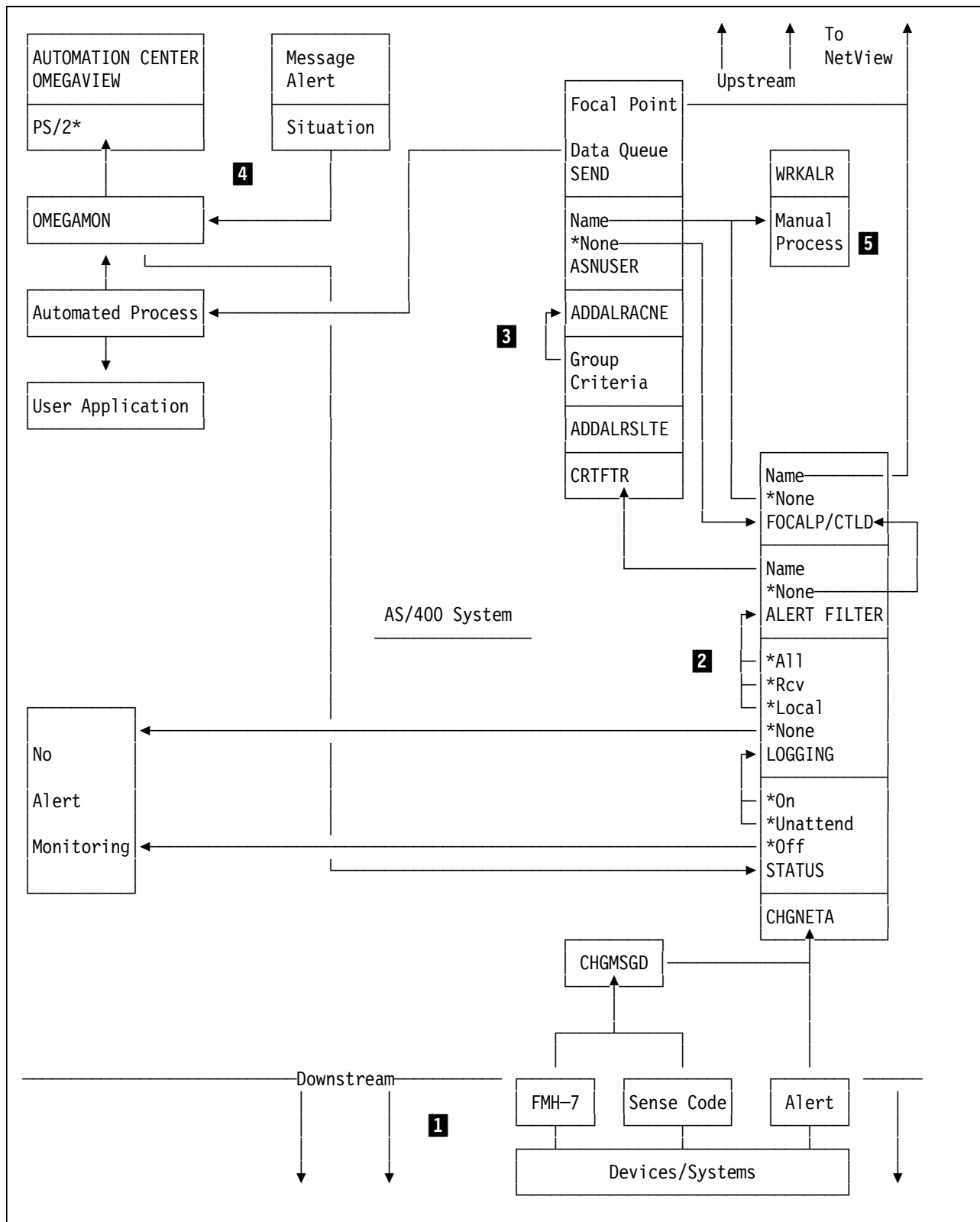


Figure 1. Hierarchical Flow of Alerts (Downstream)

The following is an explanation of the various components of Figure 1, moving from the bottom of the diagram upwards, following the conceptual alert flow:

- *Devices/systems*



The devices and systems which are connected downstream of the AS/400 produce error information in three possible formats. Exactly which format a particular system or device will use to present the information in, depends on the type of support which the system or device provides.

- *FMH-7, Sense Code, and Alert*

The three formats are:

- FMH-7 - (Format Management Header-7)
- Sense Code - provided for in the SNA protocol. Defined error conditions result in a particular sense code being sent by the system.
- Alerts - SNA Generic Alerts (Please refer to Appendix A, “SNA Generic Alerts” on page 201 for a detailed description.

- *CHGMSGD (Change Message Description)*

The AS/400 automatically converts FMH-7 and SNA Sense Codes to a message upon receipt from the downstream system. In order to convert this information into an alert, this message has to be changed using the CHGMSGD command. Please refer to 2.1.2.3, “Message Files” on page 41 for more details on this.

- *CHGNETA (Change Network Attributes)*

In order to enable the alert support on the AS/400, the network attributes have to be changed, using the CHGNETA command. Please refer to 2.1.2.2, “Changing the Network Attributes” on page 36 for details.

- *No Alert Monitoring*

If the alert status is set to \*OFF or the alert logging is set to \*NONE, in the Network Attributes, no alert processing can take place on the AS/400. If this is not the case, the AS/400 system checks to see whether or not an alert filter is specified in the network attributes.

- *ALERT FILTER*

If a name is specified in the Alert Filter parameter, the system uses this alert filter to screen alerts before proceeding to the next step of alert processing.

- *CRTFTR Create Filter*

An alert filter is made up of two components - Selection Entries and Action Entries. The selection entry determines which group to assign an alert to based on the value of certain parameters and the action entry tells the system what action to take for the alerts which have been allocated to these groups by the selection entries. Please refer to 2.1.2.6, “Implementation and Use of Alert Filters on AS/400” on page 62 for details.

- *FOCALP/CTLD Focal Point to Request/Controller Description*

The presence of a value in either of these parameters of the network attributes indicates that the alerts must be forwarded to a higher focal point. A focal point indicates that the session over which the alert flows in an LU 6.2 session using the Management Services architecture. A controller description indicates that it is an SSCP-PU session. Please see 2.1.2.2, “Changing the Network Attributes” on page 36 for more information.

- *ADDALRSLTE* Add Alert Selection Entry

This command is used to add selection entries to the alert filter. Please refer to 2.1.2.6, “Implementation and Use of Alert Filters on AS/400” on page 62 for details.

- *ADDALRACNE* Add Alert Action Entry

This command is used to add action entries to the alert filter. Please refer to 2.1.2.6, “Implementation and Use of Alert Filters on AS/400” on page 62 for details.

- *ASNUSER* User assigned

This is an optional part of the action entry. The responsibility for attending to certain deletes can be assigned to a specific user ID on the AS/400 system.

- *WRKALR* Work with Alerts

If certain alerts have been assigned to a specific user ID (*ASNUSER* has a name value specified), then that user can process the alerts manually, using the *WRKALR* command.

If there is an alert filter specified for the AS/400 system, and *ASNUSER* specifies *\*NONE*, the system returns to check for the presence of values in *FOCALP/CTLD* to determine whether the alert must be forwarded to a higher focal point.

- *SEND*

There are three possibilities for the *SEND* parameter of the alert filter action entry. The alert can be sent to:

- A data queue

If the alert is sent to a data queue, this means that it will be processed by an automated process on the AS/400 system. In the context of this publication, this could be a user-written application or *AUTOMATION CENTER/400*. Please refer to 5.1, “*AUTOMATION CENTER/400*” on page 177 for more details on *AUTOMATION CENTER/400* and 5.5, “Processing an Alert Sent to a Data Queue” on page 194 for an example of a user-written application processing an alert sent to a data queue.

- A focal point

Specifying a focal point in the *SEND* parameter of the action entry has the same effect as specifying a value in the focal point of the network attributes.

- A system

Specifying a control point in the *SEND* parameter of the action entry will send the Alert to a node other than the focal point node.

- *OMEGAMON*

This is the monitoring component of *AUTOMATION CENTER/400*. Alerts which are received by the AS/400 and which comply with the selection criteria are sent to the *OMEGAVIEW* component of *AUTOMATION CENTER/400*.

- *OMEGAVIEW*

This is the user interface of *AUTOMATION CENTER/400*, which runs on a PS/2\*. *OMEGAMON*, which runs on the AS/400, is the server and *OMEGAVIEW* is the client.

- *Upstream*

In most cases, this will be a S/370 or S/390 running NetView but could also be another AS/400 acting as a focal point.

In Figure 2, the reference numbers in parentheses indicate the section of this publication which covers the particular part of the process:

**6** Please see 3.3.2, “Using the NetView Remote Operations Product” on page 151 for a detailed discussion on remote operations.

**7** Please see 4.1, “NetView Remote Operations for AS/400 Monitoring” on page 165 for a detailed discussion on remote monitoring.

**8** Please see 5.3, “NetView Remote Operations Using RODM Method” on page 188 for a detailed discussion on automation at the upstream level.

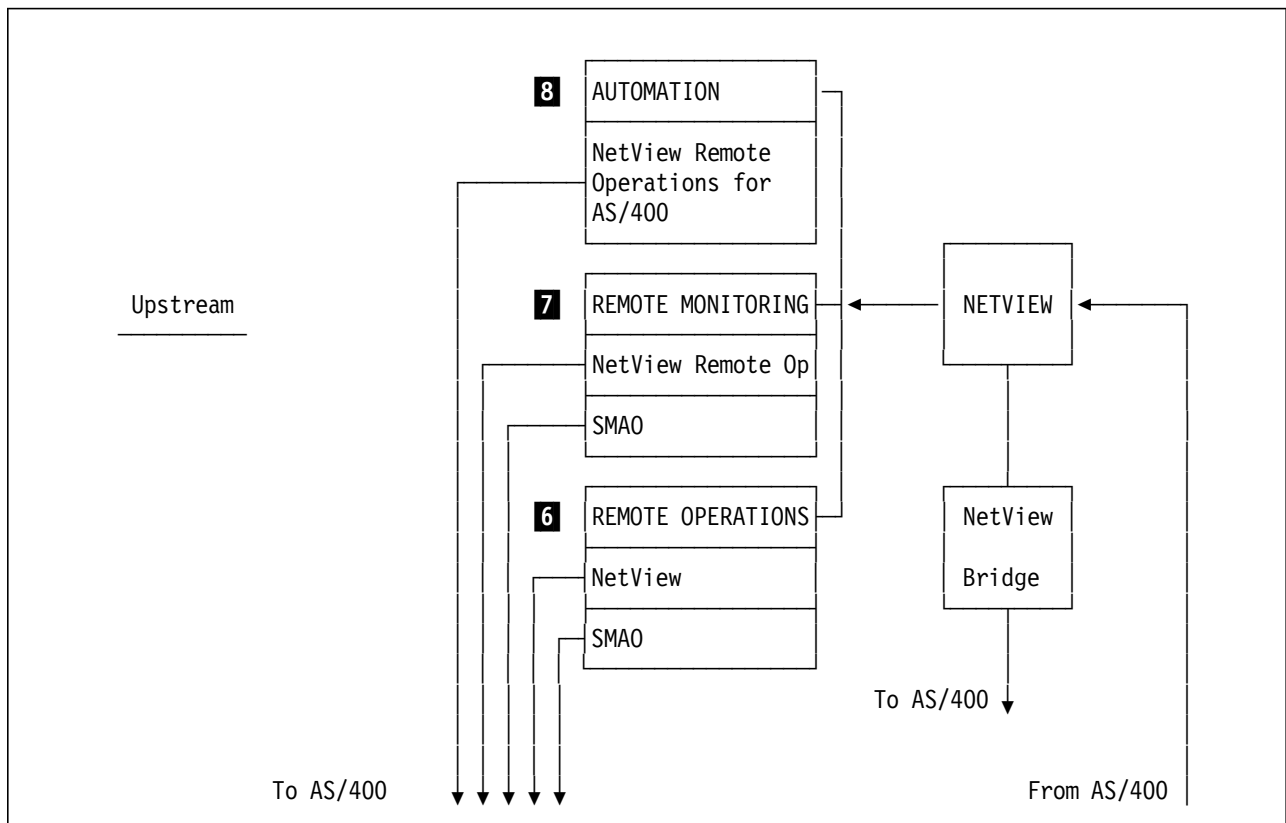


Figure 2. Hierarchical Flow of Alerts (Upstream)

The following is an explanation of the various components of Figure 2, which shows the upstream level of alert processing.

- *From AS/400*

The alerts which are received by NetView have been sent to it as a result of entries in the Focal Point to Request/Controller Description parameters in the Network Attributes or in the SEND parameter of the Action Entry shown in Figure 1 on page 2.

- *NetView*

NetView has been set to trap incoming alerts from systems downstream of it. All three functions relating to the monitoring and control of downstream AS/400 systems are dependent for their input on the alerts logged by NetView.

- *Remote Operations*

In this publication, AS/400 remote operations functions are provided by:

- NetView

The NetView Remote Operations Manager NetView Remote Operations Agent/400 achieves remote operation between NetView and AS/400 via an MS Transport session, using the operations management MS application.

- *Remote Monitoring*

In this publication, AS/400 remote monitoring functions at the upstream level are provided by:

- NetView Remote Operations for AS/400

Although monitoring, as such, is not a feature of NetView Remote Operations for AS/400, it can be achieved through customization. Please refer to 4.1, “NetView Remote Operations for AS/400 Monitoring” on page 165 for more details.

- Systems Management Automation Offering (SMAO)

SMAO operates over a Remote Job Entry (RJE) link between a S/390 processor running MVS and the AS/400. Monitoring is carried out at scheduled intervals, known as “heartbeats”. The scheduling is done in OPC\* within MVS.

- *Automation*

In this publication, automation functions at the upstream level are provided by:

- NetView Remote Operations for AS/400

Although automation, as such, is not a feature of NetView Remote Operations for AS/400, it can be achieved through customization. Please refer to 5.2, “NetView Remote Operations for AS/400 Automation” on page 185 for more details.

---

## 1.1 SystemView Introduction

In 1990, IBM\* announced the SystemView\* strategy for planning, coordinating and operating heterogeneous, enterprise-wide information systems. This strategy comprises the IBM SystemView structure and SystemView-conforming products. SystemView is the SAA\* (Systems Application Architecture\*) strategy for managing enterprise information systems.

The SystemView structure is designed to provide system users with a consistent interface, shared data, enhanced automation and increased interaction among system management products. Products conforming to the SystemView structure provide management functions which span information systems resources in SAA environments as well as other IBM and non-IBM environments. These resources may be managed across OSI (Open Systems Interconnection),

TCP/IP and SNA networks. This systems management strategy enhances the ability of users to manage enterprise-wide information systems as a business and to provide quality service to help achieve the goals of the enterprise.

SystemView addresses the management of the following resources:

- Hosts
- Databases
- Auxiliary storage
- Networks
- Business administration (of information systems)

SystemView provides end-to-end management solutions for both distributed and host systems environments. The flexibility provided by multiple managing systems - Operating System/2\* (OS/2)\*, Advanced Interactive Executive\* (AIX/6000)\*, Operating System/400\* (OS/400)\* and NetView from IBM makes it possible to extend system and network monitoring and control to AIX/6000-based, DOS-based and OS/2-based local area networks (LANs), as well as the Application System/400\* (AS/400) family. This same capability can also be extended to products managing distributed and centralized data, text, voice, graphics and image information.

### 1.1.1 SystemView Benefits

The IBM SystemView management strategy provides:

- The SystemView structure for integrating systems management applications from IBM, outside vendors and IBM customers
- User productivity gains through the use of consistent user interfaces, standardized systems management data definitions, increased integration, and enhanced automation
- Enhanced business solutions as a result of increased flexibility and extendibility through the use of open standards
- Customer investment protection through an evolutionary approach and orderly migration paths
- Customer growth through the increased availability of systems and networks
- Increased level of automation for systems management tasks
- Architected interfaces to enable vendor and customer participation

### 1.1.2 SystemView Structure

The IBM systems management strategy consists of the SystemView structure and SystemView conforming products. SystemView structure consists of three complementary elements called *dimensions* which define guidelines, standards and interfaces for integrating systems management applications.

Table 1. SystemView Structure and Application Dimension Disciplines		
System View Structure		
	Application Dimension	
	Business Management	
	Change Management	
End-Use Dimension	Configuration Management	Data Dimension
	Operations Management	
	Performance Management	
	Problem Management	

- The **End-Use Dimension** provides the user at a workstation with a consistent, user-friendly view of the applications.
- The **Application Dimension** defines guidelines for the implementation and integration of systems management applications.
- The **Data Dimension** addresses requirements for standardized systems management data definitions and access.

**The End-Use Dimension:** The End-Use Dimension addresses the needs of SystemView end users, such as the operators, system administrators, and business analysts who perform systems management tasks. The End-Use Dimension provides definitions for the presentation of systems management objects and actions. These definitions are designed to provide common semantics, appearance, behavior and terminology across related SystemView applications, thereby increasing end user productivity and reducing the overall required training effort.

The End-Use Dimension allows the user a choice of interfaces, such as graphic display, textual dialogs, or a command entry. Methods and interfaces are defined for use within SystemView applications, along with tools and services.

**The Data Dimension:** The Data Dimension provides the platform for integrating all systems management data in accordance with a data model defined by SystemView. Within this platform there are interfaces and services which can be used by applications seeking access to the systems management data.

The Data Dimension provides a common Data Model for systems management data. This prevents data redundancy and ensures consistency among the different systems and products.

**The Application Dimension:** The Application Dimension provides a comprehensive approach to integrating systems management tasks and applications. The Application Dimension defines the interfaces and services necessary to support the tasks required to administer, coordinate, and operate the enterprise systems as a business. These systems management tasks are called Disciplines and are grouped into the following six management areas:

- Business Management
- Change Management
- Configuration Management

- Operations Management
- Performance Management
- Problem Management

**Business Management** includes tasks that support a wide range of business and administrative functions to run the business aspects of enterprise-wide information systems. Examples of business management tasks are security management, inventory/asset control, accounting, billing and charge-back and budget planning.

**Change Management** includes tasks that manage and control the introduction of change into a systems environment. These would include planning, testing and distribution of changes to data processing resources.

**Configuration Management** is the collection of the facilities and processes needed to plan, develop and maintain the operational properties and interrelationships of resources within the enterprise's information systems. The design and updating of configuration information are two of the tasks which fall into this category.

**Operations Management** deals with tasks that plan, distribute, evaluate and control workloads. Examples are tasks which include workload and operations planning, scheduling and control.

**Performance Management** addresses the effectiveness with which information systems deliver services to their customers. Service planning and control are examples of performance management tasks.

**Problem Management** is the process of managing problems, incidents, and critical situations from their detection until their final resolution. Incident detection and recognition as well as problem analysis and diagnosis would be grouped under this discipline.

---

## 1.2 Operations Management Discipline

The operations management discipline includes tasks for planning, distributing, evaluating, and controlling workloads. It also addresses the resource availability needed to support the workloads.

The operations management discipline is oriented towards defined workloads. It covers the activities of starting and stopping systems and resources (including, but not limited to, host systems, workstations networks, and databases) and receiving and responding to operational notifications. However, it encompasses more than the traditional operator's console commands, messages, and responses. The objective is to allow management to set policies to manage workloads and resource availability, and to automate the interactions required to implement these policies.

Operations management should provide the flexibility to centralize control of some functions and distribute others. This ability, together with other enhanced operator functions, will reduce the cost of operations.

The requirements for operation management may include:

- Lights out operation - Automated operations, ranging from simple command lists to automate a trivial or repetitive operator function to Artificial Intelligence (AI) applied to automating operator decisions
- Data protection - Automated backup and archiving of data files
- Monitoring - Consistent, easy to use, graphical operations interface(s), that display network topology and resources

The operations process includes:

- Workload Planning - the definition, analysis, and reporting of the enterprise's workloads, both actual and anticipated
- Operations planning - determining the structure needed to support the availability of systems and resources for the defined workloads
  - Verifying that the resources needed for an scheduled workload are available; for example, that the memory and disk space in a server are available for backup operation.
  - Planning to ensure the availability of day-to-day operations items such as printer paper, tapes, and control center equipment
  - Specifying operations policies and procedures, preventive maintenance and operations recovery procedures
  - Supporting output delivery as defined by service-level agreements
- Workload control - distributes work-handling and work-processing responsibilities across systems. It includes the monitoring analysis, and adjustment of work in those systems. Examples of these functions are:
  - Translating workload policies into system specifics
  - Distributing workload policies to systems
  - Receiving work requests and distributing them to systems, based on needs and policies
  - Managing resources needed for a workload for example, ensuring a tape volume needed by a batch job is mounted and ready for use on a tape drive
  - Monitoring systems and resources to determine progress
  - Accepting and responding to notification requests for work-related events, such as job termination
  - Taking action on workload-related events, such as restarting or rerouting work
  - Managing the printing and delivery of hardcopy output
- Operations control - applying operations policies for exception conditions, resource shortages and other situations.



## 1.2.1 Problem Management

Complex configurations require expedient problem resolution procedures to maintain high system availability. Problem management is the process through which high system availability is achieved. The problem management process includes the following:

- **Problem determination**

The detection of the loss or impending loss of availability of a system resource to an end user, and the isolation of the detected problem to failing hardware, software, or microcode component.

- **Problem diagnosis**

The determination of the specific cause of a problem and the action required to resolve it. Diagnostic data gathered during problem determination provide input to this step. It may be necessary to gather and analyze additional information to complete problem diagnosis.

- **Problem reporting**

The logging of a problem or calling the help desk to have a problem logged for follow-up and solution.

- **Problem bypass and recovery**

The bypass of a failure, if necessary, until a problem can be resolved. The decision to bypass a failure is determined by the criticality of the lost resource and the cost of providing the bypass capability. If continuous operation is a requirement, recovery from a problem must take place immediately following problem determination and diagnosis.

- **Problem assignment**

Directing the problem to the proper resolver, according to the enterprise policy.

- **Problem resolution**

The action taken to correct a problem. Once a problem is resolved, any steps taken in bypassing it may be undone and the original resource placed back in service.

- **Problem tracking and control**

The tracking of problems from detection until their final resolution. Many different symptoms may result from the same problem, and different problems may be related. The tracking of problems allows the correlation of related symptoms and problems, and helps to ensure timely recovery. Escalation of problems that exceed the established policies is a critical part of this step.

- **Problem closing**

Specific notation that the problem has been solved to the satisfaction of the reporter. Problem cause and type must be noted for management analysis.

- **Problem analysis**

Analyzing problem trends to reduce the number and impact of problems is a required management activity.

## 1.2.2 Remote Operation

Remote operations, as presented in this book, is the ability to initiate action at system B from system A; for example, submitting a command from system A to execute on system B as shown in Figure 3 or capturing an alert at system A and, as a result, initiating an action at system B as a result as shown in Figure 3.

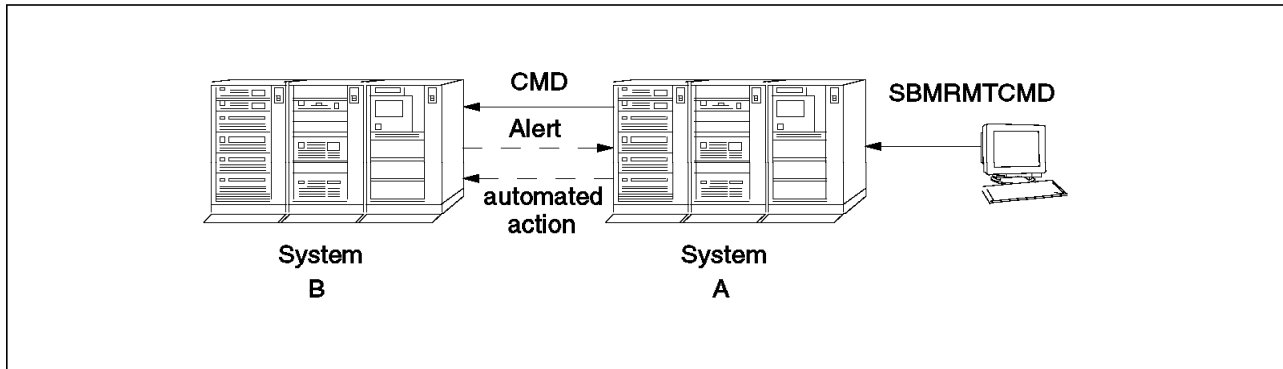


Figure 3. Remote Operations Scenario

This action can be either operator-initiated that is, an operator entering a SBMRMTCMD to another AS/400, or automated, that is, no operator intervention.

From the network management perspective, we will look at how to use the different alert formats available to achieve management via remote operation. In this respect we will be examining some products that have recently become available.

---

## 1.3 Entry Points and Focal Points

An *entry point* is a system within a network that generates and sends alerts to another system in the network. This other system is known as a focal point.

A focal point has a *sphere of control*. This sphere of control includes all the entry points from which the focal point receives alerts.

The AS/400 system can be defined as a *primary, requested, backup or default* focal point:

- Primary focal point

The system receives alerts from all systems explicitly defined in its sphere of control.

- Requested focal point

This is the system which is named by an entry point system as the focal point to which it will send alerts.

- Backup focal point

This is the system which is used as a focal point by the entry system only when the entry system cannot communicate with its primary focal point. The primary focal point notifies all entry point systems in its sphere of control of the name of the backup focal point.

- Default focal point

This is the system which receives alerts from all entry point systems which do not already have a focal point. When a new system enters the network, the default focal point identifies itself as a default focal point to this new system. If the new system does not yet have a focal point, it will send its alerts to this default focal point.

---

## 1.4 Alerts Introduction

An *alert* is a special type of message which is structured according to SNA (Systems Network Architecture) architecture. The purpose of a network architecture is to provide a common set of rules to enable systems with different hardware and/or software platforms to communicate effectively with each other because they all conform to the same set of rules. Alerts are architected for the same reason.

The basic function of an alert is to provide an operator monitoring a network of systems with:

- Notification of the actual or impending loss of the availability of a resource at one of the systems comprising the network
- Any available analysis data relating to the problem responsible for this actual or impending loss

An alert summarizes the problem and provides guidance on corrective actions to the network operator on the system receiving the alert. For those problems which a network operator cannot correct, the alert provides information that a specialist can use to isolate the source of the problem.

An alert is usually sent from one system within a network to another system which is providing a central management function to the same network. This central management system is called the problem management focal point.

The alerts that are received at the focal point can be used for:

- Monitoring unattended systems and devices in the network
- Managing situations where the local operator on a system does not know how to handle the problem
- Maintaining control of system resources and costs

A *focal point* allows you to centralize management of the network at the focal point. A focal point can be defined as an APPN\* network node that is the *destination* of alerts. There can be several focal points within a network. If the network is an APPN (Advanced Peer-to-Peer Networking\*) network, a *sphere of control* can be defined for each focal point. A sphere of control is a collection of *control points* or systems within an APPN network from which the focal point receives alerts.

A control point is defined as a collection of tasks which provide directory and route selection services for APPN. An end node control point provides its own configuration, session and management services with assistance from the control point in its serving network node. A network control point provides session and routing services.

Once the connection has been established, identification information is exchanged between the nodes and a control-point session will be started

between the control points in the directly attached network nodes. A control-point session may also be started between the control points in a directly attached network node and an APPN end node. However, a control-point session cannot be started with a low-entry networking node. The control-point session is used to exchange network topology information (when the session is between directly attached network nodes) and to conduct directory searches. The result of the exchange of network topology information is the creation of a table, called the network topology database that holds the current network connectivity information.

An *entry point* is an APPN node that generates and sends alerts.

The focal point:

- Accepts alerts from systems in the sphere of control
- Forwards alerts to a higher level focal point, if one exists

It is also possible to send an alert to a system over a non-APPN network. It is the responsibility of the receiving system to be able to handle the alerts which are received from the sending system.

The networking support which has been implemented to provide the connection to the focal point determines the type of session over which data flows:

- If APPC/APPN support is used, the focal point establishes a management services session with the systems defined in its sphere of control. The management services session is also used to send alerts to the focal point. Alerts move through the network to the focal point as a control point management services unit (CP-MSU).
- If however, APPC/APPN support is not used, the alerts flow as a network management vector transport (NMVT) on the alert controller description. This session does not support the management services capabilities, so the sphere of control functions cannot be used.

### 1.4.1 Transporting Alert Data

Alerts move through a network to the focal point as a control point management services unit (CP-MSU) on a management services session. CP-MSUs are also used to exchange management services capabilities for sphere of control support.

Alerts flow as a network management vector transport (NMVT) on the alert controller session. Record-formatted maintenance statistics (RECFMS) is an alert format that has been replaced by the NMVT and CP-MSU formats. The AS/400 discards any alerts that it receives in RECFMS format.

Table 2 on page 15 shows some of the systems which are eligible to send and receive alerts during a session.

<i>Table 2. Systems that Support Alerts</i>				
<b>System</b>	<b>Receive</b>		<b>Send</b>	
	<b>CP-MSU</b>	<b>NMVT</b>	<b>CP-MSU</b>	<b>NMVT</b>
AS/400 system	X	X	X	X
System/36		X		X
System/38		X		X
System/370	X	X	X	
System/390	X	X	X	
OS/2 system	X		X	
3174				X
RS/6000 system	X	X	X	X

## 1.4.2 Routing Alert Data

Figure 4 on page 16 shows an example of how alert data is routed in a network made up of AS/400 systems, a System/38\*, a System/36\* and a System/370\* or System/390\* system. The AS/400 systems have been configured to use APPN support and can therefore use management services sessions to send alert data.

In this example, a SSCP-PU session is used to send alerts from CHICAGO(AS/400) to NEW YORK(NetView). In this case, you have to define on the CHICAGO AS/400, the Alert Controller description ALRCTLD=NEWYORK and ARPRIFP=YES to route the alerts to NetView.

NetView V2R2 supports Management Services Sessions (SNASVCMG) which can be used to send alerts from AS/400 (CHICAGO), to NetView (NEWYORK). No special Alert controller has to be defined on the AS/400 (CHICAGO). In the network attributes, you have to define that NetView will be the requested focal point. Using Management Services capabilities has the advantage that the focal point will be automatically changed when a connection to a requested focal point fails.

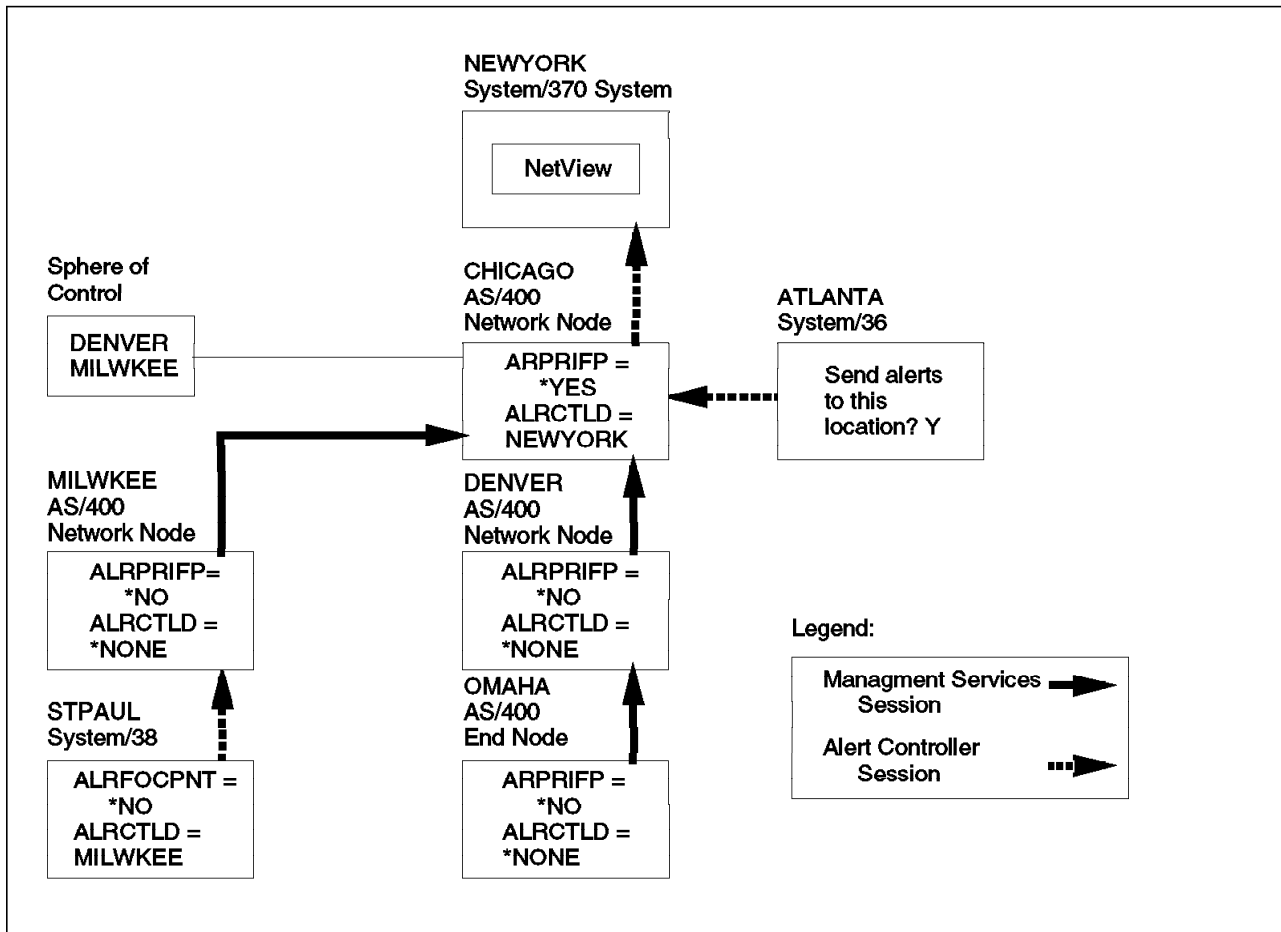


Figure 4. An Example of Alert Routing in a Network

In Figure 4, the primary focal point is CHICAGO. Chicago has been defined as a primary focal point by using the CHGNETA (Change Network Attributes) command to change the alert primary focal point parameter (ALRPRIFP) to \*YES.

The nodes from which Chicago will receive alerts (in its Sphere of Control) is set up using WRKSOC (Work with Sphere of Control) command. These nodes are the AS/400 Network Nodes at MILWKEE and DENVER. CHICAGO will acquire them.

The System/38 at STPAUL and System/36 at ATLANTA do not support management services sessions (LU 6.2) for sending alerts but only SSCP-PU sessions. Consequently, the System/38 has been configured to send its alerts to MILWKEE, while the System/36 has been configured to send its alerts to CHICAGO. MILWKEE then forwards alerts received from STPAUL to the focal point CHICAGO.

The AS/400 at OMAHA is an end node. End nodes participate in an APPN network by using the services of an attached network node. In the case of the OMAHA end node, this has been done by using the CHGNETA command to change the NETSERVER parameter to the Network ID and Control Point name of the DENVER Network Node. The alerts which OMAHA sends will be forwarded by DENVER to the focal point at CHICAGO.

The CHICAGO AS/400 has been configured to send alerts to a higher level focal point, the NetView program running on the System/370 system at NEWYORK.

This was done by using the CHGNETA command to change the ALRCTL parameter for SSCP-PU session or the change the alert focal point to request (LU 6.2 session) of the CHICAGO AS/400 to the name of the controller description created for the NEWYORK System/370 or the NetView focal point name.

---

## 1.5 Management Services Introduction

The SNA MS Transport is a multi-layered architecture that allows communication from one MS application to another using Advanced Program-to-Program Communications (APPC). The most recent level of the SNA MS architecture is called Multiple Domain Support (MDS). Understanding the origin of the term MDS really highlights the fundamental transition that is underway from subarea networking to APPN networking.

In a subarea network one SSCP domain is usually an entire network with many PUs. In an APPN network, a single network node including all its end nodes comprise one domain. Hence with the increase in the number of domains over subarea networking, we have a need for Multiple Domain Support (MDS) network management.

### 1.5.1 Subarea Networking and NMVTs (Network Management Vector Transport)

Previously in a subarea network, management information was exchanged in an NMVT. The NMVT flows over an SSCP-PU session which means that VTAM\* has to have the PU defined. The NMVT is a record made up of predefined fields(vectors) and subfields (subvectors) containing the management information. The NMVT is restricted to 512 byte RUs and only a focal point host could receive this management information.

### 1.5.2 APPN Networking and Management Services

In an APPN network, it has become necessary for more than just an SSCP-PU session to manage the network as the management data now has to be able to reach any node in the network. This is not possible with an NMVT; hence the need for SNA Management Services Multiple Domain support.

### 1.5.3 MS Architecture and Terminology

As far as the handling of MS data is concerned, there are two different node types, EP (Entry Point) and FP (Focal Point) nodes:

- Entry Point

An EP is the function in a node that captures the MS data and forwards it to a FP for processing.

- Focal Point

A FP is the central point of control where action is taken based on the information collected. The network is not restricted to one FP, there can be multiple FPs. The FP can also act as an EP; for example, an AS/400 FP may manage an attached printer directly, but send alerts for all displays up to a host acting as FP to the AS/400. In this case the AS/400 is the EP.

There are also different levels to the architecture. Why are there different levels? The evolution from hierarchical subarea networking to APPN did not

happen overnight As functions increased MS capabilities increased and were implemented.

- NMVT level

An NMVT level node can only send and receive NMVTs.

- Migration level

This represents the previous level of the architecture, where a node can send and receive CP-MSUs (Control Point-Management Service Unit, but not MDS-MUs, and only the alert MS application category is supported. CP-MSU and MDS-MU are MS data formats which replaced NMVTs.

- MDS level

This represents the current level of SNA MS architecture, with support for multiple domains and the sending and receiving of MDS-MUs. It provides the following enhancements over the previous levels.

- Support for APPN networks, so that management applications can be developed to reside on any node in the network, although FP applications must reside on a network node.
- Support for multiple MS application categories.
- Support for a focal point hierarchy.
- Removal of the NMVT RU size restriction of 512 bytes. This simplifies application development by removing the requirement to send and correlate multiple NMVTs for one MS transaction.

---

## 1.6 NetView Remote Operations for AS/400 Overview

The NetView Remote Operations for AS/400 package provides the NetView host with the capability of managing an AS/400 or network of AS/400s. This is done via the MS transport support provided by NetView and the MS transport API provided by the AS/400.

NetView Remote Operations makes provision for operational use. That is, commands entered on the NetView command line, or the NetView automation facilities can be utilized, for example, to capture an alert in the automation table and run a command list or trigger a Resource Data Object Manager (RODM) method.

The package is made up of two licensed products which are ordered separately. For more detailed information see Appendix D, "NetView Remote Operations for AS/400" on page 223.

---

## 1.7 Systems Management Automation Offering (SMAO)

SMAO/400 is a feature of IBM SystemView Systems Management Automation Offerings (SystemView SMAO). It enables the management of a network of distributed AS/400s from a focal point on ES/9000\* running MVS/ESA\* or MVS/XA\*.

SMAO/400 offers the following functions:

- Centralized monitoring of an AS/400 network
- Problem management



- Enterprise reporting
- Central accounting of distributed resources
- Automated enterprise job scheduling and tracking
- Operations automation

These functions are provided by using a number of IBM SystemView products. See Table 11 on page 274.

---

## 1.8 IBM AUTOMATION CENTER/400

This section provides a brief overview of IBM AUTOMATION CENTER/400 that includes IBM OMEGAMON/400, IBM AUTOMATED FACILITIES/400 and IBM OMEGAVIEW/400. It also covers IBM AUTOMATION CENTER/400 in a networking environment and the types of configuration required to set up this environment.

### 1.8.1 Overview of IBM AUTOMATION CENTER/400

IBM AUTOMATION CENTER/400 is comprised of the base product, IBM OMEGAMON/400 and two separate features IBM AUTOMATED FACILITIES/400 and IBM OMEGAVIEW/400. These three products combine to form a complete automated systems management offering.

### 1.8.2 IBM OMEGAMON/400

IBM OMEGAMON/400 is the base product of IBM AUTOMATION CENTER/400. It provides real-time monitoring of many different system conditions. If any of these system conditions are not performing within the guidelines which have been set up, the event is logged.

IBM OMEGAMON/400 is used on a non-programmable terminal.

### 1.8.3 IBM AUTOMATED FACILITIES/400

IBM AUTOMATED FACILITIES/400 is an optional feature of IBM OMEGAMON/400. It takes events that have been raised by IBM OMEGAMON/400 and gives an automated response to them.

IBM AUTOMATED FACILITIES/400 can also be used to automate routine operator tasks that do not respond to an IBM OMEGAMON/400 monitored event.

IBM AUTOMATED FACILITIES/400 is used on a non-programmable terminal.

### 1.8.4 IBM OMEGAVIEW/400

IBM OMEGAVIEW/400 is the graphical interface of IBM AUTOMATION CENTER/400. It provides a visual overview of the entire network.

IBM OMEGAVIEW/400 can simplify the management of both an Advanced Peer-to-Peer Network (APPN) or Transmission Control Protocol/Internet Protocol (TCP/IP) network, as well as for a single system. By using icons that change color, problem areas within the network can be easily identified.

Within IBM OMEGAVIEW/400 the graphical user interface makes it easier to create the objects than using IBM OMEGAMON/400 and IBM AUTOMATED FACILITIES/400 on a non-programmable terminal.



---

## Chapter 2. Alert Support Implementation and Downstream Information

This chapter is divided into two parts:

1. Implementation of alert support on the AS/400

This describes how alert support is implemented on the AS/400 system and the various options which are available.

2. Downstream information which is available to the AS/400 for network management purposes

This covers the downstream connection of different systems and controllers to the AS400 and the type(s) of information they can provide to the AS/400.

---

### 2.1 AS/400 Alert Support Implementation

This section discusses how to set up the AS/400 system to use alert support for problem management within a network. Systems which are connected to the AS/400 via a communications line can use an alert to notify the AS/400 of problems which they have detected within their own system. The alert support provided by the OS/400 operating system makes it possible for an AS/400 system to analyze and manage these alerts in order to resolve these problems. If necessary, the AS/400 can forward these alerts to other systems, including other AS/400 systems and host systems. In this context, only Systems Network Architecture (SNA) alerts will be covered.

You can use OS/400 alert support to do any of the following:

- Start and stop the automatic creation of alerts.
- Define your own alert conditions.
- Specify which systems send alerts to a focal point using Advanced Peer-to-Peer Networking (APPN). APPN, in addition to providing network topology and routing services, also provides *logical* direct link support to Advanced Program-to-Program Communication (APPC) systems which are not directly connected to each other.
- Create alerts for end-user applications.
- Notify the OS/400 alert manager of previously created alerts (by end-user applications), that require handling.
- Control which error conditions are able to create alerts.

#### 2.1.1 Alert Content

In the following series of panels, the example of an alert generated on a remote AS/400 system will be used. The alert has been generated because the printer is out of paper. The panels illustrate the depth of detail which is available for alerts received by the AS/400.

The WRKALR command is used to display all the alerts which have been received and have not yet been deleted on the system:

```

Work with Alerts
RALLYAS4A
08/20/93 17:27:00
Type options, press Enter.
2=Change 4=Delete 5=Display recommended actions 6=Print detail
8=Display alert detail 9=Work with problem

Resource
Opt Name Type Date Time Alert Description: Probable Cause
RALLYAS4B* LU 08/20 17:42 Device error: Display
RALLYAS4B CP 08/20 17:42 Undetermined error: Undetermined
RALLYAS4B* LU 08/20 17:38 Device error: Display
RALLYAS4B CP 08/20 17:38 Undetermined error: Undetermined
RALLYAS4B* LU 08/20 17:38 Device error: Display
RALLYAS4B CP 08/20 17:38 Undetermined error: Undetermined
8 RALLYAS4B* PRT 08/20 17:03 Out of paper: Printer
1

```

Figure 5. Work with Alerts - Panel

The WRKALR (Work with Alerts) command is used to display the alerts which have been logged on the AS/400 system. The origin of the alert is shown, together with the date and time it was logged. In addition, a short description and probable cause of the alert are shown.

**1** Entering 8 in the input field next to the alert displays the Alert Detail panel:

```

Display Alert Detail
RALLYAS4A
08/20/93 18:20:17
2 -----Resource Hierarchy-----
Resource Name Resource Type
3 RALLYAS4B CP
4 CTL01 LC
5 CTL01010 PRT

Logged date/time . . . . . : 08/20/93 17:03:13 6
Problem date/time . . . . . : 08/20/93 17:03:13 7
User assigned . . . . . :
Group assigned . . . . . :
Alert type . . . . . : Temporary 8
Alert description . . . . . : Out of paper 9
Probable cause . . . . . : Printer 10
Qualifiers . . . . . : AS/400 Message code CPA5335 11
AS/400 Message severity 99

Press Enter to continue.

F3=Exit F11=Display detail menu F12=Cancel F18=Display actions
More...

```

Figure 6. Display Alert Detail Panel - Panel 1 of 2

**2** This shows the hierarchical structure of the resources responsible for the generation of the alert.

- 3** The alert was sent by resource RALYAS4B. The resource type CP (Control Point) indicates that it is a system and/or has APPN support.
- 4** The next resource in the hierarchy is CTL01, a local controller, as indicated by the resource type - LC (Local Controller).
- 5** This is the lowest item in the Resource Hierarchy and gives the address of the device which actually caused the alert. It is a printer, as can be determined from the resource type - PRT.
- 6** The date and time at which the alert was logged.
- 7** The date and time at which a problem record was logged for this alert.
- 8** This specifies whether the alert is permanent or temporary. In the case of a permanent alert, it cannot be recovered from without help from outside the reporting product.
- 9** The description or nature of the alert.
- 10** The probable cause or source of the alert.
- 11** The identity number of the message in the QCPFMSG message file. This message has a corresponding alert identifier in the QCPFMSG alert table.

The next part of the alert detail is shown in Figure 7.

Display Alert Detail

RALYAS4A

08/20/93 18:20:40

-----Resource Hierarchy-----

Resource Name	Resource Type
RALYAS4B	CP
CTL01	LC
CTL01010	PRT

Text message:

Sender ID . . . . . : Control program **12**

Message . . . . . : End of forms on printer PRT01. (C H I P 99999) **13**

Unique alert identifier:

Product ID . . . . . : 9404 **14**

Alert ID number . . . . . : 26F4 E54B **15**

Press Enter to continue.

F3=Exit   F11=Display detail menu   F12=Cancel   F18=Display actions

Bottom

Figure 7. Display Alert Detail Panel - Panel 2 of 2

Details of the Resource Hierarchy are repeated for ease of reference.

- 12** This identifies who sent the text message in **13**. In this case, it was sent by the operating system.

**13** This provides additional information specific to the alert.

**14** The combination of the product identifier number and the alert identifier number ( **15** ) results in a unique alert identifier.

**15** This is a 4-byte hexadecimal number assigned by the alert sender to designate an individual alert. The alert ID is generated from a cyclic redundancy check (CRC) algorithm, using the cause code points as input. It can be used to identify a particular error condition (set of causes) at a problem management focal point.

Pressing F11 from Figure 7 on page 23 brings up the alert Detail Menu:

Display Detail Menu

RALYAS4A  
08/20/93 17:37:12

-----Resource Hierarchy-----

Resource Name	Resource Type
RALYAS4B	CP
CTL01	LC
CTL01010	PRT

Select one of the following:

1. Display flags

2. Display product identification

4. Display processing nodes

6. Display alert in hexadecimal

Selection or command  
===>

F3=Exit F4=Prompt F9=Retrieve F12=Cancel

*Figure 8. Display Alert Detail Menu - Panel*

Option 2 on the menu gives the Displays the Product Identification panel:

Display Product Identification		RALYAS4A
		08/20/93 17:38:03
-----Resource Hierarchy-----		
Resource Name	Resource Type	
RALYAS4B	CP	
CTL01	LC	
CTL01010	PRT	
Sender hardware identification:		
Product classification . . .	IBM hardware	
Machine type . . . . .	9404	
Model number . . . . .	E20	
Plant of manufacture . . .	10	
Sequence number . . . . .	15573	
Common name . . . . .	AS/400	
		More...
Press Enter to continue.		
F3=Exit F12=Cancel		

Figure 9. Display Product Identification - Panel 1 of 3

The panel in Figure 9 gives details of the hardware product information of the system sending the alert.

Display Product Identification		RALYAS4A
		08/20/93 17:38:49
-----Resource Hierarchy-----		
Resource Name	Resource Type	
RALYAS4B	CP	
CTL01	LC	
CTL01010	PRT	
Resource hardware identification:		
Product classification . . .	IBM or non-IBM hardware	
Machine type . . . . .	4234	
Model number . . . . .	002	
Model number . . . . .	002	
Plant of manufacture . . .	00	
Sequence number . . . . .	0000000	
		More...
Press Enter to continue.		
F3=Exit F12=Cancel		

Figure 10. Display Product Identification - Panel 2 of 3

The panel in Figure 10 gives details of the hardware product information of the resource for which the alert is being sent. Where the plant of manufacture and the serial or sequence number are not shown, as is the case here, this is because the resource cannot report these details to the system sending the alert. In this case, a 4234 printer, the system sending the alert, RALYAS4B, picks up the machine type and model number from the device description.

```

                                Display Product Identification
                                RALYAS4A
                                08/20/93 17:40:17
-----Resource Hierarchy-----
Resource Name      Resource Type
RALYAS4B           CP
CTL01              LC
CTL01010           PRT

Sender software identification:
Product classification . . . : IBM software
Program product number . . . : 5738SS1
Version . . . . . : 02
Release . . . . . : 03
Level . . . . . : 0F 1
Common name . . . . . : OS/400

Press Enter to continue.

F3=Exit  F12=Cancel

```

Figure 11. Display Product Identification - Panel 3 of 3

The panel in Figure 11 gives details of the software product information for the system sending the alert. **1** shows the level of the program, in this case, the OS/400 operating system. The system sending the alert in this case is not running a GA (General Availability) version of the program code.

Option 4 on the menu in Figure 8 on page 24 brings up the alert Display Processing Nodes panel:



```

                                Display Processing Nodes
                                08/20/93 17:51:02
                                RALYAS4A
-----Resource Hierarchy-----
Resource Name      Resource Type
RALYAS4B           CP
CTL01             LC
CTL01010          PRT

-----Processing Nodes-----
Resource Name      Resource Type
RALYAS4A           FP

Press Enter to continue.

F3=Exit  F12=Cancel

```

Figure 12. Display Processing Nodes - Panel

The processing nodes list in Figure 12 contains the names of the systems that have received, processed, and forwarded the alert. The system that last processed the alert appears at the top of the list.

Option 6 on the menu in Figure 8 on page 24 displays the alert in hexadecimal format:

```

                                Display Alert in Hexadecimal
                                RALYAS4A
                                08/20/93 17:51:02

-----Resource Hierarchy-----
Resource Name      Resource Type
RALYAS4B           CP
CTL01              LC
CTL01010          PRT

Major vector . . . . . : 0000
01350000          '....'
Subvector . . . . . : 92
0B920000 02920226 F4E54B      ' .k...k..4V.'
Subvector . . . . . : 10
3D10001E 11011300 11F9F4F0 F4C5F2F0      '.....9404E20'
F1F0F1F5 F0F7F840 40080EC1 E261F4F0      '1015078 ..AS/40'
F01C1104 0804F0F2 F0F3F0C6 0806D6E2      '0.....02030F..0S'
61F4F0F0 0908F5F7 F3F8E2E2 F1          '/400..5738SS1'

More..

Press Enter to continue.

F3=Exit  F12=Cancel

```

Figure 13. Display Alert in Hexadecimal - Panel 1 of 4

The Resource Hierarchy in Figure 13 shows the configuration hierarchy for the alert. The lowest entry of the hierarchy shows the name and type of the resource that detected the error condition. Up to four more resource names and types are displayed, which identify resources involved with the alert up to the focal point. If the detecting resource is not known, the system that sent the alert is displayed as the lowest entry.

The hexadecimal display shows, on each line, 16 bytes of the alert in hexadecimal format. The equivalent characters are shown to the right. This shows the hexadecimal display of the alert broken out by subvectors. If parsing errors are found, an unformatted (not broken out by subvectors) display is shown. For more information, please see *SNA Formats*, GA27-3136.

```

Display Alert in Hexadecimal
RALLYAS4A
08/20/93 17:52:00

-----Resource Hierarchy-----
Resource Name      Resource Type
RALLYAS4B          CP
CTL01              LC
CTL01010           PRT

Subvector . . . . . : 10
19100016 11031300 11F4F2F3 F4F0F0F2      '.....4234002'
F0F0F0F0 F0F0F0F0 F0      '000000000'
Subvector . . . . . : 01
0E010810 5D081411 030D0420 8400      '....). ....d. '
Subvector . . . . . : 4A
254A2301 01E4E2C9 C2D4D9C1 40D9C1D3      ' .ç...USIBMRALLYAS4ARAL'
E8C1E2F4 C1C5D76D C1D3C5D9 E37495B4      'YAS4AEP_ALERTèn '
6500C000 5E      'ã.{.;'
More...

Press Enter to continue.

F3=Exit  F12=Cancel

```

Figure 14. Display Alert in Hexadecimal - Panel 2 of 4

```

Display Alert in Hexadecimal
RALLYAS4A
08/20/93 17:52:53

-----Resource Hierarchy-----
Resource Name      Resource Type
RALLYAS4B          CP
CTL01              LC
CTL01010           PRT

Subvector . . . . . : 93
04936210      ' .lã.      '
Subvector . . . . . : 94
0A940401 53030481 1606      ' .m..ë..a..      '
Subvector . . . . . : 98
15980C82 212011C3 D7C1F5F3 F3F50782      ' .q.b...CPA5335.b'
21230100 63      ' ....Ä      '
Subvector . . . . . : 05
34052410 0009D9C1 D3E8C1E2 F4C120F4      ' ..... RALLYAS4A.4'
More...

Press Enter to continue.

F3=Exit  F12=Cancel

```

Figure 15. Display Alert in Hexadecimal - Panel 3 of 4

```

                                Display Alert in Hexadecimal
                                08/20/93 17:53:13
                                RALYAS4A

-----Resource Hierarchy-----
Resource Name      Resource Type
RALYAS4B           CP
CTL01              LC
CTL01010           PRT

09C3E3D3 F0F14040 40603809 C3E3D3F0      '. CTL01  -..CTL0'
F1F0F1F0 60130E20 0009D9C1 D3E8C1E2      '1010-.....RALYAS'
F4C100EF                                     '4A.Æ'
Subvector . . . . . : 31
46310602 02B90025 06120000 00000321      '-.....'
123530C5 95844096 86408696 9994A240      '...End of forms'
96954097 998995A3 859940D7 D9E3F0F1      'on printer PRT01'
4B404DC3 40C840C9 40D7C1C7 C540F160      '. (C H I PAGE 1-'
F9F9F9F9 F95D                                     '99999)'

                                Bottom

Press Enter to continue.

F3=Exit  F12=Cancel

```

Figure 16. Display Alert in Hexadecimal - Panel 4 of 4

Option 1 on the menu in Figure 8 on page 24 brings up the Display Flags panel for this alert:

```

                                Display Flags
                                08/20/93 17:55:36
                                RALYAS4A

-----Resource Hierarchy-----
Resource Name      Resource Type
RALYAS4B           CP
CTL01              LC
CTL01010           PRT

Flags:
Local/Received . . . . . : Received 1
Operator generated . . . . : No 2
Held alert . . . . . : No 3
Delayed alert . . . . . : No 4
Analysis available . . . . : No 5

Press Enter to continue.

F3=Exit  F12=Cancel

```

Figure 17. Alert Flags Display - Panel

The Display Flags display in Figure 17 shows the resource hierarchy and the values of all the flags set for this alert.

- 1** Indicates that the alert was sent from another system.
- 2** The alert was automatically created by a system.
- 3** The alert was sent when the problem was detected.
- 4** The sender is not reporting a previously detected alert condition.
- 5** Problem analysis is not available for the problem that caused this alert to be created.

## 2.1.2 Implementation Tasks

The following are some of the tasks which could be required to implement alert support on your AS/400 system, depending on your exact requirements:

- Set up the communications network (2.1.2.1, "Setting up the Communications Network")
- Change the network attributes (2.1.2.2, "Changing the Network Attributes" on page 36)
- Modify/create message files (2.1.2.3, "Message Files" on page 41)
- Modify/create alert tables (2.1.2.4, "Alert Tables" on page 52)
- Add message descriptions (2.1.2.3, "Message Files" on page 41)
- Create user profile(s) (2.1.2.5, "Manual Processing of Alerts" on page 57)
- Create alert filter(s) (2.1.2.6, "Implementation and Use of Alert Filters on AS/400" on page 62)
  - Add the appropriate selection entries
  - Add the appropriate action entries

### 2.1.2.1 Setting up the Communications Network

Please see 1.4, "Alerts Introduction" on page 13 for an introduction to alert networking concepts.

As stated in 2.1, "AS/400 Alert Support Implementation" on page 21, only Systems Network Architecture (SNA) alerts are covered in this section. The following communications objects need to be created on the AS/400 to provide the networking infrastructure for alert support:

- Line description

Connection	Command
Token-Ring Network	CRTLINTRN
Ethernet	CRTLINETH
SDLC	CRTLINS DLC
Frame Relay	CRTLINFR
IDLC	CRTLINIDLC

- Controller description

Type of Controller	Command
APPC	CRTCTLAPPC
SNA Host	CRTCTLHOST

- Device description

Type of Device	Command
APPC	CRTDEVAPPC

Please refer to the *OS/400 Communications Configuration Reference*, SC41-0001 for detailed information on creating these configuration objects.

**Sphere of Control:** The sphere of control defines the set of control points that send alerts to your system. Please see 1.4, “Alerts Introduction” on page 13 for more details. When a system is defined as a primary focal point, the control points that will be in its sphere of control must be explicitly defined if they are not able to register or acquire themselves a focal point. For example, an AS/400 using the DSPNETA parameter Alert Focal Point to Request acquires himself a focal point and thus register himself to the focal point Sphere of control. The OS/2 Communications Manager/2 is able to acquire the focal point via a .NDF statement or it can be acquired by the AS/400 via an AS/400 Sphere of Control entry. The Work with Sphere of Control (WRKSOC) command is used for this purpose.

```

Work with Sphere of Control (SOC)
System:  RALYAS4A

Position to . . . . . Control Point
Network ID . . . . .

Type options, press Enter.
1=Add  4=Remove

Control
Opt Point Network ID Current Status
*NETATR
AURELL USIBMRA Revoked
BEFRE USIBMRA Inactive
OLIVER2 USIBMRA Inactive
RALYAS4B USIBMRA Active
RALY5494 USIBMRA Inactive

F3=Exit F4=Prompt F5=Refresh F9=Command F10=Display SOC status
F11=Display new focal points F12=Cancel F16=Repeat position to

```

Figure 18. Work with Sphere of Control - Panel

The Work with Sphere of Control panel, an example of which is shown in Figure 18, allows you to add control points to the sphere of control and to remove existing control points.

**Note**

System/36 and System/38 products do not support management services for sending alerts. Consequently, these systems cannot be defined in the sphere of control. Please refer to the *S/36 C&SM User's Guide* and the *System/38 Data Communications Programmer's Guide* for information on sending alerts from these systems.

The following values are possible for Current Status:

- **Active**

Your system is actively providing focal point services for the indicated control point.

- **Add pending**

When a control point has been added, there is a delay while focal point services are started for that control point. Your system is currently trying to establish a session with the control point so that it can provide focal point services to it.

- **Inactive**

Your system is not currently providing focal point services for the indicated control point. The control point cannot communicate with your system now because of a lost connection. If a control point with this status is removed from your system's sphere of control, it is not displayed.

- **Never active**

Your system has never provided focal point services for the indicated control point. The control point has never sent alerts to your system. If a control point with this status is removed from your system's sphere of control, it is not displayed.

- **Rejected**

The indicated control point does not require focal point services from your system. It is likely that the control point has never sent alerts to your system. The control point may have a different focal point. If a control point with this status is removed from your system's sphere of control, it is not displayed.

- **Remove pending**

Your system is providing focal point services but a user has removed the control point from the sphere of control. The control point is removed from the sphere of control when another system starts focal point services for the control point or the session is lost.

- **Revoked**

The indicated control point is no longer in your systems' sphere of control. A new focal point is now providing focal point services for the control point. If a control point with this status is removed from your system's sphere of control, it is not displayed.

Press F11 from the panel shown in Figure 18 on page 32 to display new focal points as shown in Figure 19 on page 34.

```

Work with Sphere of Control (SOC)
System: RALYAS4A
Position to . . . . . Control Point
Network ID . . . . .

Type options, press Enter.
1=Add 4=Remove

--New Focal Point--
Control
Opt Point Network ID Point Network ID
AURELL USIBMRA RA3 USIBMRA
BEFRE USIBMRA
OLIVER2 USIBMRA
RALYAS4B USIBMRA
RALY5494 USIBMRA

```

Figure 19. Displaying New Focal Points

**Displaying the Sphere of Control Status:** Pressing F10 from the Work with Sphere of Control (SOC), shown in Figure 18 on page 32, displays the status of all systems currently defined in your system's sphere of control. This display shows:

- Systems defined from the Work with Sphere of Control panel
- Systems the AS/400 system has defined in your sphere of control because your system is a default, requested, or backup focal point for those systems.

```

Display Sphere of Control Status
System: RALYAS4A
Position to . . . . . Control Point
Network ID . . . . .

Type options, press Enter.
5=Display

Opt Control Point Network ID Type of Services Current Status
AURELL USIBMRA *NETATR
RALYASA USIBMRA Default Never active
RALYASB USIBMRA Default Never active
RALYAS4B USIBMRA Primary Active
RALYAS4C USIBMRA Default Rejected
RALY5494 USIBMRA Primary Inactive
RA3 USIBMRA Default Add pending
R1N USIBMRA Default Never active
R4N USIBMRA Default Never active

F3=Exit F5=Refresh F6=Print list F11=Display new focal points
F12=Cancel F16=Repeat Position To
M

```

Figure 20. Display Sphere of Control Status



*Adding a System to the Sphere of Control:* Option 1 (Add) on the Work with Sphere of Control (SOC) is used to add systems to the alert sphere of control as shown in Figure 21 on page 35. The *control point name* and the *network ID* must be specified.

Work with Sphere of Control (SOC)

System: RALYAS4A

Position to . . . . .

Control Point

Network ID . . . . .

Type options, press Enter.

1=Add 4=Remove

Opt	Control Point	Network ID	Current Status
1	rs6000	usibmra	
	AURELL	USIBMRA	Revoked
	BEFRE	USIBMRA	Inactive
	OLIVER2	USIBMRA	Inactive
	RALYAS4B	USIBMRA	Active
	RALY5494	USIBMRA	Inactive

F3=Exit F4=Prompt F5=Refresh F9=Command F10=Display SOC status

F11=Display new focal points F12=Cancel F16=Repeat position to

Figure 21. Adding a System to the Sphere of Control

When you add a new control point to the sphere of control and your system is defined to be the primary focal point, the AS/400 system sends management services capabilities to the new control point to enable your AS/400 system to be a focal point for it.

*Removing Systems from the Sphere of Control:* Option 4 (Remove) from the Work with Sphere of Control (SOC) panel is used to remove control points from your sphere of control.

A control point in the sphere of control should not be removed from the sphere of control until another focal point has started focal point services to that system. This ensures that a system always has a focal point. When a control point is removed, it goes into a remove pending condition as explained in “Sphere of Control” on page 32. This remove pending condition will continue until an operator at another focal point system adds the control point to its sphere of control. The recommended method for removing a system from the sphere of control is as follows:

- Define another system in the network to be a primary focal point.
- Add the system you want to remove into the sphere of control of the new primary focal point. This new primary focal point will then take over as focal point for the system you are removing.
- Wait until the system you want to remove has a status of Revoked on your system.
- Remove the system from your sphere of control.

### 2.1.2.2 Changing the Network Attributes

Alert support is disabled by default in OS/400. Certain network attributes need to be changed in order to enable it.

Change Network Attributes (CHGNETA)

Type choices, press Enter.

System name . . . . .	*SAME	Name, *SAME
Local network ID . . . . .	*SAME	Name, *SAME
Local control point name . . . .	*SAME	Name, *SAME
Default local location name . .	*SAME	Name, *SAME
Default mode . . . . .	*SAME	Name, *SAME
Node type . . . . .	*SAME	*SAME, *ENDNODE, *NETNODE
Data compression . . . . .	*SAME	1-2147483647, *SAME, *NONE
Intermediate data compression .	*SAME	1-2147483647, *SAME, *NONE
Maximum intermediate sessions .	*SAME	0-9999, *SAME
Route addition resistance . . .	*SAME	0-255, *SAME
Network node servers:		
Server network ID . . . . .	*SAME	Name, *SAME, *NONE, *LCLNETID
Control point name . . . . .		Name, *ANY
+ for more values		
Alert status . . . . .	*SAME <b>1</b>	*SAME, *ON, *OFF, *UNATTEND
Alert logging status . . . . .	*SAME <b>2</b>	*SAME, *NONE, *LOCAL, *ANY
		More...
F3=Exit   F4=Prompt   F5=Refresh   F12=Cancel   F13=How to use this display		
F24=More keys		

Figure 22. Change the Network Attributes for Alert Support - Panel 1 of 2

**1 Alert status.** This specifies whether local alerts are created. When alert status is active, alerts are created for all of the messages that have been defined as alertable and that report a permanent error with network lines, local devices or control units, or programming and operator errors. The possible values are:

- \*SAME  
Alert processing does not change.
- \*ON  
Alerts are created by the system for all alert conditions, except unattended conditions.
- \*UNATTEND  
Alerts are created by the system for all alert conditions, including messages for which \*UNATTEND is specified on the Alert options prompt (ALROPT parameter) of the Add Message Description (ADDMSGD) Change Message Description (CHGMSGD) command.
- \*OFF  
Alerts are not created by the system.

**2 Alert logging status.** This parameter specifies which alerts are logged. The following values are valid:

- \*SAME  
Alert logging does not change.

- \*NONE  
No alerts are logged.
- \*LOCAL  
Only locally created alerts are logged.
- \*RCV  
Only alerts received from other nodes are logged.
- \*ALL  
Both locally created and incoming alerts are logged.

Change Network Attributes (CHGNETA)

Type choices, press Enter.

Alert primary focal point . . .	*SAME	3	*SAME, *NO, *YES
Alert default focal point . . .	*SAME	4	*SAME, *NO, *YES
Alert backup focal point:			
Network ID . . . . .	*SAME	5	Name, *SAME, *NONE, *LCLNETID
Control point name . . . . .			Name
Alert focal point to request:			
Network ID . . . . .	*SAME	6	Name, *SAME, *NONE, *LCLNETID
Control point name . . . . .		6	Name
Alert controller description . .	*SAME	7	Name, *SAME, *NONE
Alert hold count . . . . .	*SAME	8	0-32767, *SA E, *NOMAX
Alert filter . . . . .	*SAME	9	Name, *SAME, *NONE
Library . . . . .			Name, *LIBL, *CURLIB
Message queue . . . . .	*SAME	10	Name, *SAME
Library . . . . .			Name, *LIBL, *CURLIB
Output queue . . . . .	*SAME	11	Name, *SAME
Library . . . . .			Name, *LIBL, *CURLIB

More...

F3=Exit   F4=Prompt   F5=Refresh   F12=Cancel   F13=How to use this display  
F24=More keys

Figure 23. Change the Network Attributes for Alert Support - Panel 2 of 2

**3 Alert primary focal point.** This specifies whether the system is an alert primary focal point. If the system is defined as a primary alert focal point, alerts are received from all network nodes explicitly defined in the sphere of control or from nodes requesting it as their focal point. The following values are valid:

- \*SAME

The alert primary focal point does not change.

- \*NO

The system is not an alert primary focal point. This parameter cannot be changed from \*YES to \*NO if there is any node in the sphere of control that has a status of Active-in Sphere of Control or Add Pending-in Sphere of Control. Use the Display Sphere of Control Status (DSPSOCSTS) command to see the status for all nodes in the sphere of control.

- \*YES

The system is defined as an alert primary focal point and provides focal point services to all nodes in the network that are explicitly defined in the

sphere of control. If a system is defined as a focal point, \*ALL or \*RCV should be specified on the Alert logging status prompt (ALRLOGSTS parameter) to ensure that alerts coming in from nodes in the sphere of control are logged.

**4 Alert default focal point.** This specifies whether the system is an alert default focal point. If the system is defined as a Default Focal Point, alerts are received from all nodes in the network which are not explicitly defined in the sphere of control of some other focal point node within the network. The possible values are:

- \*SAME

The alert default focal point does not change.

- \*NO

The system is not an alert default focal point. This parameter cannot be changed from \*YES to \*NO if there are any nodes in the sphere of control that have a status of Active-in Sphere of Control or Add Pending-in Sphere of Control. Use the Display Sphere of Control Status (DSPSOCSTS) command to see the status for all nodes in the sphere of control.

- \*YES

The system is an alert default focal point, and provides focal point services to all nodes in the network which are not being serviced by an alert primary focal point or another alert default focal point. If a system is defined as a focal point, \*ALL or \*RCV should be specified on the Alert logging status prompt (ALRLOGSTS parameter) to ensure that alerts coming in from nodes in the sphere of control are logged. If a system is defined as a focal point, the APPN node type must have the value \*NETNODE.

**5 Alert backup focal point.** This specifies the name of the system that provides alert focal point services using Management Services Sessions (LU 6.2 sessions) if the primary focal point is unavailable. The possible values are:

- \*SAME

This value does not change.

- \*NONE

The backup focal point is not defined.

The possible backup focal point network IDs are:

- \*LCLNETID

The network ID of the backup focal point is same as that of the local system.

- Network ID

Specify the network ID of the system that provides backup focal point services for alerts.

The possible control point name values are:

- Control-point-name

Specify the control point name of the system that provides backup focal point services for alerts.

**6 Alert focal point to request.** This specifies the name of the system that is requested to provide alert focal point services using Management Services sessions (LU 6.2 sessions).

The possible values are:

- \*SAME

This value does not change.

- \*NONE

A focal point is not requested and the current focal

The possible requested focal point network IDs are:

- \*LCLNETID

The network ID of the requested focal point is same as that of the local system.

- Network-ID

Specify the network ID of the system that is requested to provide focal point services for alerts.

The possible control point name values are:

- Control-point-name

Specify the control point name of the system that is requested to provide focal point services for alerts.

**7 Alert controller description.** This specifies the name of the controller through which alerts are sent on the alert controller session using SSCP-PU session. Only a type HOST or APPC controller can be specified. The controller must be varied on for alert processing to be operational on the alert controller session, although it does not need to be varied on when this command is used. The possible values are:

- \*SAME

The name of the controller does not change.

- \*NONE

There is no alert controller description. Specifying \*ON on the Alert status prompt (ALRSTS parameter) and \*YES on the Alert primary focal point prompt (ALRPRIFP parameter) with \*NONE for the controller description means that only local alerts are created and logged.

- Controller-description

Specify the name of the controller that is used for alerts in an alert controller session. This controller is ignored if the system has a focal point (for example, if the node is in another system's sphere of control).

**8 Alert hold count.** This specifies the maximum number of alerts that are created before the alerts are sent over the alert controller session (ALRCTLN network attribute). The alerts are held (queued) by the system until the specified number of alerts have been created. This parameter can be used to manage alerts that are sent over a limited resource by reducing the number of times alerts are sent. The possible values are:

- \*SAME

The alert hold count does not change.

- \*NOMAX

The alerts are held indefinitely. The current alert hold count is the maximum value. The alerts can be sent at a later time by changing the ALRHLCNT value to a lower value.

- Alert-hold-count

Specify the maximum number of alerts that can be created before being sent. Alerts have a "held" status until the maximum is reached. If the value 0 is specified, alerts are sent as soon as they are created. Valid values range from 0 through 32767.

**Note:** The ALRHLCNT network attribute applies only when the ALRCTLD network attribute is used. When management services sessions, APPN, and sphere of control support are used, the ALRHLCNT value is ignored.

**9 Alert filter.** This specifies the qualified name of the alert filter used by the alert manager when processing alerts. The possible values are:

- \*SAME

This value does not change.

- \*NONE

An alert filter is not used.

- Filter-name

Specify the name of the alert filter.

**10 Message queue.** This specifies the name and library of the message queue where messages received through the SNADS network are sent for users who have no message queue specified in their user profile, or whose message queue is not available. The possible values are:

- \*SAME

The message queue does not change.

- Message-queue-name

Specify the name and library of the message queue.

- The possible library values are:

- \*LIBL

The library list is used to locate the message queue.

- \*CURLIB

The current library for the job is used to locate the message queue. If no library is specified as the current library for the job, QGPL is used.

- Library-name

Specify the name of the library where the message queue is located.

**Note:** When \*LIBL is used as the library name, the library list of the job calling this command is searched to find a message queue with the object name specified. If the message queue is found, the name of the library in which it is found is used as the name stored. If the message queue is not found, an exception is signaled and no network attributes are changed. When the library name or \*CURLIB is specified, this

command attempts to find the message queue. If the message queue cannot be found in the library specified, a diagnostic message is sent. If all other parameters on the command were specified correctly, the MSGQ network attribute is changed to the qualified message queue name, whether or not this command is able to find the message queue in the library specified.

**11 Output queue.** This specifies the name and library of the output queue to which spooled files received through the SNADS network are sent for users whose output queue is not available.

- \*SAME

The output queue does not change.

- Output-queue-name

Specify the name and library of the output queue.

- Library-name

Specify the name of the library where the message queue is located.

**Note:** When \*LIBL is used as the library name, the library list of the job calling this command is searched to find a message queue with the object name specified. If the message queue is found, the name of the library in which it is found is used as the name stored. If the message queue is not found, an exception is signaled and no network attributes are changed. When the library name or \*CURLIB is specified, this command attempts to find the message queue. If the message queue cannot be found in the library specified, a diagnostic message is sent. If all other parameters on the command were specified correctly, the MSGQ network attribute is changed to the qualified message queue name, whether or not this command is able to find the message queue in the library specified.

### 2.1.2.3 Message Files

The AS/400 system creates an alert when an *alertable message* is sent to the local system operator. An alertable message is any message with the alert option field, located in the message description set to a value other than \*NO.

Message CPA5335 which was used for the alert example in Figure 5 on page 22, will be used to demonstrate the content of an individual message in relation to generic SNA alert support on the AS/400.

The DSPMSGD command is used to display the message description. The attributes of the message are shown by selecting option 5 from the resulting panel as shown in Figure 24 on page 42.

Display Message Attributes		System: RALYAS4A
Message ID . . . . .	: CPA5335	
Message file . . . . .	: QCPFMSG	
Library . . . . .	: QSYS	
Severity . . . . .	: 99	
Log problem . . . . .	: *NO	
Default program . . . . .	: *NONE	
Default library . . . . .	:	
Message level . . . . .	: 03/15/90 02	
<b>Alert option . . . . .</b>	<b>: *UNATTEND 25</b>	
Data to be dumped . . . . .	: *NONE	
		More..
Press Enter to continue.		
F3=Exit F12=Cancel		

Figure 24. Display Message Attributes - Panel

Work with Message Descriptions		System: RALYAS4A
Message file: QCPFMSG	Library: QSYS	
Position to . . . . .	Message ID	
Type options, press Enter.		
2=Change 4=Delete 5=Display details 6=Print		
Opt	Message ID	Severity Message Text
5	CPA5335	99 End of forms on printer &3. (C H I PAGE 1-999

Figure 25. Work with Message Descriptions. Note the use of the substitution parameter &3.

Option 5 on the Work with Message Descriptions panel brings up the following menu:



Select one of the following:

1. **Display message text**
2. Display field data
3. Display reply specifications
4. Display special reply values
5. Display message attributes

30. All of the above

Selection

1

F3=Exit F12=Cancel

*Figure 26. Message Detail Display Menu*

Option 1 can be used to display the message text:

```
Display Formatted Message Text                                     System:  RALYAS4A
Message ID . . . . . :  CPA5335
Message file . . . . . :  QCPFMSG
Library . . . . . :  QSYS

Message . . . . :  End of forms on printer &3. (C H I PAGE 1-99999)
Cause . . . . :  File &1 in library &2 was being processed when an end
the forms occurred.
Recovery . . . :  Do one of the following and try the request again.
Possible choices for replying to message . . . . . :
C -- To cancel the printer writer,
1. Press Stop only if Start and Stop are two separate keys.
2. Load the new forms.
3. Press Cancel.
3. Press Cancel.
4. Press Stop and Start, or press Start/Stop.
5. Type a C.
H -- To hold the file,
1. Press Stop only if Start and Stop are two separate keys.

2. Load the new forms.
3. Press Cancel.
4. Press Stop and Start, or press Start/Stop.
5. Type an H.
I -- To continue printing starting with the next line of the file,
1. Press Stop only if Start and Stop are two separate keys.
2. Load the new forms.
3. Press Start or Start/Stop.
4. Type an I.
PAGE -- To continue printing on the page the printer writer is on,
1. Press Stop only if Start and Stop are two separate keys.
2. Load the new forms.
3. Press Cancel.
4. Press Stop and Start, or press Start/Stop.

5. Type PAGE.
1-99999 -- To continue printing on a specific page,
1. Press Stop only if Start and Stop are two separate keys.
2. Load the new forms.
3. Press Cancel.
4. Press Stop and Start, or press Start/Stop.
5. Type the page number (1-99999) where you want to start printing.
Use the Work with Writer (WRKWTR) command to determine the page where the
printer writer is located.
```

Figure 27. Display Formatted Message Text - Panel. Note the use of the substitution parameters &1, &2 and &3.

Selecting option 5 in Figure 26 on page 43 displays the attributes of message CPA5335:

Display Message Attributes		System: RALYAS4A
Message ID . . . . .	: CPA5335	
Message file . . . . .	: QCPFMSG	
Library . . . . .	: QSYS	
Severity . . . . .	: 99	
Log problem . . . . .	: *NO	
Default program . . . . .	: *NONE	
Default library . . . . .	:	
Message level . . . . .	: 03/15/90 02	
Alert option . . . . .	: *UNATTEND 25	
Data to be dumped . . . . .	: *NONE	
Press Enter to continue.		
F3=Exit F12=Cancel		

Figure 28. Display Message Attributes - Panel

The following panel shows the corresponding alert description in the alert table, QCPFMSG to demonstrate the one-on-one relationship between messages in the QCPFMSG message which produce alerts and the corresponding entry in the QCPFMSG alert table. The command WRKALRTBL (Work Alert Table command) is used to work with alerts.

Work with Alert Descriptions		System: RALYAS4A
Alert table . . . . .	: QCPFMSG	
Library . . . . .	: QSYS	
Program . . . . .	: 5738SS1 (0S/400)	
Position to . . . . .	Message ID	
Type options, press Enter.		
1=Add 2=Change 4=Remove 5=Display recommended actions 6=Print		
8=Display alert detail		
Opt	Message ID	Alert Description: Probable Cause
8	CPA5335	Out of paper: Printer

Figure 29. Work with Alert Descriptions - Panel

Option 8 can be used to show the Alert Details:

Display Alert Detail		System: RALYAS4A
Message ID . . . . .	:	CPA5335
Message text . . . . .	:	End of forms on printer &3. (C H I PAGE 1-999) 99)
Alert type . . . . .	:	(02) Temporary
Alert description . . . . .	:	(9202) Out of paper
Alert option . . . . .	:	*UNATTEND
Alert ID . . . . .	:	26F4 E54B
Probable		
Cause		Probable Cause Text
6210		Printer
Press Enter to continue.		
F3=Exit F10=Display message description F12=Cancel F18=Display actions		
F20=Right		

Figure 30. Display Alert Detail - Panel. Note the use of the substitution parameter &3.

Press F18 to display actions:

Display Recommended Actions		System: RALYAS4A
Message ID . . . . .	:	CPA5335
Message text . . . . .	:	End of forms on printer &3. (C H I PAGE 1-999) 99)
Type options, press Enter.		
5=Display detailed qualifiers		
Opt	Type	Cause or Action Text
	User cause	5303 Out of paper
	User action	1606 Add paper

Figure 31. Display Alert Recommended Actions - Panel. Note the use of the substitution parameter &3.

Only a subset of the messages in the QCPFMSG message file is set up to produce an alert. It may be necessary for management purposes to change a particular message to produce an alert. This is done by changing the alert option within a message description. The command to change a message description is the CHGMSGD command. It is possible in this way, to select those alerts which must be sent to a network operator at a focal point. The following message, CPF0A01, will be used as an example:

```

Message ID . . . . . : CPF0A01
Message file . . . . . : QCPFMMSG
Library . . . . . : QSYS

Message . . . . . : Performance monitor has already been submitted.
Cause . . . . . : The performance monitor &3/&2/&1 has already been
                  submitted to job queue &4 in library &5 by job &8, &7, and &6.
                  Either the
                  performance monitor is still on the job queue, or it is currently active.
Recovery . . . . . : If you want to start the performance monitor again,
                  must first end the existing performance monitor (ENDPFMON command), and
                  then try the request again.

```

Figure 32. Displaying the Text of a System Message. Note the use of the substitution parameters &1-&8.

Displaying the message attributes confirms that the message is currently not alertable:

```

Message ID . . . . . : CPF0A01
Message file . . . . . : QCPFMMSG
Library . . . . . : QSYS

Severity . . . . . : 0

Log problem . . . . . : *NO

Default program . . . . . : *NONE
Default library . . . . . :

Message level . . . . . : 11/16/89 02

Alert option . . . . . : *NO 1

```

Figure 33. Displaying the Attributes of a Message

**1** The following alert options are possible for messages sent to the QHST log and the system operator message queue:

- \*SAME  
The alert option is not changed.
- \*NO  
No alert is sent.
- \*IMMED  
An alert is sent immediately, simultaneous with sending the message to QHST.
- \*UNATTEND  
An alert is sent immediately only when \*UNATTEND is specified on the Alert status prompt (ALRSTS parameter) of the Change Network Attributes (CHGNETA) command.
- \*DEFER

The alert is sent after local problem analysis. \*DEFER should be specified only for those messages against which problem analysis can be run. An alert is sent at the first exit from problem analysis for the problem referred to by the message. All alerts set to \*DEFER are treated as \*IMMED if:

- \*UNATTEND is specified on the Alert status prompt (ALRSTS parameter) of the Change Network Attributes (CHGNETA) command.
- An error log ID is not available for a problem that might be resolved using problem analysis. \*NO is specified on the Log problem prompt (LOGPRB parameter). (Problem analysis is not available for the condition reported by the message).

A user application may require a particular message to be sent to the system operator message queue, for which none of the existing messages are suitable. This is done using the ADDMSGD (Add Message Description) command.

Add Message Description (ADDMSGD)

Type choices, press Enter.

Message identifier . . . . . abc1234      Name

Message file . . . . . qcpfmsg      Name

Library . . . . . \*LIBL      Name, \*LIBL, \*CURLIB

First-level message text . . . . 'This is an example of a user message  
is being added to the QCPFMSG message file.'

Second-level message text . . . 'This is the second-level message text  
giving more detail to the first-level message text'

Severity code . . . . . 30      0-99      ...

More..

F3=Exit   F4=Prompt   F5=Refresh   F10=Additional parameters   F12=Cancel

F13=How to use this display      F24=More keys

Figure 34. Add a Message Description - Panel 1 of 2

The first and second-level text of the message are added and the severity code. This particular message will only be sent if a job has a message logging severity level of 30 or lower.

Add Message Description (ADDMSGD)

Type choices, press Enter.

Message data fields formats:

Data type . . . . .	*NONE	<b>1</b>	*NONE, *QTDCHR, *CHAR.
Length . . . . .		<b>2</b>	Number, *VARY
*VARY bytes or dec pos . . . .		<b>3</b>	Number
+ for more values			
Reply type . . . . .	*CHAR		*CHAR, *DEC, *ALPHA, *N
Maximum reply length:			
Length . . . . .	*TYPE		Number, *TYPE, *NONE
Decimal positions . . . . .			Number
Valid reply values . . . . .	*NONE		
+ for more values			
Special reply values:			
Original from-value . . . . .	*NONE		
Replacement to-value . . . . .			
+ for more values			
Range of reply values:			
Lower value . . . . .	*NONE		
Upper value . . . . .			
Relationship for valid replies:			
Relational operator . . . . .	*NONE		*NONE, *EQ, *LE, *GE, *GT
Value . . . . .			
Default reply value . . . . .	*NONE		

F3=Exit   F4=Prompt   F5=Refresh   F10=Additional parameters   F12=Cancel  
F13=How to use this display   F24=More keys

Figure 35. Add a Message Description - Panel 2 of 2

**1** This specifies which, if any, of 1 to 99 message data fields formats are being described. Each field is described in this parameter by a list of attributes. All 99 of the message data fields can be used as substitution values in the message and message help defined in this message description. They can also be specified on the Data to be dumped prompt (DMPLST parameter) and the Alert options prompt (ALROPT parameter) of this command. Please see the discussion on the resource name variable following Figure 36 on page 50.

The following panel displays the message text for message CPA5335 which was used in the alert content example in Figure 5 on page 22. Note the use of the substitution parameters, &3, &1, and &2.

Message ID . . . . . : CPA5335  
Message file . . . . . : QCPFMSG  
Library . . . . . : QSYS

Message . . . . . : End of forms on printer &3. (C H I PAGE 1-99999)  
Cause . . . . . : File &1 in library &2 was being processed when an end of the forms occurred.

The field data for these substitution parameters is shown on the following display:

Display Field Data					
Message ID . . . . .	:	CPA5335			
Message file . . . . .	:	QCPFMSG			
Library . . . . .	:	QSYS			
Field	Data Type	Length	Decimal Positions	Vary Length	Dump
&1	*CHAR	10			*NO
&2	*CHAR	10			*NO
&3	*CHAR	10			*NO

If the default of \*NONE is specified, no message data fields can be referred to in the first-level or second-level message text. This value specifies the type of data the substitution field contains and how the data is formatted when substituted in the message text.

The contents of **2** and **3** depend on the type of message data which is specified. Valid data types include formatted and unformatted character strings as well as hexadecimal, decimal and binary.

**2** This specifies the number of characters or digits that are passed in the message data. How this value is used, depends on the type of data specified in **1**.

**3** This value is used in one of two ways, depending on the type specified in the parameter **1**. If character or hexadecimal data types are specified, then it is used to indicate the size of the length field actually passed. If a decimal data type is specified for **1**, then this value indicates the number of decimal positions in the decimal value.

F10 is pressed from the panel in Figure 26 on page 43 to bring up the additional parameters panel to access the alert options for this message:

Additional Parameters			
Default program to call . . . . .	*NONE	Name, *NONE	
Library . . . . .		Name, *LIBL, *CURLIB	
Data to be dumped . . . . .	*JOB	1-99, *NONE, *JOB, *JOB	
+ for more values			
M			
F3=Exit	F4=Prompt	F5=Refresh	F12=Cancel
F24=More keys		F13=How to use this display	
Add Message Description (ADDMSGD)			
Type choices, press Enter.			
Level of message:			
Creation date . . . . .	*CURRENT	Date, *CURRENT	
Level number . . . . .	1	01-99	
<b>Alert options</b>			
Alert type . . . . .	*NO	*IMMED, *DEFER, *UNATTEND	
Resource name variable . . . . .	*NONE	1-99, *NONE	
Log problem . . . . .	*NO	*NO, *YES	

Figure 36. Adding Additional Parameters to a Message Description



The following values can be used for the alert type:

- **\*NO**

No alert is sent.

- **\*IMMED**

An alert is sent immediately, simultaneous with sending the message to QHST and/or QSYSOPR.

- **\*UNATTEND**

An alert is sent immediately only when \*UNATTEND is specified on the Alert status prompt (ALRSTS parameter) of the Change Network Attributes (CHGNETA) command.

- **\*DEFER**

The alert is sent after local problem analysis. DEFER should be specified only for those messages against which problem analysis can be run. An alert is sent at the first exit from problem analysis for the problem referred to by the message. All alerts set to \*DEFER are treated as \*IMMED if:

- \*UNATTEND is specified on the Alert status prompt (ALRSTS parameter) of the Change Network Attributes (CHGNETA) command.
- An error log ID is not available for a problem that might be resolved using problem analysis.
- \*NO is specified on the Log problem prompt (LOGPRB parameter). Problem analysis is not available for the condition reported by the message.

The resource name variable identifies the name of the failing resource in the message. The failing resource is the lowest level (most remote) resource that is common to all resources whose actual or impending loss is the cause of the alert. The resource name variable is a number from 1 to 99 that is the number of the substitution variable in the message data containing the name of the failing resource. The name of the resource is placed in the substitution variable by the system when the message is sent to the QSYSOPR message queue. The possible resource name variable values are:

- **\*NONE**

No message data field format number is passed with the alert identifier.

- **Format-number**

Specify the message data field format number that is passed with the alert identifier.

**Note**

Resource name variables 23 - 30 are reserved values for system use only.

Please see the discussion following Figure 26 on page 43.

#### 2.1.2.4 Alert Tables

An alert table contains alert descriptions. Alert descriptions define the code points to use in the alert for a particular message. Please see Appendix A, “SNA Generic Alerts” on page 201 for more information on code points.

There is a one-to-one correspondence between a message description, which defines an error, and an alert description, which defines a network problem notification. The alert table and the message file with which it is linked, must share the same name.

Figure 37 shows the relationship between the IBM-supplied message file, QCPFMMSG and the alert table, QCPFMMSG.

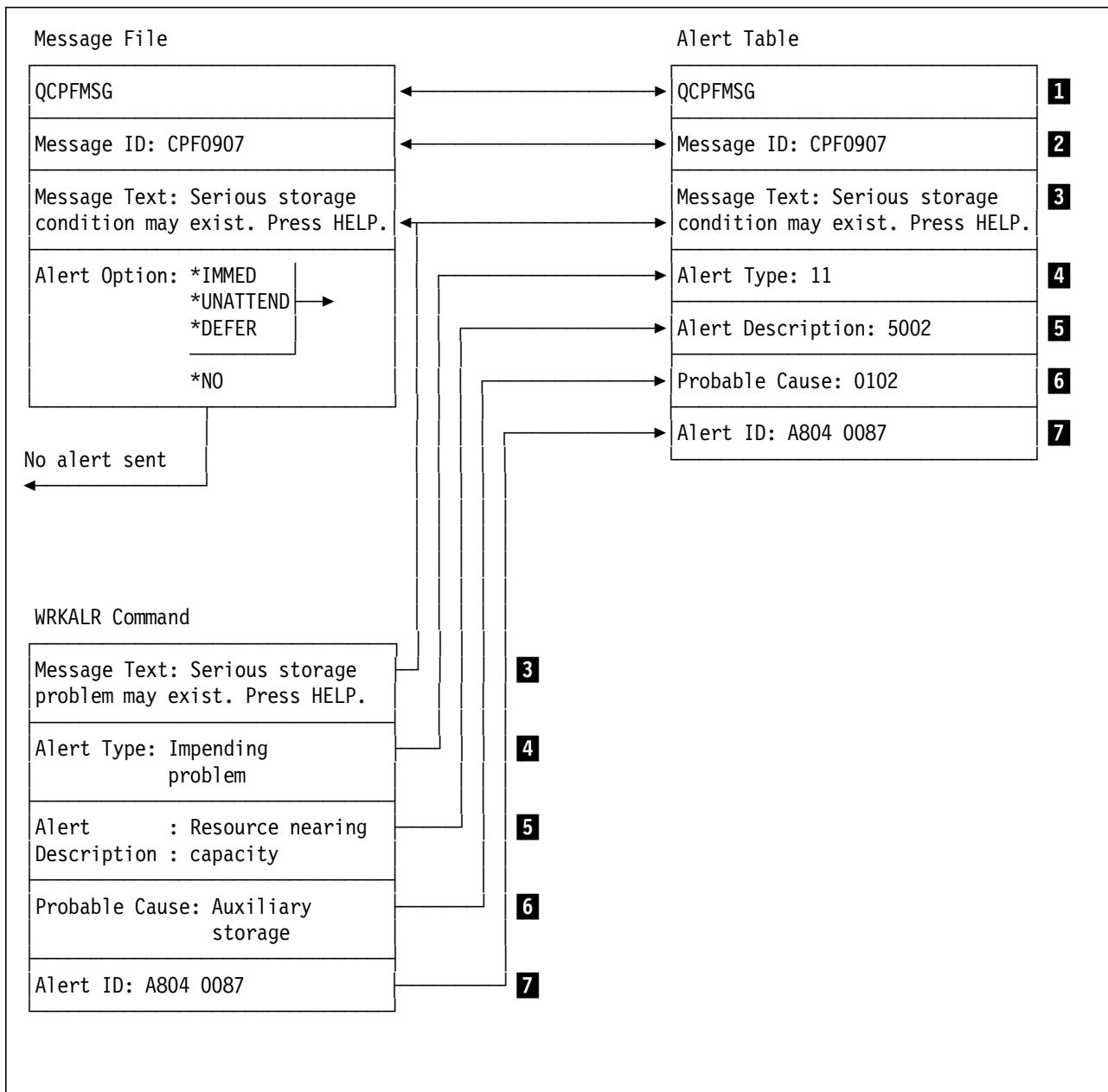


Figure 37. Relationship Between Message Files and Alert Tables

The relationship between the message file QCPFMSG and the alert table QCPFMSG, as illustrated in Figure 37 can be summarized as follows:

- **1** The message file and the alert table it is paired with, *must* share the same name, in this case, QCPFMSG
- **2** If a certain message in the message file is to produce an alert, there must be an alert table entry with the same identifier.
- **3** The message text must also be contained in the alert table entry, as shown in the figure.
- The message must have an alert option of either \*IMMED, \*UNATTEND or \*DEFER. Please see 2.1.2.3, “Message Files” on page 41 for an explanation of these options. If the alert option is \*NO, no alert will be sent.
- When an entry is added to the alert table, code points can be specified for the alert type, alert description and alert probable cause.

Please see A.4, “SNA Generic Alert Code Points” on page 209 for more detail on these categories of code points.

- **4** A code point of 11 has been added for the alert type
- **5** A code point of 5002 has been added for the description of the alert
- **6** A code point of 0102 has been added for the probable cause of the alert
- **7** The Alert ID of A804 0087 is generated by the AS/400 system during the process of adding the entry to the alert table description. It is generated from a cyclic redundancy check (CRC) algorithm, using the cause code points as input.
- When the alert is sent, the system translates the code points specified in the alert table entry into text. This text is displayed when the WRKALR (Work with Alerts) command is used.
  - **3** The same message text is included in the alert.
  - **4** Code point 11 is translated to “Impending problem”.
  - **5** Code point 5002 is translated to “Resource nearing capacity”.
  - **6** Code point 0102 is translated to “Auxiliary storage”.
  - **7** The alert identifier of the alert table entry is used in the alert.

**Note:** An alert flowing between node transports only code points. That means that you have to keep corresponding definitions between nodes and check if the code point is defined with the same message in the receiving node.

There are two alert tables supplied with the AS/400 system. These can be viewed using the Work with Alert Table (WRKALRTBL) command specifying \*ALL as shown in Figure 24 on page 42.

Work with Alert Tables			
Type options, press Enter.			
1=Create   2=Change   4=Delete   5=Work with alert descriptions			
	Alert		
Opt	Table	Library	Text
	QCPFMSG	QSYS	
	QPQMSGF	QSYS	

Figure 38. Work with Alert Tables - Panel

QCPFMSG is for general AS/400 system use and is aligned with the OS/400 QCPFMSG message file. QPQMSGF is a specialized alert table intended for use by the subsystem controlling remote printers and is linked with the QPQMSGF message file.

The QCPFMSG alert table and its corresponding message file, QCPFMSG are often sufficient for the needs of a user installation. The needs of the installation may dictate however that changes are required. It is not advisable to change the IBM-supplied alert tables. The CRTDUPOBJ (Create Duplicate Object) should be used to create a copy of QCPFMSG in a user library and then the CHGALRTBL (Change Alert Table) command can be used.

Change Alert Table (CHGALRTBL)			
Type choices, press Enter.			
Alert table	. . . . .	> qcpfmsg	Name
Library	. . . . .	> userlib	Name, *LIBL, *CURLIB
Product	. . . . .	product	Character value, *SAME,
Licensed program text	. . . . .	'Production application'	
Text 'description'	. . . . .	> 'Production application alert table'	

Figure 39. Change Alert Table - Panel

- Alert table and Library

The name of the alert table to be changed and the library in which it resides.

- Product

This specifies the licensed program for which the alert table is used. It is included in the alert. The program does not have to be an IBM licensed program. Any 7-character ID that is significant for the network operator viewing alerts can be specified.

- Licensed program text

This specifies the text for the alert table licensed program. This text is included in the alert.

If necessary however, you can create your own OS/400 alerts. The procedure is as follows:

- Create an alert table using the CRTALRTBL (Create Alert Table) command.

- Add alert descriptions to this alert table using the ADDALRD (Add Alert Description) command.

```

                                Create Alert Table (CRTALRTBL)

Type choices, press Enter.

Alert table . . . . . > example      Name
Library . . . . . > mylib           Name, *CURLIB
Product . . . . . produce 1        Character value, 5738SS1
Licensed program text . . . . . Production application 2
Text 'description' . . . . . Production application alert table

                                Additional Parameters

Authority . . . . . *LIBCRTAUT      Name, *LIBCRTAUT, *CHANGE

```

Figure 40. Create Alert Table - Command Prompt

**1** This specifies the licensed program for which the alert table is used. It is included in the alert. The program does not have to be an IBM licensed program. Any 7-character ID that is significant for the network operator viewing alerts can be specified.

**2** This specifies the text for the alert table licensed program. This text is included in the alert.

```

                                Add Alert Description (ADDALRD)

Type choices, press Enter.

Message identifier . . . . . > prd0001      Name
Alert table . . . . . example             Name
Library . . . . . mylib                   Name, *LIBL, *CURLIB
Alert type . . . . . 17 1                 00-FF, *NONE
Alert description code point . . 7001 2    0000-FFFF, *NON
Probable cause code point . . . 7000 3    0000-FFFF, *NON
+ for more values

```

Figure 41. Add Alert Description - Panel 1 of 3

Please see A.4, “SNA Generic Alert Code Points” on page 209 for more details on alert type, description, and probable cause code points.

In the example shown in Figure 41, the alert has been specified as follows:

**1** 17 - operator intervention required

The alert condition was caused because action is required by an operator.

**2** 7001 - resources not active

An operator has deactivated, or failed to activate, resources required for a requested operation

**3** 7000 - personnel

Action on the part of service, or other personnel.

Add Alert Description (ADDALRD)

Type choices, press Enter.

Cause:

Cause type . . . . .	*user	<b>4</b>	*NONE, *USER, *INSTALL.
Cause code point . . . . .	7002	<b>5</b>	Hexadecimal value
Detail data ID 1 . . . . .	*none		Hexadecimal value, *NON
Detail data 1 . . . . .	*nodata		
Detail data ID 2 . . . . .			Hexadecimal value, *NON
Detail data 2 . . . . .			
Detail data ID 3 . . . . .			Hexadecimal value, *NON
Detail data 3 . . . . .			
Product identifier . . . . .			*NONE, *SNDHDW, *SNDSEW
+ for more values			

M

F3=Exit   F4=Prompt   F5=Refresh   F12=Cancel   F13=How to use this display  
F24=More keys

Figure 42. Add Alert Description - Panel 2 of 3

#### **4** Cause type

This specifies the causes for the alert description. In this example \*USER has been specified. These code points describe the conditions caused by a user and defined as conditions which can be resolved by the operator without contacting any service organization. The other possible values are \*INSTALL - these code points describe conditions resulting from the initial installation or setup of the equipment. \*FAILURE - These code points describe conditions caused by the failure of a resource.

#### **5** Cause code point

Remote system operator. A person (or program) responsible for the operation of all or part of it, or responsible for performing system orientated procedures.

Add Alert Description (ADDALRD)

Type choices, press Enter.

Recommended action:

Action type . . . . .	*user <b>6</b>	*NONE, *USER, *INSTALL.
Action code point . . . . .	1301 <b>7</b>	Hexadecimal value
Detail data ID 1 . . . . .	*none	Hexadecimal value, *NON
Detail data 1 . . . . .	*nodata	
Detail data ID 2 . . . . .		Hexadecimal value, *NON
Detail data 2 . . . . .		
Detail data ID 3 . . . . .		Hexadecimal value, *NON
Detail data 3 . . . . .		
Product identifier . . . . .		*NONE, *SNDHDW, *SNDSEFW...
+ for more values		

Bottom

Figure 43. Add Alert Description - Panel 3 of 3

#### **6** Action type

This specifies the actions for the alert description. In this example \*USER has been specified. These code points describe the actions recommended to correct the conditions caused by a user. The other possible values are \*INSTALL - these code points describe the actions recommended to correct conditions resulting from the initial installation or setup of the equipment. \*FAILURE - these code points describe the actions recommended to correct the conditions caused by the failure of a resource. \*UNKNOWN - the code point that follows is for a recommended action when the cause of the error is undetermined. This keyword can only be specified if CAUSE is \*NONE.

#### **7** Action code point

Ready the device and then retry.

### **2.1.2.5 Manual Processing of Alerts**

A user profile can be specified in the ASNUSER parameter of an action entry within an alert filter. The purpose of this is to route all alerts which have met certain selection criteria to a particular user profile for attention. This user profile may already exist on the system or it may be specially created for the purpose. The command CRTUSRPRF (Create User Profile) is used under Security Officer (QSECOFR) authority.

```

                                Create User Profile (CRTUSRPRF)

Type choices, press Enter.

User profile . . . . . filter1      Name
User password . . . . . *USRPRF     Name, *USRPRF, *NONE
Set password to expired . . . . *NO      *NO, *YES
Status . . . . . *ENABLED          *ENABLED, *DISABLED
User class . . . . . *secofr        *USER, *SYSOPR, *PGMR..
Assistance level . . . . . *SYSVAL   *SYSVAL, *BASIC, *INTER
Current library . . . . . *CRTDFT    Name, *CRTDFT
Initial program to call . . . . *NONE    Name, *NONE
Library . . . . .                Name, *LIBL, *CURLIB
Initial menu . . . . . MAIN         Name, *SIGNOFF
Library . . . . . *LIBL            Name, *LIBL, *CURLIB
Limit capabilities . . . . . *NO      *NO, *PARTIAL, *YES
Text 'description' . . . . . Profile for alerts sent by Filter1 action ent
ry

F3=Exit  F4=Prompt  F5=Refresh  F10=Additional parameters  F12=Cancel
F13=How to use this display  F24=More keys

```

Figure 44. Create User Profile for Alerts - Panel

You should create the profile with a user class of \*SECOFR to ensure that the user profile will not have authority problems when processing alerts directed to it by the alert filter.

```

                                Display Messages

Queue . . . . . FILTER1      System:  RALYAS4A
Library . . . . . QUSRSYS    Program . . . . : *DSPMSG
Severity . . . . : 99        Library . . . . :
Delivery . . . . : *BREAK

Type reply (if required), press Enter.
Alert has been received from USIBMRA.RALYAS4B.

```

Figure 45. Displaying Message Queue for User Profile Processing Alerts

The panel in Figure 45 shows the message that has been sent to the message queue of the user profile created in Figure 44. It is recommended that the message queue be changed to Delivery \*BREAK. This is to ensure that the person doing the manual monitoring the message queue is aware immediately of all alerts sent to it by the alert filter.

**Logging Alerts:** The OS/400 alert support allows you to log and display alerts that have either been locally created on your system, or have been received from other systems in the network if your AS/400 system is a focal point.

Alerts that have either been created locally by the system or have been received from other systems are logged in the alert database. The logging of alerts is controlled using the alert logging status (ALRLOGSTS) network attribute. Please



see 2.1.2.2, “Changing the Network Attributes” on page 36. The following table summarizes the position:

<i>Table 3. OS/400 Alert Logging Status Summary</i>				
	<b>*ALL</b>	<b>*LOCAL</b>	<b>RCV</b>	<b>*NONE</b>
<b>Local</b>	Logged	Logged	Not logged	Not logged
<b>Received</b>	Logged	Not logged	Logged	Not logged

*The Alert Database:* The alert databases on the AS/400 are a physical file named QAALERT and a logical file named QAALHSN in library QUSRSYS. The files used for alerts are shown in Table 4.

<i>Table 4. Database Files Used for OS/400 Alert Support</i>	
<b>*File Name</b>	<b>Description</b>
QAALERT	Physical file for alerts
QAALHSN	Logical file keyed on held alerts
QAALRCLC	Logical file keyed on received/local alerts
QAALRSCN	Logical file keyed on resource name
QAALRSCT	Logical file keyed on resource type
QAALALTP	Logical file keyed on alert type
QAALPBID	Logical file keyed on problem ID
QAALUSER	Logical file keyed on assigned user
QAALGRP	Logical file keyed on assigned group

The automatic cleanup features of the Operational Assistant\* program will automatically delete alerts that are older than a specified number of days and reorganize the alert database. Type GO ASSIST to specify cleanup options.

The following cleanup options are available:

- Database Backup and Recovery

Specify \*NONSYS for the LIB parameter in the SAVLIB (Save Library) command, to save the QUSRSYS library. Please see the *Backup and Recovery Guide*, SC41-8079 for more information about saving the system.

- Database Reorganization

The RGZPFM (Reorganize Physical File Member) command can be used to reorganize the alert database. This will free up the space currently occupied by deleted alert records. Please see the *Control Language Reference*, SC41-0030, for more information about this command.

- Deleting Alerts

One or more alerts can be deleted from the alert database using the DLTALR (Delete Alert) command. The RGZPFM command can be used to reorganize the alert database after deleting alerts.

- Clearing the Database

All of the alerts logged in the alert database can be deleted by using the CLRPFM (Clear Physical File Member) command. This will clear all alert records currently in the physical file. The *Control Language Reference* contains more information about this command.

*Working with Logged Alerts:* The WRKALR (Work with Alerts) command displays logged alerts, with the most recent alert displayed first. Logged alerts can include alerts created locally as well as alerts received from other systems in the network, depending on the current setting of the ALRLOGSTS network attribute. Please see Table 3. Alerts can be deleted using the WRKALR command.

A subset of alerts can be selected for display by specifying parameters on the WRKALR (Work with Alerts) command, or by pressing F15 (Subset) on the Work with Alerts panel.

Work with Alerts (WRKALR)

Type choices, press Enter.

Display option . . . . .	*ALL	*ALL, *RCV, *LOCAL, *HE
Period:		
Start time and date:		
Start time . . . . .	*AVAIL	Time, *AVAIL
Start date . . . . .	*BEGIN	Date, *BEGIN, *CURRENT
End time and date:		
End time . . . . .	*AVAIL	Time, *AVAIL
End date . . . . .	*END	Date, *END
Alert type . . . . .	*ALL	Character value, *ALL..
+ for more values		
Alert resource . . . . .	RALYAS4B	Name, *ALL
+ for more values		
Alert resource type . . . . .	*ALL	Character value, *ALL
+ for more values		
User assigned . . . . .	*ALL	Character value, *ALL,
+ for more values		
Group . . . . .	*ALL	Name, *ALL, *NONE, *DEF
+ for more values		
Output . . . . .	*	*, *PRINT

F3=Exit F4=Prompt F5=Refresh F12=Cancel F13=How to use this display  
F24=More keys

Figure 46. Working with a Subset of Alerts

In Figure 46, the WRKALR command has been entered, specifying that only alerts received from AS/400 RALYAS4B are to be displayed.

The following are some of the alert subsets which can be specified:

- Alert type
 

Specifies which types of alerts are shown. The alert type indicates the severity of the alert.

  - \*PAFF
 

All alerts that report a problem with a permanently impaired resource are shown.
  - \*ALL
 

All types of alerts are shown.
  - \*TEMP
 

All alerts that report a temporary problem are shown.

- \*PERM  
All alerts that report a permanent problem are shown.
- \*PERF  
All alerts that report a performance problem are shown.
- \*IMPEND  
All alerts that report an impending problem are shown.
- \*UNKNOWN  
All alerts that report a problem with an unknown severity are shown.
- Alert type code point  
Specifies the code point for the alert type. Code points are specified with two (2) hexadecimal digits.
- Alert resource  
Specifies the name of resources that are reporting problems. Up to 50 alert resource names can be specified.
  - \*ALL  
Alerts associated with all failing resources are shown.
  - Alert resource  
Specifies an alert resource name. Alerts that are reporting problems associated with that alert resource name are shown.
- Alert resource type  
This specifies the types of resources that are reporting problems. Up to 50 alert resource types can be specified. Each alert resource name has an alert resource type associated with that resource.
  - \*ALL  
Alerts for all alert resource types are shown.
  - Alert resource type  
Specifies a particular alert resource type. Alerts that are reporting problems associated with the assigned alert resource type are shown.
- User assigned  
Specifies the user to which the alerts being shown are assigned. This value is taken from the value on the ASNUSER parameter in the Add Alert Action Entry (ADDALRACNE) command.
  - \*ALL  
All alerts are shown.
  - \*NONE  
The alerts not assigned to a user are shown.
  - User-name  
Specifies the name of the user to which the alerts being shown are assigned.
- Group

Specifies the group to which the alerts being shown are assigned. This value is taken from the value on the GROUP parameter in the Add Alert Selection Entry (ADDALRSLTE) command.

- \*ALL  
All alerts are shown.
- \*DEFAULT  
The alerts assigned to the default group are shown.
- \*NONE  
The alerts not assigned to a group are shown.
- Group-name  
Specifies the name of the group to which the alerts being shown are assigned.

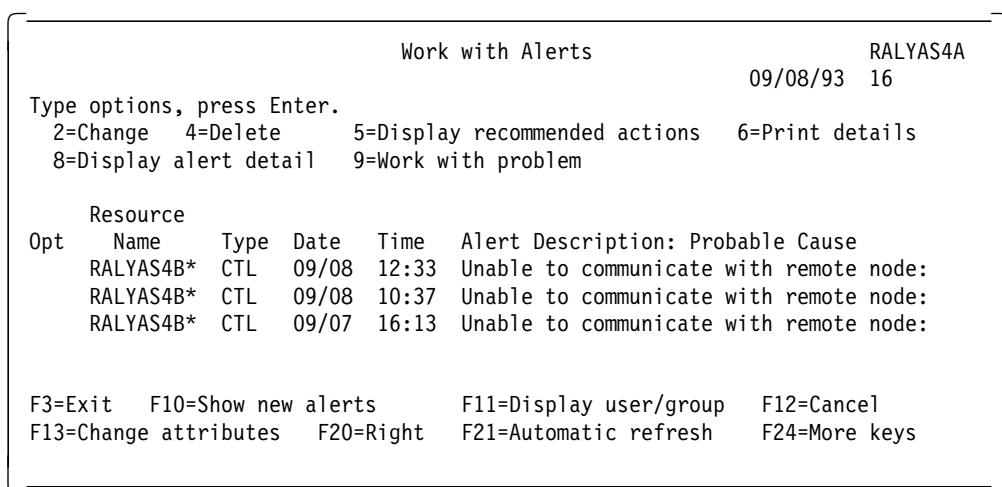


Figure 47. WRKALR Subset Display

The resulting output is displayed in Figure 46 on page 60. All normal WRKALR functions can now be performed from this panel on the subset of alerts. For more information on the available content of alerts, please see Figure 5 on page 22 through Figure 17 on page 30.

### 2.1.2.6 Implementation and Use of Alert Filters on AS/400

This section covers the OS/400 alert filter support on the AS/400 system. It describes how alert filters can be used to route and process Systems Network Architecture (SNA) alerts in a network and how to automate operations for both locally generated alerts and those received from within the network. In a large network, even if it were possible to scan every single alert received on the focal point, this would be very wasteful of human resources.

An alert filter makes it possible to automatically sort alerts into manageable categories and to take the appropriate action. This action may in some cases involve no active response at all, in which case, these particular alerts can be effectively discarded.

It is necessary to formulate the network management policy of the organization before alert filtering can be effectively implemented on the AS/400 or any other system which has support for alert filtering.

Once the network management policy has been agreed upon, alert support should be enabled to establish the type and flow of alerts through the network to the focal point on which alert filtering is to be implemented. You should determine the relevant content of the alerts to enable accurate selection to be done by the selection entries of the system alert filter.

### 2.1.2.7 Filter Components

The alert filter (if any), which the AS/400 system uses, is specified in the network attributes of the system. An alert filter consists of two parts:

- Selection Entries

Selection entries do the sorting of the alerts. As the alert is received by or generated on the system, it is checked against the selection entries in the system alert filter. These selection entries are made according to the network management policy of the organization and are assigned to defined groups.

- Action Entries

Action entries determine how the system handles the alert. Once the alert has been assigned to a group by a selection entry, the action entry takes the action(s) specified in the action entry for the alerts in that group. This action is, of course also determined by the network management policy of the organization.

The CHGNETA (Change Network Attributes) command is used to tell the AS/400 system which alert filter to use, as shown in Figure 48.

Change Network Attributes (CHGNETA)

Type choices, press Enter.

Alert primary focal point . . .	*SAME	*SAME, *NO, *YES
Alert default focal point . . .	*SAME	*SAME, *NO, *YES
Alert backup focal point:		
Network ID . . . . .	*SAME	Name, *SAME, *NONE, *LCL
Control point name . . . . .		Name
Alert focal point to request:		
Network ID . . . . .	*SAME	Name, *SAME, *NONE, *LCL
Control point name . . . . .		Name
Alert controller description . .	*SAME	Name, *SAME, *NONE
Alert hold count . . . . .	*SAME	0-32767, *SAME, *NOMAX
Alert filter . . . . .	<b>AS400NET</b>	Name, *SAME, *NONE
Library . . . . .	<b>QALSND</b>	Name, *LIBL, *CURLIB

Figure 48. Using CHGNETA Command to Specify Alert Filter

Figure 49 on page 64 shows, in concept, how alert filtering is implemented on the AS/400 system.

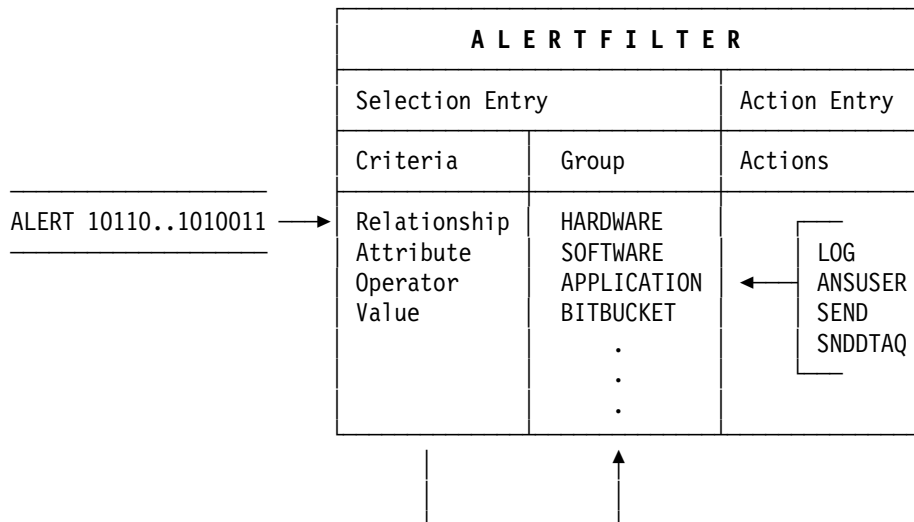


Figure 49. Conceptual Operation of AS/400 Alert Filter

In Figure 49, specific contents of the alert are compared with the criteria set up in the selection entry. Depending on which criteria are met, the alert is assigned to a specific group.

The different groups are created during the alert filter creation process. Hardware alerts might all be assigned to one group, system software alerts to another and non-disruptive alerts to yet another for discarding.

Once the alert has been assigned to a specific group, the action entry component of the alert filter processes the alert based on the values specified in the action entry. Options include whether or not to log the alert, assign it to a specific user ID, send it to another focal point, or send the alert to a data queue for processing by a user-written application. These options are not exclusive and an action entry could be set up to perform a combination of these actions to alerts which have been allocated to a particular group.

Figure 50 on page 65 and Figure 51 on page 65, show the selection entry and action entries which make up the alert filter AS400NET specified in Figure 48 on page 63.

Use the WRKFTR, WRKFTRACNE, and WRKFTRSLTE commands to display the different entries.

```

                                Display Filter Selection Entry
                                System:  RALYAS4A
Filter . . . . . : AS400NET
Library . . . . . : QALSNDA
Type . . . . . : *ALR
Sequence number . . . . . : 0001
Group . . . . . : HARDWARE

Type options, press Enter.
5=Display

Opt Relationship Attribute Operator Value
      *IF      *RSCTYPE  *CT      TAP
      *OR      *RSCTYPE  *CT      PRT

```

Figure 50. Displaying a Selection Entry in the AS400NET Filter

This is an example of a very simple selection entry. If the resource type specified in the alert contains the values "TAP" or "PRT", then the alert is allocated to the group HARDWARE.

```

                                Work with Filter Action Entries
                                System:  RALYAS4A
Filter . . . . . : AS400NET
Library . . . . . : QALSNDA
Type . . . . . : *ALR

Type options, press Enter.
1=Add 2=Change 3=Copy 4=Remove 5=Display 7=Rename

Opt  Group      Actions
     HARDWARE   LOG(*YES) ASNUSER(QSYSOPR) SEND(USIBMRA.RA3) SNDDTAQ...
     SOFTWARE   LOG(*YES) ASNUSER(*NONE) SEND(*NONE) SNDDTAQ(QALSNDA/P
     *DEFAULT   LOG(*NETATR) ASNUSER(*NONE) SEND(*FOCALPT) SNDDTAQ(*..

```

Figure 51. Displaying an Action Entry in the AS400NET Filter

This is an example of the action entry for the HARDWARE group specified in Figure 50:

- The alert is logged.
- The alert is assigned to user ID QSYSOPR.
- The alert is forwarded to a higher focal point RA3 in network USIBMRA.
- The alert is not sent to a data queue.

This is an example of the action entry for the SOFTWARE group specified in Figure 50:

- The alert is logged.
- The alert is not assigned to user ID.
- The alert is not forwarded to a higher focal point.
- The alert is sent to a data queue PERFORM in library QALSNDA.

The alert notification record will be sent to the specified data queue. This will allow a user application to monitor the queue and process alerts as they come in. SNDDTAQ can be specified multiple times and will enqueue the alert notification record each time SNDDTAQ is specified. The alert notification record will not be enqueued on a specific data queue more than once. The data queue can be used by user written management applications as well as Management Services Transport applications in OS/400.

The \*DEFAULT action entry is supplied with OS/400:

- The alert is logged or not logged depending on the network attribute.
- The alert is not assigned to any user ID.
- The alert is forwarded to a higher focal point, if defined in the network attributes.
- The alert is not sent to a data queue.

**Alert Filter Selection Entry details:** Figure 52 shows how a selection entry is added to an existing alert filter:

System: RALYAS4A

Work with Filter Selection Entries  
 Filter . . . . . : AS400NET  
 Library . . . . . : QALSND  
 Type . . . . . : \*ALR

Type options, press Enter.  
 1=Add 2=Change 3=Copy 4=Remove 5=Display 7=Move

Opt	Sequence Number	Group	Selection Data
1	2		
	0001	HARDWARE	*IF *RSCTYPE *CT TAP *OR *RSCTYPE *CT PRT
	0002	SOFTWARE	*IF *ALRID *EQ 3B495B35

Figure 52. Adding a Selection Entry to an Alert Filter

On the Work with Filter Selection Entries panel, the sequence number of the selection entry is keyed in as shown in Figure 52. The following panel is displayed:



Add Alert Selection Entry (ADDALRSLTE)		
Type choices, press Enter.		
Filter . . . . .	> AS400NET	Name
Library . . . . .	> QALSND	Name, *LIBL, *CURLIB
Selection data:		
Relationship . . . . .	<b>1</b>	*ANY, *IF, *AND, *OR
Attribute . . . . .	<b>2</b>	*ORIGIN, *RSCNAME...
Relational operator . . . . .	<b>3</b>	*EQ, *GT, *LT, *NE, *GE
Value . . . . .	<b>4</b>	
+ for more values		
Sequence number . . . . .	> 2	1-9999, *GEN
Group . . . . .	printers	Name, *DEFAULT

Figure 53. Adding a Selection Entry

Figure 53 specifies the comparisons to be made to determine if the alert belongs in the specified group. The selection entry results in a successful match with an alert when the data in the alert satisfies the relationships specified on the SELECT parameter. Up to 10 attribute values can be compared to the alert.

- Relationship **1**

The possible values are:

- \*ANY

Any alert matches this selection record. Specify the conditions under which an alert matches the selection entry. Each condition must contain the following four elements:

1. One of the logical operators \*IF, \*AND, or \*OR
2. The attribute compared
3. One of the relational operators
4. The attribute value

- The possible Logical Operator values are:

- \*IF

Identifies the first condition that must be satisfied.

- \*AND

The conditions on both sides of the \*AND must be satisfied.

- \*OR

One of the conditions on each side of the \*OR must be satisfied. If there is one set or several sets of conditions, the \*IF value must be specified as the first value in the first set of comparison values. If more than one set of conditions are specified, \*AND or \*OR must be specified as the first value in each set after the first. Each condition must be enclosed in parentheses. \*AND is evaluated before \*OR.

- Attribute **2**

The possible attribute values are:

- \*ORIGIN

Specifies whether the alert is generated or received. The valid values for this attribute are L (Locally generated) or R (Received).

- \*RSCNAME

Specifies the name of the failing resource. The value for this attribute must be an 8-character name.

- \*RSCTYPE

Specifies the type of the failing resource. The value for this attribute must be a 3-character resource type (for example, TAP or DKT).

- \*HIERNAME

Specifies all of the resources in the alert resource hierarchy. The alert resource hierarchy is the list of resources, separated by blanks, displayed on the Work with Alerts (WRKALR) command detailed data displays. The value for this attribute can be a list of up to 5 resource names separated by a blank, unless the value is used with the \*CT relational operator. If the \*CT value is used, the selection relationship can test to see if the given resource name is found anywhere within the hierarchy. This attribute contains the resource names from the hierarchy only.

- \*HIERTYPE

Specifies all of the resource types in the alert resource hierarchy. The resource types match the resource names specified on the \*HIERNAME attribute. The value for this attribute can be a list of up to 5 resource types 1 to 3 characters in length, separated by a blank, unless the value is used with the \*CT relational operator. If the \*CT value is used, the selection relationship can test to see if the given resource type is found anywhere within the hierarchy.

- \*MSGID

Specifies the message identifier.

- \*MSGSEV

Specifies the message severity. This value must be greater than or equal to -2,147,483,647 and less than or equal to 2,147,483,647.

- \*ALRID

Specifies the alert identifier. The alert identifier is displayed on the Work with Alerts (WRKALR) command detailed data display. The value for this attribute must be an 8-digit hexadecimal number unless it is used with the \*CT relational operator. If the \*CT operator or a wildcard character is used, the attribute must have an even number of digits up to a maximum of 8. The alert ID may not be a valid comparison for AS/400 alerts created after problem analysis.

- \*ALRTYPE

Specifies the alert type code point that is in the alert. The value for this attribute is a 2-digit hexadecimal number.

- \*ALRDSC

Specifies the alert description code point that is in the alert. The value for this attribute must be an 4-digit hexadecimal number unless it is used with the \*CT relational operator. If the \*CT operator or a wildcard

character is used, the attribute must have an even number of digits up to a maximum of 4.

- **\*PBLCSE**

Specifies the probable cause code point that is in the alert. The value for this attribute must be an 4-digit hexadecimal number unless it is used with the \*CT relational operator. If the \*CT operator or a wildcard character is used, the attribute must have an even number of digits up to a maximum of 4.

- **\*USRCSE**

Specifies the first user cause code point that is in the alert. The value for this attribute must be an 4-digit hexadecimal number unless it is used with the \*CT relational operator. If the \*CT operator or a wildcard character is used, the attribute must have an even number of digits up to a maximum of 4.

- **\*INSCSE**

Specifies the first install cause code point that is in the alert. The value for this attribute must be an 4-digit hexadecimal number unless it is used with the \*CT relational operator. If the \*CT operator or a wildcard character is used, the attribute must have an even number of digits up to a maximum of 4.

- **\*FLRCSE**

Specifies the first failure cause code point that is in the alert. The value for this attribute must be an 4-digit hexadecimal number unless it is used with the \*CT relational operator. If the \*CT operator or a wildcard character is used, the attribute must have an even number of digits up to a maximum of 4.

- **\*RSCHDW**

Specifies the failing hardware resource information in the alert. This information is displayed on the Work with Alerts (WRKALR) command detailed data displays. Specify a value for this attribute using the following form:

```
tttt mmm ss-sssssss
tttt mmm ss-sssss
tttt mmm sssssss
tttt mmm ssssss
```

where tttt is the machine type, mmm is the model number, and ssssssss is the serial number. Use this format to match a particular hardware resource or use a part of the hardware value with the \*CT relational operator to provide a partial match.

- **\*SNDHDW**

Specifies the sending hardware resource information in the alert. This information is displayed on the Work with Alerts (WRKALR) command detailed data displays. Specify a value for this attribute using the following form:

```
tttt mmm ss-sssssss
tttt mmm ss-sssss
tttt mmm sssssss
tttt mmm ssssss
```

where `tttt` is the machine type, `mmm` is the model number, and `ssssssss` is the serial number. Use this format to match a particular hardware resource or use a part of the hardware value with the `*CT` relational operator to provide a partial match.

- `*RSCSW`

Specifies the failing software resource information in the alert. This information is displayed on the Work with Alerts (WRKALR) command detailed data displays. Specify a value for this attribute using the following form:

`pppppp vv rr mm`

where `pppppp` is the licensed program identifier, `vv` is the version number, `rr` is the release number, and `mm` is the modification level. Use this format to match a particular software resource or use a part of the software value with the `*CT` relational operator to provide a partial match.

- `*SNDSW`

Specifies the sending software resource information in the alert. This information is displayed on the Work with Alerts (WRKALR) command detailed data displays. Specify a value for this attribute using the following form:

`pppppp vv rr mm`

where `pppppp` is the licensed program identifier, `vv` is the version number, `rr` is the release number, and `mm` is the modification level. Use this format to match a particular software resource or use a part of the software value with the `*CT` relational operator to provide a partial match.

- Relational operator **3**

The possible relational operator values are:

- `*EQ`

The attribute must be equal to the value specified in Attribute Value.

- `*GT`

The attribute must be greater than the value specified in Attribute Value.

- `*LT`

The attribute must be less than the value specified in Attribute Value.

- `*NE`

The attribute must not be equal to the value specified in Attribute Value.

- `*GE`

The attribute must be greater than or equal to the value specified in Attribute Value.

- `*LE`

The attribute must be less than or equal to the value specified in Attribute Value.

- `*CT`

The attribute must contain the value specified in Attribute Value.

- Value **4**

The possible attribute values are:

- Attribute-value

Specify the value (a maximum of 60 characters) to be compared with the contents of the specified attribute. The value must be specified in apostrophes if it contains blanks or special characters and must be in character format. If a CL variable is specified for the value, it must be a character variable.

- Generic\*-attribute-value

Specify the generic attribute value. A generic value is a character string of one or more characters followed by an asterisk (\*); for example, ABC\*. If a generic name is specified, all values that begin with the generic value are matches. If an asterisk is not included with the generic (prefix) value, the system assumes it to be the complete value. Generic attribute values are only allowed with the \*EQ and \*NE operator.

**Alert Filter Action Entry details:** Figure 54 shows how an action entry is added to an existing alert filter:

Work with Filter Action Entries

System: RA

Filter . . . . . : AS400NET  
Library . . . . . : QALSND  
Type . . . . . : \*ALR

Type options, press Enter.  
1=Add 2=Change 3=Copy 4=Remove 5=Display 7=Rename

Opt	Group	Actions
1	PRINTERS	
	HARDWARE	LOG(*YES) ASNUSER(QSYSOPR) SEND(USIBMRA.RA3) SNDD
	SOFTWARE	LOG(*YES) ASNUSER(*NONE) SEND(*NONE) SNDDTAQ(QALS
	*DEFAULT	LOG(*NETATR) ASNUSER(*NONE) SEND(*FOCALPT) SNDDTA

Figure 54. Work with Filter Action Entries - Panel

Taking option 1 brings up the Add Alert Action Entry (ADDALRACNE) shown in Figure 55.

Add Alert Action Entry (ADDALRACNE)

Type choices, press Enter.

Filter . . . . .	> AS400NET	Name
Library . . . . .	> QALSND	Name, *LIBL, *CURLIB
Group . . . . .	> printers	Name
Log alert . . . . .	> *yes	*YES, *NO, *NETATR
User assigned . . . . .	> qsysopr	Character value, *NONE
Send to system: 1		
Network identifier . . . . .	2 *NONE	Name, *NONE, *NETATR, *
Control point . . . . .	3	Name
+ for more values		

Figure 55. Adding an Action Entry to a Filter - Panel 1 of 2

**1** This specifies the destination to which the alert is to be sent. An alert cannot be sent to the local system. The system checks for this action when the alert is sent. The possible values are network identifier and control point.

**2** The possible Network identifier values are:

- \*NONE

The alert is not sent

- \*FOCALPT

The alert is sent to the system focal point. The focal point system is determined at send time.

- \*NETATR

The LCLNETID value specified in the system network attributes is used. The destination node has the same ID as the local system.

- Network-ID

The network ID of the destination node is specified.

**3** The possible Control point value is:

- Name

The control point name of the destination system is specified.

Add Alert Action Entry (ADDALRACNE)

Type choices, press Enter.

Send to data queue:

Data queue . . . . . \*NONE **4**

Name, \*NONE

Library . . . . .

Name, \*LIBL, \*CURLIB

Data queue key . . . . .

Figure 56. Adding an Action Entry to a Filter - Panel 2 of 2

**4** This specifies the data queue in which an alert notification record is placed. Keyed data queues are supported. The possible Data queue value is:

- Data queue name

The name of the data queue is specified.

The possible Data queue key value are:

- \*NONE

No key is used on the data queue.

- Data queue key

The Data queue key is specified.

## 2.2 AS/400 Downstream Information

Systems making up a network can be categorized according to their functional relationship with each other. This functional relationship is determined by the status which each system has within a hierarchical structure. A conceptual view of this hierarchy is shown in Figure 57.

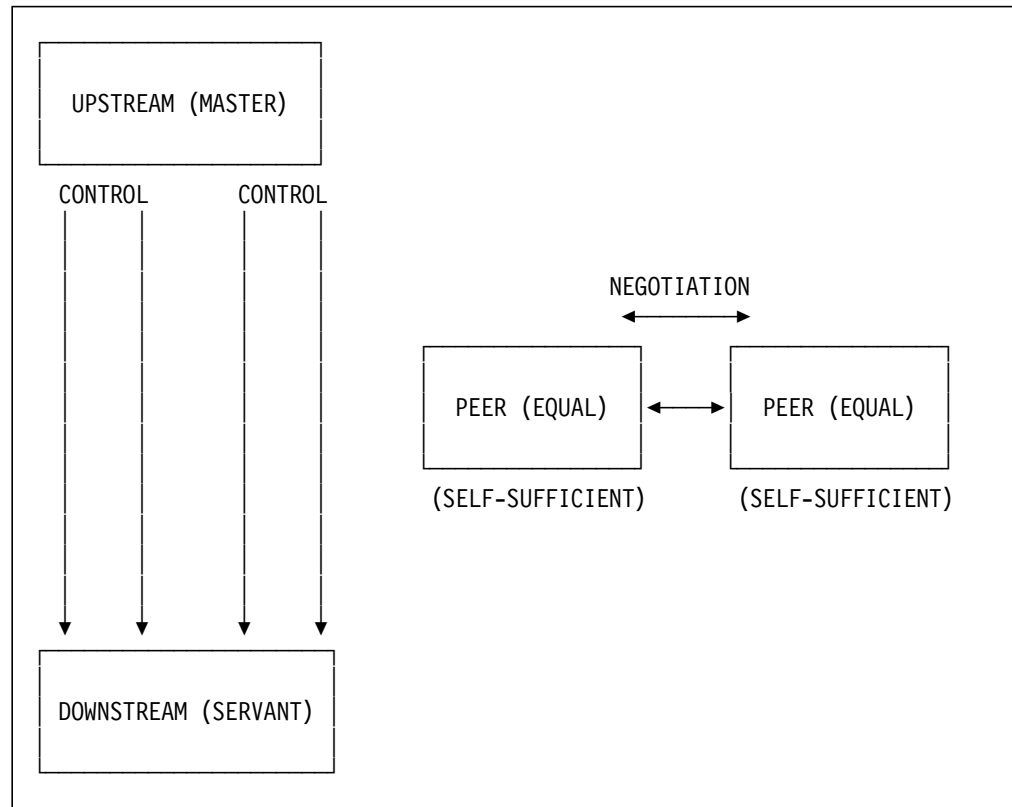


Figure 57. Hierarchy of Control in a Network - Conceptual View

Systems can occupy one of three positions within the network hierarchy; upstream, downstream or peer. The upstream and downstream positions are paired in a functional relationship.

- Upstream

Any system which occupies a higher position in the network hierarchy than another system is said to be *upstream* of it. It is usually called a *host* and provides networking support to any systems below it in the hierarchy.

- Downstream

Any system or device which is below another in the network hierarchy is said to be *downstream* of it. Downstream systems or devices are dependent on a host for networking support.

- Peer

Peer systems are able to participate in and control a network of systems without requiring the networking support traditionally provided by a host. Systems which are in a peer relationship with each other are equals within the hierarchy. Any sessions which they start with other peer systems in the network are done by negotiation.

Any one system can be in a peer relationship with another system and at the same time be attached downstream of another. One example of this is an AS/400 running an APPN session to another AS/400 (peer) and simultaneously running a 3270 emulation to a System/390 host (downstream).

This section will focus on the management of devices and systems which are attached *downstream* of the AS/400.

The method of managing devices attached downstream is determined by;

- The type of device itself or the type of device which is being emulated
- The data streams which the device is able to send to the AS/400 either directly or indirectly

In the following section, we are going to investigate the type of network management information are available from the following systems:

- IBM 5494
- AS/400 running SystemView System Manager/400
- PS/2 running OS/2 Communications Manager
- RISC/6000 running AIX
- IBM 3174 Establishment controller
- PS/2 running DOS
- IBM LAN Manager
- 8230 Token-Ring Network CAU

#### **2.2.1.1 5494 Remote Control Unit**

This section gives an overview of how a 5494 Remote Control Unit can be connected to an AS/400 as well as the types of management information the control unit can provide. Configuration and trace details are provided as the result of test that were done with the 5494.

**Types of Connection:** The 5494 communicates with an AS/400 through an SNA Node Type 2.1 (T2.1) connection using the following interfaces:

- EIA 232D (V.24/V.28)
- V35
- X.21
- Token-ring

It supports the following communication protocols for link establishment and end-to-end communication with an AS/400 system:

- X.21 switched for automatic call establishment when using an X.21 interface.
- V.25 bis for automatic call establishment when using an EIA232D (V.24/V.28) interface.
- SDLC for end-to-end link communication with AS/400 system.
- X.25 for communication with an AS/400 system through a packet switched network.
- Token-ring for establishing communication using the Token-Ring interface.



- SNA is used to exchange information with the AS/400. The 5494 establishes an SNA LU 6.2 session with the AS/400 system using low-entry networking (LEN) end node support. The 5494 can support two types of workstations, namely:
  - **Dependent Workstations (DWS)** are workstations that are incapable of operating independently of the 5494 or the AS/400 system. Typically these are “dumb” terminals, but a PC or PS/2 running a 5250 emulation program is also considered a dependent workstation. For dependent workstations (DWSs) and printers, the 5494 encapsulates SNA LU 4 and LU 7 sessions within LU 6.2 sessions. The AS/400 system support for DWSs is maintained using the 5250 data stream commands and SNA LU 4 and LU 7 commands. These commands are encapsulated in LU 6.2 headers. The 5494 implements a single LU with parallel sessions for the support of all attached DWSs. There is one session per DWS. In addition, there is a special LU 6.2 controller session that is used to send device information to the AS/400.
  - **Independent Workstations (IWS)** are workstations that can operate independently of an AS/400 system, but can also communicate with the AS/400 system (for example a PC or PS/2 running PC Support/400). For independent workstations (IWSs), the 5494 supports end node pass-through. An IWS session is an LU 6.2 session between the IWS and the AS/400. There are no sessions between the IWS and the 5494; the 5494 just passes the LU 6.2 session through to the AS/400.

***Network Management Support Provided by the 5494 (SNA Alert Support):***

Problem determination is provided on the 5494 in the form of:

- Error message codes displayed on the 5494 operator panel LCD
- Error logs that record errors occurring on the 5494 and all attached workstations

In addition, the 5494 SNA Alert function sends device, program, and communication error information to the AS/400 system, where alert messages can be displayed on the AS/400 operator console.

The 5494 generates alerts in response to the following type of errors:

- Attached display or printer errors
- Unknown device errors, which occur if an attached device fails to initialize properly and cannot be identified by the 5494
- Code change errors, which occur if a corrective code correction file is incompatible with the level of code loaded in the 5494, or if the code correction file contains formats errors
- LU 6.2 DWS device session errors, which are communications protocol errors that are most likely to be encountered by users writing applications to run on the AS/400 system
- Low-entry networking (LEN) IWS errors, which are link level or session level errors affecting independent workstations attached directly to the 5494
- Token-ring gateway errors, which are errors detected by the token-ring adapter

Within the token-ring gateway, these are nine alerts. The token-ring gateway alerts are as follows:

- Lobe problem during insertion
- Beaconsing problem during insertion
- Duplicate station address on ring during insertion
- Remove ring station MAC frame received during insertion
- Undefined error during insertion
- Wire fault on ring
- Adapter off ring beacon auto-recover process
- REMOVE ADAPTER command received
- Ring beaconsing timeout

Each 5494 alert is contained within an NMVT. The NMVT RU contains an alert major vector and a series of subvectors and subfields.

**Dependent workstation (DWS) alerts** are sent on the controller LU 6.2 session. In this session the 5494 is the PLU.

**Independent workstation alerts** are also sent on the controller session. The 5494 does not modify these alerts in any way. They arrive at the AS/400 in the same form as when they left the IWS. When the AS/400 issues a response to an alert, the 5494 forwards this response to the IWS without change.

Because of information added to encapsulate the alert on the controller session, the maximum RU size for an alert is:

- 247 bytes when the link to the adjacent link station supports 265-byte frames
- 503 bytes when the link to the adjacent link station supports 521-byte frames

The 5494 rejects IWS alerts that exceed these lengths. The 5494 also rejects NMVTs from IWSs that do not contain alert major vectors.

**Test Environment:** The following section describes the test environment which was set up to illustrate the management data flow.

The 5494 was attached to the AS/400 via token-ring. Two dependent workstations (DWSs) were connected to the 5494. When a 5494 has DWSs attached, an APPC as well as an RWS (Remote Workstation) controller definitions are required. Figure 58 on page 77 and Figure 59 on page 77 show the APPC controller and device descriptions used.

Display Controller Description			09/09/93
Controller description . . . . .	CTLD	RALY5494	
Option . . . . .	OPTION	*BASIC	
Category of controller . . . . .		*APPC	
Link type . . . . .	LINKTYPE	*LAN	
Online at IPL . . . . .	ONLINE	*YES	
Active switched line . . . . .		L41TR	
Character code . . . . .	CODE	*EBCDIC	
Maximum frame size . . . . .	MAXFRAME	521	
Remote network identifier . . . . .	RMTNETID	*NETATR	
Remote control point . . . . .	RMTCPNAME	RALY5494	
Initial connection . . . . .	INLCNN	*DIAL	
Dial initiation . . . . .	DIALINIT	*LINKTYPE	
Switched disconnect . . . . .	SWTDSC	*YES	
Data link role . . . . .	ROLE	*NEG	
LAN remote adapter address . . . . .	ADPTADR	400054940001	
Controller description . . . . .	CTLD	RALY5494	
Option . . . . .	OPTION	*BASIC	
Category of controller . . . . .		*APPC	
LAN DSAP . . . . .	DSAP	04	
LAN SSAP . . . . .	SSAP	04	
Text . . . . .	TEXT	*BLANK	

Figure 58. 5494 APPC Controller Description Panel

Display Device Description			09/09/93
Device description . . . . .	DEVD	RALY5494	
Option . . . . .	OPTION	*BASIC	
Category of device . . . . .		*APPC	
Automatically created . . . . .		YES	
Remote location . . . . .	RMTLOCNAME	RALY5494	
Online at IPL . . . . .	ONLINE	*NO	
Local location . . . . .	LCLLOCNAME	RALYAS4A	
Remote network identifier . . . . .	RMTNETID	*NETATR	
Attached controller . . . . .	CTL	RALY5494	
Message queue . . . . .	MSGQ	QSYSOPR	
Library . . . . .		*LIBL	
Local location address . . . . .	LOCADR	00	
APPN-capable . . . . .	APPN	*YES	
Single session . . . . .	SNGSSN		
Single session capable . . . . .		*NO	
Device description . . . . .	DEVD	RALY5494	
Option . . . . .	OPTION	*BASIC	
Category of device . . . . .		*APPC	
Text . . . . .	TEXT	AUTOMATICALLY CREATED BY QLUS	

Figure 59. 5494 APPC Device Description Panel

Figure 60 on page 78 shows the RWS controller description and Figure 61 on page 78 shows the DWS description used.

Controller description . . . . .	CTLD	RA5494RWS
Option . . . . .	OPTION	*BASIC
Category of controller . . . . .		*RWS
Controller type . . . . .	TYPE	5494
Controller model . . . . .	MODEL	2
Link type . . . . .	LINKTYPE	*NONE
Online at IPL . . . . .	ONLINE	*YES
Remote location . . . . .	RMTLOCNAME	RALY5494
Local location . . . . .	LCLLOCNAME	*NETATR
Remote network identifier . . . . .	RMTNETID	*NETATR
Text . . . . .	TEXT	*BLANK

Figure 60. Remote Workstation Controller Description

Device description . . . . .	DEVD	RA5494DSP1
Option . . . . .	OPTION	*BASIC
Category of device . . . . .		*DSP
Device class . . . . .	DEVCLS	*RMT
Device type . . . . .	TYPE	5251
Device model . . . . .	MODEL	11
Local location address . . . . .	LOCADR	15
Online at IPL . . . . .	ONLINE	*YES
Attached controller . . . . .	CTL	RA5494RWS
Drop line at signoff . . . . .	DROP	*NO
Character identifier . . . . .	CHRID	*SYSVAL
Allow blinking cursor . . . . .	ALWBLN	*YES
Print device . . . . .	PRTDEV	*SYSVAL
Output queue . . . . .	OUTQ	*DEV
Device description . . . . .	DEVD	RA5494DSP1
Option . . . . .	OPTION	*BASIC
Category of device . . . . .		*DSP
Printer file . . . . .	PRTFILE	QSYSPRT
Library . . . . .		*LIBL
Maximum length of request unit . . . . .	MAXLENRU	*CALC
Workstation customizing object . . . . .	WSCST	*NONE
Text . . . . .	TEXT	*BLANK

Figure 61. Dependent Workstation Device Description

**Controller session set up:** Figure 62 on page 79 shows the flow to set up the controller session between the 5494 and the AS/400. The following is a brief description of the trace:

- 129** 5494 sends BIND, with mode SNASVCMG, to the AS/400.
- 132** AS/400 sends positive response to the 5494.
- 134** FMH-5 ATTACH is sent from the 5494.
- 135** The data portion of the FMH-5 with CNOS (X'1210') GDS variable indicating that mode QRMTWSC should be used.
- 140** Positive response to the QRMTWSC request sent from the AS/400 to the 5494.
- 142** The 5494 sends UNBIND (X'320F') request to the AS/400 to break the session.
- 143** The 5494 sends BIND, with mode QRMTWSC, to the AS/400.
- 148** Positive response from the AS/400 to the 5494.

The controller session has now been established and will be used for all management information, in the form of NMVTs, to be sent to the AS/400.

COMMUNICATIONS TRACE				Title: 5494 STRT OFF ON	09/13/93 13:06:33	Page: 3
Record Number	S/R	Controller Name	Data Type	SNA Data: TH, RH, RU		
129	R	RALY5494	EBCDIC	TH : FID=2, MPF=Only ODAI=1, DAF'=01, OAF'=01, SNF'=0001, EFI RH : ('6B8000'X) REQ SC, FI, BCI, ECI, DR1		
		RU Command	: BIND			
		RU Data	: 31001307B0B0D0B300008686800006020000000000000023000010E4E2 *.....}...FF.....US* C9C2D4D9C14BD9C1D3E8F5F4F9F41D000902E2D5C1E2E5C3D4C71104E4E2 *IBMRA.RALY5494...SNASVCMG...US* C9C2D4D9C14BD9C1D3E8F5F4F9F40010E4E2C9C2D4D9C14BD9C1D3E8C1E2 *IBMRA.RALY5494...USIBMRA.RALYAS* F4C16019F08F0E427FF948A410E4E2C9C2D4D9C14BD9C1D3E8F5F4F9F4 *4A-.0..."9.U.USIBMRA.RALY5494 *			
132	S	RALY5494	EBCDIC	TH : FID=2, MPF=Only ODAI=1, DAF'=01, OAF'=01, SNF'=0001, EFI RH : ('EB8000'X) RSP SC, FI, DR1		
		RU Command	: BIND			
		RU Data	: 31001307B0B050B30007868687000602000000000000090234000001D00 *.....&...FFG..... * 0902E2D5C1E2E5C3D4C71105E4E2C9C2D4D9C14BD9C1D3E8C1E2F4C10000 *..SNASVCMG..USIBMRA.RALYAS4A..* 6019F08F0E427FF948A410E4E2C9C2D4D9C14BD9C1D3E8F5F4F9F4 *-..0..."9.U.USIBMRA.RALY5494 *			
134	R	RALY5494	EBCDIC	TH : FID=2, MPF=Only ODAI=1, DAF'=01, OAF'=01, SNF'=0001 RH : ('0A9100'X) REQ FMD, FI, BCI, DR1, ERI, PI		
		RU Command	: FMH- 5=0F0502FF0003D000000206F1000000 *.....}....1... *			
135	R	RALY5494	EBCDIC	TH : FID=2, MPF=Only ODAI=1, DAF'=01, OAF'=01, SNF'=0002 RH : ('019020'X) REQ FMD, ECI, DR1, ERI, CDI		
		RU Data	: 001812100200000000001D0001001C0007D8D9D4E3E6E2C3 *.....}.....QRMTWSC *			
138	S	RALY5494	EBCDIC	TH : FID=2, MPF=Only ODAI=1, DAF'=01, OAF'=01, SNF'=0000 RH : ('830100'X) RSP FMD, PI		
		No RU data				
140	S	RALY5494	EBCDIC	TH : FID=2, MPF=Only ODAI=1, DAF'=01, OAF'=01, SNF'=0001 RH : ('039001'X) REQ FMD, BCI, ECI, DR1, ERI, CEBI		
		RU Data	: 001812100A00000000001D0001001C0007D8D9D4E3E6E2C3 *.....}.....QRMTWSC *			
142	R	RALY5494	EBCDIC	TH : FID=2, MPF=Only ODAI=1, DAF'=01, OAF'=01, SNF'=0001, EFI RH : ('6B8000'X) REQ SC, FI, BCI, ECI, DR1		
		RU Command	: UNBIND			
		RU Data	: 320F000000006019F08F0E427FF948A410E4E2C9C2D4D9C14BD9C1D3E8F5 *.....-.0..."9.U.USIBMRA.RALY5* F4F9F4 *494 *			
143	R	RALY5494	EBCDIC	TH : FID=2, MPF=Only ODAI=1, DAF'=01, OAF'=01, SNF'=0002, EFI RH : ('6B8000'X) REQ SC, FI, BCI, ECI, DR1		
		RU Command	: BIND			
		RU Data	: 31001307B0B0D0B300008686800006020000000000000023000010E4E2 *.....}...FF.....US* C9C2D4D9C14BD9C1D3E8F5F4F9F41C000802D8D9D4E3E6E2C31104E4E2C9 *IBMRA.RALY5494...QRMTWSC..USI* C2D4D9C14BD9C1D3E8F5F4F9F40010E4E2C9C2D4D9C14BD9C1D3E8C1E2F4 *BMRA.RALY5494...USIBMRA.RALYAS4* C16019F08F0E427FF948A510E4E2C9C2D4D9C14BD9C1D3E8F5F4F9F4 *A-.0..."9.V.USIBMRA.RALY5494 *			
146	S	RALY5494	EBCDIC	TH : FID=2, MPF=Only ODAI=1, DAF'=01, OAF'=01, SNF'=0001, EFI RH : ('EB8000'X) RSP SC, FI, DR1		
		RU Command	: UNBIND			
		RU Data	: 32 *			
148	S	RALY5494	EBCDIC	TH : FID=2, MPF=Only ODAI=1, DAF'=01, OAF'=01, SNF'=0002, EFI RH : ('EB8000'X) RSP SC, FI, DR1		
		RU Command	: BIND			
		RU Data	: 31001307B0B050B30007868687000602000000000000090234000001C00 *.....&...FFG..... * 0802D8D9D4E3E6E2C31105E4E2C9C2D4D9C14BD9C1D3E8C1E2F4C1000060 *..QRMTWSC..USIBMRA.RALYAS4A..* 19F08F0E427FF948A510E4E2C9C2D4D9C14BD9C1D3E8F5F4F9F4 *.0..."9.V.USIBMRA.RALY5494 *			

Figure 62. Trace of 5494 Controller Session Setup

Alerts sent by IWSs to the 5494 are also sent to the AS/400 on this session. However, this was not tested.

The AS/400 now sends BINDs, with mode QRMTWSC, for every DWS defined on the RWS controller. In this case the AS/400 is the PLU.

Figure 64 on page 80 shows the mode status when two DWSs have the logon screens displayed.

Opt		Description		Work with Configuration Status		Status		-----Job-----		RALYAS4A	
			L41TR				ACTIVE				
			RALY5494				ACTIVE				
			RALY5494				ACTIVE				
			QRMTWSC				ACTIVE/TARGET		RALY5494	QUSER	041623

Figure 63. Status of 5494 APPC Device

Figure 64 shows that the number of conversations for which the AS/400 is the target is 1. This means that a BIND request was received by the AS/400 and that the AS/400 is the SLU for the session. The number of conversations for which the AS/400 was the source is 2. In this case it means the number of sessions in which the AS/400 is the PLU, that is the two sessions with the DWSs.

Display Mode Status							System: RALYAS4A
Device . . . . . :		RALY5494					
Device status . . . . . :		ACTIVE					
Type options, press Enter.							
5=Display details							
Mode		-----Conversations-----					
Opt	Mode	Status	Total	Source	Target	Detached	
	SNASVCMG	Started	0	0	0	0	
	QRMTWSC	Started	3	2	1	0	
F3=Exit F5=Refresh F11=Display sessions F12=Cancel							

Figure 64. Status of 5494 QRMTWSC Mode

Display Details of Mode Status						System:	RALYAS4A
Mode/status . . . . .	:	SNASVCMG	Started				
Device/status . . . . .	:	RALY5494	ACTIVE				
Local location/network ID . . . . .	:	RALYAS4A	USIBMRA				
Remote location/network ID . . . . .	:	RALY5494	USIBMRA				
Conversations:		Total	Source	Target	Detached		
Configured maximum . . . . .	:	512					
Number for device . . . . .	:	0	0	0	0		
Number for location . . . . .	:	0	0	0	0		
Sessions:		Total	Local	Remote			
Configured limits . . . . .	:	2	1				
Local maximum . . . . .	:	2					
Negotiated limits . . . . .	:	0	0	0			
Number for device . . . . .	:	0	0				
Number for location . . . . .	:	0	0				
							Bottom
Press Enter to continue.							
F3=Exit F5=Refresh F12=Cancel F14=Display previous mode							

Figure 65. Detail of SNASVCMG Mode for 5494

Display Details of Mode Status				
Mode/status . . . . .	QRMTWSC	System:	RALYAS4A	
Device/status . . . . .	RALY5494	Started		
Local location/network ID . . . . .	RALYAS4A	ACTIVE		
Remote location/network ID . . . . .	RALY5494	USIBMRA		
Conversations:	Total	Source	Target	Detached
Configured maximum . . . . .	57			
Number for device . . . . .	3	2	1	0
Number for location . . . . .	3	2	1	0
Sessions:	Total	Local	Remote	
Configured limits . . . . .	57	56		
Local maximum . . . . .	57			
Negotiated limits . . . . .	29	28	1	
Number for device . . . . .	3	2		
Number for location . . . . .	3	2		
				Bottom
Press Enter to continue.				
F3=Exit F5=Refresh F12=Cancel F14=Display previous mode				

Figure 66. Detail of QRMTWSC Mode for 5494

Display Mode Status					System:	RALYAS4A
Device . . . . .	RALY5494					
Device status . . . . .	ACTIVE					
Type options, press Enter.						
5=Display details						
	Mode	--Sessions--				
Opt	Mode	Status	Total	Local		
	SNASVCMG	Started	0	0		
	QRMTWSC	Started	3	2		
F3=Exit	F5=Refresh	F11=Display conversations	F12=Cancel			

Figure 67. Status of SNASVCMG and QRMTWSC Modes for 5494

Additional information regarding the sessions using QRMTWSC can be obtained by using the following AS/400 command:

DSPAPPNINF \*SSN

```

                                Display APPN Jobs
                                System:  R

Type options, press Enter.
5=Display session PCIDs
Opt  Job      User      Number
    AURELL    MERWE    042101
    QLUS      QSYS     042053
    GRAHAM2    GRAHAMA  042100
    OLIVER2    FORTUIN   042097
    OLIVER2    FORTUIN   042095
    GRAHAM2    GRAHAMA  042093
    BERND      BEFRE    042090
    BERND      BEFRE    042088
    BERND      BEFRE    042086
    BERND      BEFRE    042084
    BERND      BEFRE    042081
    OLIVER2    FORTUIN   042080
    GRAHAM2    GRAHAMA  042078
    5  RALY5494 QUSER     042077

F3=Exit  F5=Refresh  F6=Print information  F12=Cancel  F17=Top
F18=Bottom

```

Figure 68. APPN Jobs

Taking option 5 against the 5494 job (RALY5494) gives:

```

                                Display Session PCIDs
                                System:  R

Job:  RALY5494    User:  QUSER    Number:  042077
Type options, press Enter.
5=Display route  8=Display formatted BIND  9=Display error data...

Opt  PCID      Control Point  Network ID  Mode  Status
1 F64B0D2BC9D626EF RALYAS4A  USIBMRA  QRMTWSC  Active
2 F64B0D2BC9D626F0 RALYAS4A  USIBMRA  QRMTWSC  Active
3 F08F0E427FF948A3 RALY5494  USIBMRA  QRMTWSC  Active

```

Figure 69. 5494 Sessions Using QRMTWSC

**1** and **2** in Figure 69 are the two dependent workstation sessions started by the AS/400. **3** is the controller session on which management information is sent to the AS/400. In Figure 70 on page 83 **1** is the PLU name of the management session, and **2** is the name of the SLU.



```

Display Formatted BIND
System: R
PCID . . . . . : F08F0E427FF948A3
Control point . . . . . : RALY5494
Network ID . . . . . : USIBMRA

BIND type . . . . . : Negotiable
FM profile (hex) . . . . . : 13
TS profile (hex) . . . . . : 07
FM usage (hex):
Primary protocols . . . . . : B0
Secondary protocols . . . . . : B0
Common protocols . . . . . : D0B3
TS usage (hex) . . . . . : 000086868000
PS profile (hex) . . . . . : 06
PS usage (hex) . . . . . : 0200000000000000002300
Cryptography options (hex) . . . . . : 00

System:
PCID . . . . . : F08F0E427FF948A3
Control point . . . . . : RALY5494
Network ID . . . . . : USIBMRA

Primary NS LU name:
LU name . . . . . : RALY5494
Network ID . . . . . : USIBMRA
User data fields:
Unformatted data (hex) . . . . . :
Mode name . . . . . : QRMTWSC
Session instance ID (hex) . . . . . :
PLU network name: 1
LU name . . . . . : RALY5494
Network ID . . . . . : USIBMRA

PCID . . . . . : F08F0E427FF948A3
Control point . . . . . : RALY5494
Network ID . . . . . : USIBMRA

SLU network name:
SLU network name:
LU name . . . . . :
Network ID . . . . . :
Random data (hex) . . . . . :
Enciphered data (hex) . . . . . :
URC (hex) . . . . . :
Secondary NS LU name: 2
LU name . . . . . : RALYAS4A
Network ID . . . . . : USIBMRA
Transmission priority . . . . . :
Class of service . . . . . :

```

Figure 70. 5494 BIND with Mode QRMTWSC

In an attempt to produce an NMVT, the physical device which is connected to the 5494 was powered off. Figure 71 on page 84 shows the flow produced. The following is a brief description of the trace records:

- 482** - The 5494 sends a RSHUTD (Request Shutdown X'C2') to the AS/400 on the DWS session.
- 490** - The AS/400 sends an UNBIND request to the 5494 on the DWS session.
- 495** - The 5494 sends an NMVT (X'41038D') to the AS/400 on the controller session. This NMVT contains the Reply Product Set ID (X'0090') major vector.

For more information on this major vector please refer to *Systems Network Architecture Formats* GA27-3136.

**502** - the AS/400 sends DACTLU for the DWS device.

COMMUNICATIONS TRACE				Title: 5494 STRT OFF ON	09/13/93 13:06:33	Page: 11
Record Number	S/R	Controller Name	Data Type	SNA Data: TH, RH, RU		
466	S	RALY5494	EBCDIC	TH : FID=2, MPF=Only ODAI=0, DAF'=01, OAF'=01, SNF'=000A RH : ('039020'X) REQ FMD, BCI, ECI, DR1, ERI, CDI		
			RU Data . . . . .	: 004FD8243CD50390200411002811130120D79985A2A240C595A3859940A3 *. Q..N.....PRESS ENTER T* 9640839695A38995A4854B02132C402011170120C6F37EC5A789A3404040 *0 CONTINUE.... .....F3=EXIT * C6F1F27EC3819583859302171F402004520000 *F12=CANCEL... ..... *		
<b>482</b>	R	RALY5494	EBCDIC	TH : FID=2, MPF=Only ODAI=0, DAF'=01, OAF'=01, SNF'=000A RH : ('039020'X) REQ FMD, BCI, ECI, DR1, ERI, CDI		
			RU Data . . . . .	: 000AD8243DD54B8000 <b>C2</b> *..Q..N...B *		
486	S	RALY5494	EBCDIC	TH : FID=2, MPF=Only ODAI=0, DAF'=01, OAF'=01, SNF'=000B RH : ('029000'X) REQ FMD, BCI, DR1, ERI		
			RU Data . . . . .	: 000AD8243DD5CB8000 <b>C2</b> *..Q..N...B *		
<b>490</b>	S	RALY5494	EBCDIC	TH : FID=2, MPF=Only ODAI=0, DAF'=01, OAF'=01, SNF'=000C RH : ('019020'X) REQ FMD, ECI, DR1, ERI, CDI		
			RU Data . . . . .	: 000BD8243DD56B80003201 *..Q..N,.... *		
494	R	RALY5494	EBCDIC	TH : FID=2, MPF=Only ODAI=0, DAF'=01, OAF'=01, SNF'=000B RH : ('039020'X) REQ FMD, BCI, ECI, DR1, ERI, CDI		
			RU Data . . . . .	: 000AD8243DD5EB800032 *..Q..N.... *		
<b>495</b>	R	RALY5494	EBCDIC	TH : FID=2, MPF=Only ODAI=1, DAF'=01, OAF'=01, SNF'=000F RH : ('039120'X) REQ FMD, BCI, ECI, DR1, ERI, PI, CDI		
			RU Data . . . . .	: 0032D8243C000B800041038D0000000010002100900A0401000000000000 *..Q.....* 150982041003000320020A0108105D090D0C071B *..B.....)..... *		
500	S	RALY5494	EBCDIC	TH : FID=2, MPF=Only ODAI=1, DAF'=01, OAF'=01, SNF'=0000 RH : ('830100'X) RSP FMD, PI		
			No RU data			
<b>502</b>	S	RALY5494	EBCDIC	TH : FID=2, MPF=Only ODAI=0, DAF'=01, OAF'=01, SNF'=000D RH : ('039020'X) REQ FMD, BCI, ECI, DR1, ERI, CDI		
			RU Data . . . . .	: 000AD8243D556B8000 <b>0E</b> *..Q....,.... *		
504	R	RALY5494	EBCDIC	TH : FID=2, MPF=Only ODAI=0, DAF'=01, OAF'=01, SNF'=000C RH : ('039020'X) REQ FMD, BCI, ECI, DR1, ERI, CDI		
			RU Data . . . . .	: 000AD8243D55EB80000E *..Q..... *		
			No RU data			

Figure 71. Trace Showing NMVT When 5494 Device Powered Off

Figure 72 on page 85 shows the flow produced when the same device is powered on again.

**129** - When the device is powered on the 5494 sends an NMVT (X'41038D') to the AS/400 on the controller session. This NMVT also contains the Reply Product Set ID (X'0090') major vector.

**133** - The AS/400 immediately sends a BIND to the 5494 for the device to make it useable again.

COMMUNICATIONS TRACE				Title: 5494 POWER ON DSP	09/13/93 13:17:42	Page: 3
Record Number	S/R	Controller Name	Data Type	SNA Data: TH, RH, RU		
129	R	RALY5494	EBCDIC	TH : FID=2, MPF=Only ODAI=1, DAF'=01, OAF'=01, SNF'=0011 RH : ('039020'X) REQ FMD, BCI, ECI, DR1, ERI, CDI RU Data . . . . . : 004BD8243C000B800041038D0000000010003A00900A0401000000000000 *..Q.....*		
				15098204100300032001191000161101130012F3F4F8F7F0C8C30000F0F0 *..B.....34870HC...00* F0000488360A0108105D090D0C130D *0..H.....)*		
131	S	RALY5494	EBCDIC	TH : FID=2, MPF=Only ODAI=1, DAF'=01, OAF'=01, SNF'=0013 RH : ('039020'X) REQ FMD, BCI, ECI, DR1, ERI, CDI RU Data . . . . . : 000CD8243C008B800041038D *..Q.....*		
133	S	RALY5494	EBCDIC	TH : FID=2, MPF=Only ODAI=0, DAF'=01, OAF'=01, SNF'=0000, EFI RH : ('6B8000'X) REQ SC, FI, BCI, ECI, DR1 RU Command . . . . . : BIND RU Data . . . . . : 31001307B0B051B307878B8B87070602000000000000009023400010E4E2 *.....G..G.....US*		
				C9C2D4D9C14BD9C1D3E8C1E2F4C126000802D8D9D4E3E6E2C3090301B3AE *IBMRA.RALYAS4A...QRMTWSC...* 9483C000D81104E4E2C9C2D4D9C14BD9C1D3E8C1E2F4C10010E4E2C9C2D4 *MC{..USIBMRA.RALYAS4A..USIBM* D9C14BD9C1D3E8F5F4F9F46019F64B0D2BC9D628D410E4E2C9C2D4D9C14B *RA.RALY5494-.6...IO.M.USIBMRA.* D9C1D3E8C1E2F4C12C0A01087BC3D6D5D5C3E32B190101174615800110 *RALYAS4A...#CONNECT.....* E4E2C9C2D4D9C14BD9C1D3E8F5F4F9F400 *USIBMRA.RALY5494.*		
135	R	RALY5494	EBCDIC	TH : FID=2, MPF=Only ODAI=0, DAF'=01, OAF'=01, SNF'=0000, EFI RH : ('EB8000'X) RSP SC, FI, DR1 RU Command . . . . . : BIND RU Data . . . . . : 31001307B0B0D0B30707868687070602000000000000000230000002600 *.....}...FFG.....*		
				0802D8D9D4E3E6E2C31105E4E2C9C2D4D9C14BD9C1D3E8F5F4F9F4090302 *..QRMTWSC..USIBMRA.RALY5494...* B3AE9483C000D800006019F64B0D2BC9D628D410E4E2C9C2D4D9C14BD9C1 *..MC{..Q..-.6...IO.M.USIBMRA.RA* D3E8C1E2F4C1 *LYAS4A*		

Figure 72. SNA Flow when 5494 Device is Powered On

Please refer to *5494 Remote Control Unit Functions Reference*, SC30-3533-01 for further information on the 5494.

## 2.2.2 RS/6000 Running AIX

### 2.2.2.1 RS/6000 Running AIX AS/400 Connection Program/6000 Version 2

IBM AIX AS/400 Connection Program/6000 Version 2 provides a flexible set of functions for customers who need to take advantage of AS/400 data, applications, and resources from RISC System/6000\* workstation. AIX AS/400 Connection Program/6000 Version 2 provides the following functions:

- AS/400 remote command
  - Using the remote command function you can submit control language commands to an AS/400 system from a RISC System/6000 workstation in an SNA environment.
- File transfer
  - Transferring data from an AS/400 System to a RISC System/6000 and vice versa.
- AS/400 database access through remote Structured Query Language (SQL) application program interface
  - Application developers can create RISC System/6000 applications using SQL statements to access the AS/400 database while running in either an SNA or TCP/IP environment.
- 5250 emulation for ASCII workstations (e5250)
  - AS/400 5250 sessions can also be displayed on any ASCII workstation attached to a RISC System/6000 in an SNA or TCP/IP environment.

- 5250 emulation in AIXwindows\* environment (x5250)

AS/400 5250 sessions may be displayed using AIXwindows graphical user interface on a RISC System/6000 in an SNA or TCP/IP environment. This enhanced 5250 emulation also includes extended 5250 data stream support, color, and mouse support.

- Remote printer support

Remote printer support allows printed output from AS/400 application to be routed to RISC System/6000 networked printers while running in an SNA or TCP/IP environment. Printed output from a RISC System/6000 application can also be printed on AS/400 attached printers.

For an SNA connection, the following Software Requirements exist on the RS/6000:

- AIX Version 3 Release 2 or later
- AIX SNA Services/6000 (5601-287) Version 1 or later

This communication software contains UNIX device drivers, applications, configuration files, and terminal dependent information.

- AIX AS/400 Connection Program/6000 (5765-173)

You will need 4MB of disk space on your RISC System/6000

- AIXwindows Environment/6000 (5701-257) is required to run 5250 emulation in an X-window environment.

AIX AS/400 Connection Program/6000 Version 2 runs on all AS/400 system models except the Application System/Entry\* 9402 Model Y10.

AS/400 system requirements are as follows:

- Operation System/400 (OS/400) Version 2 Release 1 (5738SS1) or later
  - OS/400 Version 2 Release 2 is required for the text assist function of the x5250 emulation program and for printing from an AS/400 System to a RISC System/6000.
- Systems Network Architecture (SNA)
  - The 5250 emulation function is provided in the base OS/400 operating system.
  - PC Support/400 (5738-PC1) is required for the file transfer, remote command, remote SQL database access, and remote print functions.
- TCP/IP Connectivity Utility/400 (5838-TC1) is required for TCP/IP (5250 emulation and remote SQL database access).

**Collecting Information using AIX AS/400 Connection Program/6000:** Many of our customers run a network with an AS/400 acting as a host system comprising additional AS/400 systems, competitor networks and RISC System/6000. As we expect the number of connections between AS/400 and RS/6000 to grow, we thought it would be of high interest to gather the information an AS/400 can get from connected RS/6000 systems running the different possible software components in case of a failure. The result shown makes it possible to know how the dataflow looks with several program products used.

**Scenario 1:** The preparations you have to do depend on the type of connection you choose. Either TCP/IP or SNA connections are possible.

The environments used in this section are configured based on the *AS/400 and RISC Connectivity* GG24-4039.

- RS/6000 preparations
  - SNA connection
    1. Define SNA Profiles
    2. Start SNA, SNA Attachment and Connection Profile
  - TCP/IP approach
    - Define TCP/IP connection
    - Add AS/400 to the host table
- AS/400 preparations
  - TCP/IP connection

Use CFGTCP command to create the necessary environment

    1. Make sure the TCP/IP subsystem is started

A network controller and device will be automatically created
  - SNA connection
    1. Set System value QAUTOCFG to 1

This enables OS/400 to automatically create APPC device
    2. Change network attributes and message description(s) according to the recommendations earlier in this chapter.

Although the AIX AS/400 connection Program is not able to send alerts to the AS/400 it is still possible to receive information during a failure of a RS/6000 device. In this case the AS/400 gets an FMH-7 header like shown in Figure 73 on page 88 This header is used by LU 6.2 sessions to report error conditions. The AS/400 converts it to a message which can be made alertable.
- Ensure the automatically created controller and device are in the - vary on pending - status.

The status of the controller and the device should be:

  - Vary on pending if SNA connection on the RS/6000 is not started
  - active if SNA attachment and connection on the RISC System/6000 are started
- Session initiation from the RS/6000
  1. Issue the following command string on the command line of any window of an RS/6000 screen to establish the connection to the AS/400:
    - SNA connection

e5250 -s nnn

where nnn is the name of the SNA attachment profile
    - TCP/IP connection

e5250 nnn

where nnn is the name of the remote system

## 2. Sign on to the AS/400

- The established pass-through session fails

To force the RS/6000 to send sense codes to the AS/400 the active session is cancelled by closing the window on the RS/6000. That means the corresponding 5250 session in the AS/400 is ended abnormally.

Figure 73 shows the trace of FMH-7.

```
F1F9F9F34B404040402004520000                                *1993.      .....      *
1029  R  RS60007C  EBCDIC  TH : FID=2, MPF=Only          ODAI=0, DAF'=01, OAF'=02, SNF'=0007
                                RH : ('029100'X) REQ FMD, BCI, DR1, ERI, PI
                                No RU data
1030  R  RS60007C  EBCDIC  TH : FID=2, MPF=Only          ODAI=0, DAF'=01, OAF'=02, SNF'=0008
                                RH : ('098001'X) REQ FMD, FI, ECI, DR1, CEBI
                                RU Command . . . . : FMH- 7=0707086400000                                *
1033  S  RS60007C  EBCDIC  TH : FID=2, MPF=Only          ODAI=0, DAF'=02, OAF'=01, SNF'=0000
                                RH : ('830100'X) RSP FMD, PI
                                No RU data
1034  S  RS60007C  EBCDIC  TH : FID=2, MPF=Only          ODAI=0, DAF'=02, OAF'=01, SNF'=8006
                                RH : ('838000'X) RSP FMD, DR1
                                No RU data
*****  E N D   O F   C O M P U T E R   P R I N T O U T   * * * * *
```

Figure 73. FMH-7 Showing Sense Code 08640000

The AS/400 receives a FMH-7 header with sense code 08640000 - function abort: LU 6.2 session terminated abnormally.

- AS/400 handling abnormal situations

When the AS/400 gets a Function Management Header 7 (FMH-7) it creates a message dependent on the sense code which is sent with the FMH-7 data. For any message detected by hardware, software, or application programs an alert can be created, depending on parameters in the AS/400 network attributes and message description. Some AS/400 message files contain predefined messages that can generate an alert.

- Alert information

The part Implementation of Alert Support on AS/400 earlier in this chapter discusses in detail the information you get when an alert arises. The screens starting with Figure 5 on page 22 show what they look like and what information is supplied with them.

- OS/400 Network Management Vector Transport - NMVT

According to the Management Service architecture information flows between systems as Management Service Units (MSU). The AS/400 is one of the SNA systems that has currently implemented this architecture. It is able to route alerts to another focal point. Since a SSCP-PU session exists between NetView and AS/400, the MSU used in this session is called Network Management Vector Transport (NMVT).

Figure 74 on page 89 shows the trace with NMVT information sent to NetView.

```

1035 S RA3HOST EBCDIC TH : FID=2, MPF=First ODAI=0, DAF'=00, OAF'=00, SNF'=0003
      RU Command . . . . : NMVT
      RU Data . . . . . : 41038D0000000000F900000B92000012FE00331AA4A13D10001E110113 *.....9...K.....U.....*
                                0011F9F4F0F6C5F5F0F1F0F1F5F0F7F84040080EC1E261F4F0F01C110408 *..9406E501015078 ..AS/400....*
                                04F0F2F0F3F0C60806D6E261F4F0F00908F5F7F3F8E2E2F10E0108105D08 *.02030F..OS/400..5738SS1....)*
                                1212122404208400254A230101E4E2C9C2D4D9C140D9C1D3E8C1E2F4C1C5 *.....D..¢...USIBMRA RALYAS4AE*
                                D76DC1D3C5D9E3749341839C00005F0493FE0006970481200015980C8221 *P_ALERT.L.C....L...P.A...Q.B.*
                                2011C3D7C6F2F6F7F078221230100281E050E100009D9C1D3E8C1E2F4C1 *..CPF2677B.....*
                                20F40E200009D9C1D3E8C1E2F4C100EF3D31060202B90025061200000000 *..4....RALYAS4A.....*
                                0321122C30C485A589838540D8D7C1C4C5E5F0F0F14095964093969587 *.....DEVICE QPADEV0001 NO LONG*
                                85994083969494A495898381A3899587 *ER COMMUNICATING *

1036 S RA3HOST EBCDIC TH : FID=2, MPF=Last ODAI=0, DAF'=00, OAF'=00, SNF'=0003
      RU Data . . . . . : 4B *..*

1039 R RA3HOST EBCDIC TH : FID=2, MPF=Only ODAI=0, DAF'=00, OAF'=00, SNF'=0003
      RU Command . . . . : NMVT
      RU Data . . . . . : 41038D *...*

COMMUNICATIONS TRACE Title: RS6000 CONNECTIONPGM 08/18/93 18:19:32 Page: 11
Record Number S/R Name Controller Data Type SNA Data: TH, RH, RU
-----
1048 S RA3HOST EBCDIC TH : FID=2, MPF=First ODAI=0, DAF'=00, OAF'=00, SNF'=0003
      RU Command . . . . : NMVT
      RU Data . . . . . : 41038D000000000015300000B92000011002ED4AAAA33D10001E110113 *.....K.....¢.T.....*
                                0011F9F4F0F6C5F5F0F1F0F1F5F0F7F84040080EC1E261F4F0F01C110408 *..9406E501015078 ..AS/400....*
                                04F0F2F0F3F0C60806D6E261F4F0F00908F5F7F3F8E2E2F10E0108105D08 *.02030F..OS/400..5738SS1....)*
                                1212122404208400254A230101E4E2C9C2D4D9C140D9C1D3E8C1E2F4C1C5 *.....D..¢...USIBMRA RALYAS4AE*
                                D76DC1D3C5D9E374934183A8800077049363024096040163020C8122C0F0 *P_ALERT.L.CY....L.. O....A.{0*
                                A01000330100B2158200A511C4E2D7D3D6C740D3D6C74DD8C8E2E35D0282 *.....B.V.DSPLOG LOG(QHST).B*
                                OC82002211C3D7C6F5F1F4F00B8200A511C1D5E9D7D9C215980C82212011 *..B...CPF5140.B.V.ANZPRB.Q.B...*
                                C3D7C6F5F1F4F007822123010046340524100009D9C1D3E8C1E2F4C120F4 *CPF5140B.....R
                                09D8D7C1C3E3D3F0F1608009D8D7C1C4 *..QPACTL01-..QPAD *

1049 S RA3HOST EBCDIC TH : FID=2, MPF=Last ODAI=0, DAF'=00, OAF'=00, SNF'=0003
      RU Data . . . . . : C5E5F0F060F30E200009D9C1D3E8C1E2F4C100EF4731060202B900250612 *EV00-3....RALYAS4A.....*
                                000000000321123630E285A2A289969540A2A396979785844082A8408140 *.....SESSION STOPPED BY A *
                                998598A485A2A34086999694408485A589838540D8D7C1C4C5E5F0F0F0F1 *REQUEST FROM DEVICE QPADEV0001*
                                4B *..*

1055 R RA3HOST EBCDIC TH : FID=2, MPF=Only ODAI=0, DAF'=00, OAF'=00, SNF'=0003
      RU Command . . . . : NMVT
      RU Data . . . . . : 41038D *...*

1083 S RA3HOST EBCDIC TH : FID=2, MPF=First ODAI=0, DAF'=00, OAF'=00, SNF'=0003
      RU Command . . . . : NMVT
      RU Data . . . . . : 41038D00000000001A300000B920000013305968D7F5B3D10001E110113 *.....T...K.....O."$......*
                                0011F9F4F0F6C5F5F0F1F0F1F5F0F7F84040080EC1E261F4F0F01C110408 *..9406E501015078 ..AS/400....*
                                04F0F2F0F3F0C60806D6E261F4F0F00908F5F7F3F8E2E2F1191000161103 *.02030F..OS/400..5738SS1....*
                                130011D7C5C5D9F0F0F000000000000000000E0108105D081212122F04 *...PEER000.....)*
                                208400254A230101E4E2C9C2D4D9C140D9C1D3E8C1E2F4C1C5D76DC1D3C5 *..D..¢...USIBMRA RALYAS4AEP_ALE*
                                D9E37493418D4E4000EA0A9323008003220035000E940601601802230681 *RT.L.+ ...L.....M..-...A*
                                312313001095040137000A81010A0102150312002F960601220033211081 *.....N....A.....O.....A*
                                3123130103011200330300B2F0A00B8200A511C1D5E9D7D9C20C82002211 *.....O..B.V.ANZPRB.B...*
                                C3D7C1F5F8C5F015980C82212011C3D7 *CPA58E0.Q.B...CP *

```

Figure 74. Trace Showing NMVT Information Sent to NetView

This extract from the trace shows that every message appearing in the AS/400 is transferred to NetView (CPF2677 and CPF5140).

- Information provided from AS/400 for NetView

On an AS/400 system, alerts are created on the basis of messages written to the history log. Every time an alertable message is sent to the QSYSOPR message queue the focal point receives an alert. The NetView operator would see the following panel:

```

N E T V I E W          SESSION DOMAIN: RA3AN   MERWE   08/19/93 09:34:05
NPDA-30A                * ALERTS-DYNAMIC *

DOMAIN RESNAME TYPE TIME ALERT DESCRIPTION: PROBABLE CAUSE
RA3AN RALYAS4A CP 09:31 UNDETERMINED ERROR: UNDETERMINED
RA3AN RALYAS4A CP 09:34 UNDETERMINED ERROR: UNDETERMINED
RA3AN RALYAS4A*TERM 08:19 DEVICE ERROR: DISPLAY
RA3AN RALYAS4A CP 08:19 UNDETERMINED ERROR: UNDETERMINED
RA3AN RALYAS4A CP 08:13 UNDETERMINED ERROR: UNDETERMINED
RA3AN RALYAS4A CP 08:11 UNDETERMINED ERROR: UNDETERMINED
RA3AN RALYAS4A*TERM 08:10 DEVICE ERROR: DISPLAY
RA3AN RALYAS4A CP 08:10 UNDETERMINED ERROR: UNDETERMINED
RA3AN RALYAS4A CP 08:08 UNDETERMINED ERROR: UNDETERMINED
RA3AN RALYAS4A CP 08:06 UNDETERMINED ERROR: UNDETERMINED
RA3AN RALYAS4A CP 08:04 UNDETERMINED ERROR: UNDETERMINED
RA3AN RALYAS4A CP 10800 UNDETERMINED ERROR: UNDETERMINED
RA3AN RALYAS4A CP 07:59 UNDETERMINED ERROR: UNDETERMINED
RA3AN RALYAS4A CP 07:57 UNDETERMINED ERROR: UNDETERMINED
RA3AN RALYAS4A CP 07:54 UNDETERMINED ERROR: UNDETERMINED

DEPRESS ENTER KEY TO VIEW ALERTS-STATIC

???
CMD==>

```

Figure 75. AS/400 Alerts Shown on NetView's Alerts-Dynamic Panel

Figure 76 shows the recommended actions by NetView.

```

N E T V I E W          SESSION DOMAIN: RA3AN   FREITAG 08/19/93 09:31:55
NPDA-45A                * RECOMMENDED ACTION FOR SELECTED EVENT *   PAGE
RA3AN      RALYAS4A      QPACTLO1      QPADEV00
DOMAIN      +-----+   +-----+   +-----+
              | CP |   |---| CTRL |---| LU  |
              +-----+   +-----+   +-----+

USER      CAUSED - NONE

INSTALL CAUSED - NONE

FAILURE CAUSED - DISPLAY
ACTIONS - I252 - REVIEW SENDING DEVICE LOG ---:
              COMMAND DSPLOG LOG(QHST)

              I168 - FOR SYSTEM MESSAGE CODE CPF5140
              I035 - PERFORM PROBLEM RECOVERY PROCEDURES
              I145 - IF PROBLEM PERSISTS THEN DO THE FOLLOWING

???
CMD==>

```

Figure 76. NetView Recommended Action for the Special Event

## 2.2.2.2 RS/6000 Running TCP/IP Using TELNET Command

**Scenario 2:** As stated before, the definitions for RISC System/6000 and the AS/400 were created as described in *AS/400 and RISC System/6000 Connectivity*.

### **RISC/6000 and AS/400 Definitions:**

- RS/6000 preparations

Corresponding to the TCP/IP approach in Scenario 1 you should do the following:



1. Define TCP/IP connection.
  2. Add the AS/400 system to the TCP/IP host table.
- AS/400 preparations

The environment for the AS/400 has to be set up as follows:

1. Use CFGTCP command to create/change AS/400 tables.
2. Make sure the TCP/IP subsystem is started.

AS/400 will automatically create a network controller and device.

3. The alert status of the network attributes and the message descriptions should be set according to the rules discussed earlier in this chapter.

If necessary, use the CHGNETA command to accomplish this, as shown in Figure 22 on page 36.

**TELNET to the AS/400 from RS/6000 Example::** There are three TELNET commands for starting a terminal emulation session from RISC System/6000 to the AS/400:

```
tn
TELNET
tn3270
```

When using commands tn or TELNET, the terminal type used is negotiated. It will always be a 3270 mode screen. We used TELNET to issue our sessions with the AS/400.

- Session initiation

```
TELNET nnn
```

where nnn is the name of the remote system

- Sign on to the AS/400

Be aware that you are using a 3270-like screen attached to the AS/400. The command CHGKBDMAP should be used to establish 5250 keyboard mapping.

- Failure using the TELNET function from RISC System/6000

We cancelled the session by closing the window on the RS/6000. At that time we were using a virtual device in the AS/400, and the result is the same as in scenario 1. AS/400 is creating a message. This message we made alertable as shown in Figure 33 on page 47. One difference exists: Data flows using TCP/IP protocol.

The trace in Figure 77 on page 92 shows the data flowing between the two systems when establishing the session. Record # 470 presents the sign on screen sent to the RISC System/6000 followed by the main menu with record # 534. The last trace record (#577) shows that the RS/6000 is reacting after the cancellation of the session with a normal end of TCP/IP transmission. ( **1** flag 11). Since the AS/400 is still handling a TELNET session it produces the message CPF5140: Session stopped by a request from device... Because the message is made alertable it can be shown using the WRKALR command and it is transferred to NetView too.

Figure 77 on page 92 presents an extract from an TCP/IP trace.

COMMUNICATIONS TRACE			Title: RS6000 TELNET			09/22/93 14:30:30				Page: 10				
Record Number	S/R	Data Length	Record Timer	Data Type	Controller Name	Destination MAC Address	Source MAC Address	Frame Format	Command	Number Sent	Number Received	Poll/Final	DSAP	SSAP
464	R	45	883.9			400010020001	90005AC92031	LLC	UI			OFF	AA	AA
Routing Information . . . . . : 0820BB235824BB30										IP Dest Addr :9.67.38.82				
Frame Type DOD: IP IP Protocol: TCP IP Src Addr :9.67.3.75										*.....S.....'.....*				
Data . . . : 000000080045000028A22F00003C067D7E0943264B09432652041800170A										*Y....4.&...K....*				
A8063D3702F41E50103E64D2180000														
465	R	57	883.9			400010020001	90005AC92031	LLC	UI			OFF	AA	AA
Routing Information . . . . . : 0820BB235824BB30										IP Dest Addr :9.67.38.82				
Frame Type DOD: IP IP Protocol: TCP IP Src Addr :9.67.3.75										*.....S.....'.....*				
Data . . . : 000000080045000034A23000003C067D710943264B09432652041800170A										*Y....4.&...3.....*				
A8063D3702F41E50183E64BCF30000FFFB19FFFD19FFFB00FFFD00														
468	S	51	884.1			10005AC92031	C00010020001	LLC	UI			OFF	AA	AA
Routing Information . . . . . : 08A0BB235824BB30										IP Dest Addr :9.67.38.75				
Frame Type : DOD IP IP Protocol: TCP IP Src Addr :9.67.3.82										*.....F.....*				
Data . . . : 00000008004500002E58AA00003C06CFD094326520943264B0017041837										*.4..Y..&...M.....*				
02F41E0AA8064950183FB9D49B0010FFFD00FFFB00														
469	R	45	884.3			400010020001	90005AC92031	LLC	UI			OFF	AA	AA
Routing Information . . . . . : 0820BB235824BB30										IP Dest Addr :9.67.38.82				
Frame Type : DOD IP IP Protocol: TCP IP Src Addr :9.67.3.75										*.....S.....'.....*				
Data . . . : 000000080045000028A23100003C067D7C0943264B09432652041800170A										*Y....4.&...K....*				
A806493702F42450103E64D2060000														
470	S	554	884.3			10005AC92031	C00010 020001	LLC	UI			OFF	AA	AA
Routing Information . . . . . : 08A0BB235824BB30										IP Dest Addr :9.67.38.75				
Frame Type : DOD IP IP Protocol: TCP IP Src Addr :9.67.3.82										*.....E.....*				
Data . . . : 00000008004500022558AB00003C06C505094326520943264B0017041837										*.4..Y..&...+....B. . . . N.*				
02F4240AA8064950183FB94EAF001005C21140401140401140401140D51D										*Y SIGN ON. 7 .-.A=*				
E840404040404040404040404040404040E289879540D6953C40F7401D6011C17E										*..-SYSTEM . . . . .:..-BM.-RA=*				
1D60E2A8A2A3859440404B404B404B404B404B407A1D6011C2D41D60D9C1										*LYAS4A..-C+.-SUBSYSTEM . . . *				
D3E8C1E2F4C11D6011C34E1D60E2A482A2A8A2A38594404B404B404B404B										* :..-CU.-QINTER .-.D;.-DISP*				
407A1D6011C3E41D60D8C9D5E3C5D9404040401D6011C45E1D60C489A297										*LAY . . . . .:..-D4.-QPADEV00*				
9381A8404B404B404B404B404B407A1D6011C4F41D60D8D7C1C4C5E5F0F0										*01.-F.-USER . . . . .*				
F0F11D6011C65F1D60E4A2859940404B404B404B404B404B404B404B404B										* . . . . .:..-GC. ....*				
404B404B404B404B404B404B1D6011C7C31D40000000000000000000001D										*0.HL.<.H;.0.H".-PROGRAM/PROCED*				
F011C8D31D4C11C85E1DF011C87F1D60D799968799819461979996838584										*URE . . . . .:..-IT. ....*				
A49985404B404B404B404B404B404B404B404B1D6011C9E31D4000000000										*.....0.¢ .-MENU . . . . .*				
0000000000001DF0114A4F1D60D48595A440404B404B404B404B404B404B										* . . . . .:..-¢3. ....*				
404B404B404B404B404B404B404B1D60114AF31D4000000000000000000										*....0.-.-CURRENT LIBRARY . . *				
0000001DF0114B5F1D60C3A499998595A340938982998199A8404B404B40										* . . . . .:..-<C. ....*				
4B404B404B404B404B404B1D60114CC31D400000000000000000000000										*..0.G?..-PASSWORD . . . . .*				
1DF011C76F1D60D781A2A2A696998440404B404B404B404B404B404B404B										* . . . . .:..-HL.<.H;..)0.8 (C)*				
404B404B404B404B404B1D6011C8D31D4C3CC85E00115DD61DF8404DC35D										* COPYRIGHT IBM CORP. 1980, 199*				
Data . . . : 40C3D6D7E8D9C9C7C8E340C9C2D440C3D6D9D74B40F1F9F8F06B40F1F9F9										*3. .-.GD...				
F34B404040401D6011C7C413FFEF														

Figure 77 (Part 1 of 2). TCP/IP Protocol During Failure of a TELNET Session



Session failures are treated by the AS/400 like the loss of a normal dumb terminal. A message is sent and can be displayed, if needed, as alert information.

### **2.2.2.3 RS/6000 Running AIX NetView Service Point Program**

The AIX NetView Service Point program is a library of functions and a set of system services that enable applications residing on a local or distributed (remote) AIX-based workstation to exchange data with NetView. AIX NetView Service Point and NetView are separate programs.

Network Management Service Point is a program or a set of programs that provides network management support for programs for which network management entry point support does not exist. It transports only network management data for these programs. The service point must be in the same domain and network as its focal point. A service point provides a connection through which network management data can be converted to SNA formats and transmitted to the focal point for processing. It uses SNA formats and protocols when communicating with its focal point.

As the AS/400 has the possibility to act as the primary focal point it is able to answer the requests coming from an RS/6000 System using the AIX NetView Service Point Program.

The following Software Requirements exist on the RS/6000:

- AIX Version 3 Release 5 or later
- AIX SNA Services/6000 (5601-287) Version 1 or later

This communication software contains UNIX device drivers, applications, configuration files, and terminal dependent information.

### **Scenario 3**

#### **Note**

The AIX NetView Service Point Program has never run successfully with an AS/400. Since the possibilities provided by the AIX NetView Service Point Program has all functions supporting MS Transport data flow we thought it would be useful to test it in a network with the AS/400 as its focal point.

- RS/6000 preparations
  1. Change the supplied SNA profiles

The RISC System/6000 provides the System Management Interface Tool (SMIT) for system customization functions. Using SMIT, you can specify the required SNA configuration profiles for data exchange between AIX NetView Service Point Program and the AS/400. SMIT's facilities provide the menus and help to guide you in the configuration of the parameters required by AIX NetView Service Point.

2. Change the Service Point Profile Summary

With the AIX NetView Service Point Program there are provided some SNA profiles. We chose those created for the token-ring connection.

We modified the profiles, if necessary. The following screens show the definitions we made to connect to the AS/400.

- The Token-Ring Attachment Profile

The TRN attachment profile includes information about the names of several different profiles used with this configuration, the type of routing performed and the remote link address.

Figure 78 shows SNA Attachment Profile NVIXTA01.

```
NVIXTA01_ATTACHMENT:
type                    = ATTACHMENT
profile_name            = NVIXTA01 1
control_point_profile_name = NVIXCP 1
logical_link_profile_name = NVIXLLT1 1
physical_link_profile_name = NVIXPLT1 1
stop_attachment_on_inactivity = no
call_type               = call
autolisten              = no
timeout_value           = 0
access_routing           = link_address 2
remote_link_address      = 400010020001 2
remote_sap_address       = 04
lu_address_registration  = no
lu_address_registration_name = LDEFAULT
```

Figure 78. The SNA Attachment Profile

**1** Points to the supplied profiles naming convention.

**2** Defines the token-ring address of the AS/400.

- The SNA Token-Ring Logical Link Profile

Figure 79 shows SNA TRN Logical Link Profile NVIXLLT1.

```
NVIXLLT1_TOKENRINGLOGICAL:
type                    = TOKENRINGLOGICAL
profile_name            = NVIXLLT1
transmit_window_count   = 10
dynamic_window_increment = 1
retransmit_count        = 8
receive_window_count    = 127
ring_access_priority    = 0
inactivity_timeout      = 48
drop_link_on_inactivity = yes
response_timeout        = 2
acknowledgement_timeout = 1
force_disconnect_timeout = 120
link_trace              = no
trace_entry_size        = short
logical_link_type       = token_ring
maximum_i_field         = user_defined 1
maximum_i_field_size    = 265
physical_link_type      = token_ring
```

Figure 79. SNA Token-Ring Logical Link Profile

**Note**

The maximum size of the maximum\_i\_field\_size field is negotiated to 1994 whenever a size greater than this figure is selected. For example, this is true if system\_defined is selected for the maximum\_i\_field **1**

- The SNA Token-Ring Physical Link Profile

Figure 80 on page 96 shows the SNA Token-Ring Physical Link Profile NVIXPLT1.

```

NVIXPLT1_TOKENRINGPHYSICAL:
  type                = TOKENRINGPHYSICAL
  profile_name        = NVIXPLT1
  device_name         = tok1 1
  local_link_name     = RS60007
  local_sap_address   = 04
  physical_link_type  = token_ring
  maximum_number_of_logical_links = 32

```

Figure 80. SNA Token-Ring Physical Link Profile

The device\_name **1** you take depends on the attachments you have on the RS/6000. It could differ from the selection shown here.

- The SNA LU 6.2 Local LU Profile

The logical unit profiles define the local logical unit characteristics and the logical connection between the LU's characteristics and the Service Point physical characteristics at the connection level.

Figure 81 shows SNA LU 6.2 Local LU Profile NVIXL62MDS1.

```

NVIXL62MDS1_LOCALLU:
  type                = LOCALLU
  profile_name        = NVIXL62MDS1
  local_lu_name       = RS60007
  network_name        = USIBMRAA
  lu_type             = lu6.2
  independent_lu      = yes
  tpn_list_name       = NVIXTPLMDS1
  local_lu_address    = 1
  sscp_id             = *

```

Figure 81. SNA LU 6.2 Local Logical Unit Profile

- The SNA LU 6.2 Logical Connection Profile

This profile once started establishes finally the connection to the AS/400.

Figure 82 shows SNA LU 6.2 Logical Connection Profile.  
NVIXLCMDS1

```

NVIXLCMDS1_CONNECTION:
  type                = CONNECTION
  profile_name        = NVIXLCMDS1
  attachment_profile_name = NVIXTA01
  local_lu_profile_name = NVIXL62MDS1
  network_name        = USIBMRA
  remote_lu_name       = RALYAS4A
  stop_connection_on_inactivity = yes
  lu_type             = lu6.2
  interface_type      = extended
  remote_tpn_list_name = NVXRTPMDS1
  mode_list_name       = NVIXMLPMS1
  node_verification    = no
  inactivity_timeout_value = 3
  notify               = no
  parallel_sessions    = parallel
  negotiate_session_limits = yes
  security_accepted    = none
  conversation_security_access_list_name = CONVDEFAULT

```

Figure 82. SNA LU 6.2 Logical Connection Program

- The Mode Characteristics

Contrary to the definition for the SNA connection program, the mode\_name field *must* be blank.

Figure 83 shows SNA mode description profile NVIXMOPMDS1.

```
NVIXMOPMDS1_MODE:
type                = MODE
profile_name        = NVIXMOPMDS1
mode_name           = 1
maximum_number_of_sessions = 8
minimum_contention_winners = 4
minimum_contention_losers = 0
receive_pacing      = 3
send_pacing         = 3
maximum_ru_size     = 2816
recovery_level      = no_reconnect
```

Figure 83. SNA Mode Description Profile

**Note**

The mode\_name **1** *must be blank*. A session using the SNASVCMG mode is automatically established when the connection is activated.

– The SNA Mode List Profile

Figure 84 shows SNA mode list profile NVIXMLPMDS1.

```
NVIXMLPMDS1_MODELIST:
type                = MODELIST
listname            = NVIXMLPMDS1
list_members        = NVIXMOPMDS1
```

Figure 84. SNA Mode List Profile

– The SNA LU 6.2 Transaction Program Profile

The TPN profile holds names of transaction programs performing requests to, and receiving requests from the focal point program.

Figure 85 on page 98 shows SNA LU 6.2 TPN Profile NVXTPNMDS1.

```

NVXTPNMDS01_TPN:
type                = TPN
profile_name        = NVXTPNMDS01
tpn_name            = nvixSrd
profile_name        = NVIXMDSRECEIVE 1
tpn_name_hex        = no
conversation_type    = basic
pip_data            = no
sync_level          = none
recovery_level      = no_reconnect
full_path_to_tpn_executable = /usr/lpp/nvix/bin/evp_nvixSrd
multiple_instances  = no
user_id             = 0
server_synonym_name =
restart_action       = once
communication_type   = sockets
stdin               = /dev/null
stdout              = /dev/console
stderr              = /dev/console
subfields           = 0
communication_ipc_queue_key = 0
security_required    = none
resource_security_access_list_name = RSRCDFAULT

```

Figure 85. SNA LU 6.2 Transaction Program Profile

**1** It is necessary to have *both* transaction programs in the profile. Please check carefully before starting the connection.

- The SNA Transaction Program List

Figure 86 shows SNA the TPN List NVIXTPLMDS1.

```

NVIXTPLMDS1_TPNLIST:
type                = TPNLIST
Listname            = NVIXTPLMDS1
list_members        = NVXTPNMDS01
list_members        = NVIXMDSRECEIVE

```

Figure 86. SNA Transaction Program List Profile

- The SNA Remote Transaction Program Profile

This profiles contains the Management Service Transaction Profile name in hexadecimal.

Figure 87 shows SNA the Remote TP Profile NVXRTPNMDS1.

```

NVXRTPNMDS1_REMOTETPN:
type                = REMOTETPN
profile_name        = NVXRTPNMDS1
tpn_name            =
tpn_name_hex        = 23F0F0F1 1
pip_data            = no
conversation_type    = basic
recovery_level      = no_reconnect
sync_level          = confirm
tpn_name_in_hex     = yes

```

Figure 87. SNA Remote Transaction Program Profile

The remote transaction program name **1** is supplied in hexadecimal value which is the name given to the Multiple Domain Support transaction program for receiving data (MS Transaction Program Name - MDS\_RECEIVE).

- The SNA Remote Transaction List Profile



Figure 88 on page 99 shows SNA the RTP List Profile NVXRTPLMDS1.

```
NVXRTPLMDS1_REMOTETPNLIST:
  type = REMOTETPNLIST
  Listname = NVXRTPLMDS1
  list_members = NVXRTPNMDS1
```

Figure 88. SNA Remote Transaction List Profile

- The SNA Control Point Profile

The control point profile contains information about AS/400 relating definitions, for example the network identification (NETID).

Figure 89 shows the SNA Control Point Profile NVIXCP.

```
NVIXCP_CONTROLPOINT:
  type = CONTROLPOINT
  profile_name = NVIXCP
  xid_node_id = 07100001
  network_name = USIBMRAA
  cp_name = RS60007C
```

Figure 89. SNA Control Point Profile

- The Service Point Profile Summary

Before the AIX Service Point Program can be started you should check and change, if necessary the Service Point Profile Summary. The Service Point must specify which configuration profiles will be used to establish the connection between the AIX Service Point Program and the AS/400.

Figure 90 shows the Service Point Profile Summary.

```

Service Point Profile Summary

Type or select values in entry fields.
Press Enter AFTER making all desired changes.

* PU-SSCP Attachment          +          NVIXTA01
* SSCP Id                     +          050000000001
* CP Name                     +          RS60007C
  FTS LU 6.2 Logical Connection
* Polling Period
  Service Point Codepage
  MDS LU 6.2 Logical Connection          +          NVIXLCMDS1
```

Figure 90. Selections Made to Define Service Point Profile

- Establishing the connection to the AS/400
  - Preparations on the AS/400
 

Vary on the APPC controller and device.
  - Preparations on the RISC System/6000

- Start the SNA Environment

Use the SMIT functions and menus to carry out this and the following steps:

1. Start the SNA Attachment Profile NVIXTA01.
2. Start the SNA LU 6.2 Logical Connection Profile NVIXLCMDS1.
3. Start the AIX NetView Service Point.

- Showing the status of the connection

- RS/6000 panels

You can use the SMIT tool to show the status of the SNA connection and the Service Point. It will show you that the attachment and the connection is active. The Service Point panel will tell you, among other things, that an LU 6.2 session is active.

- The AS/400 side

The status of Controller and device is *active*.

The work with sphere of control status (WRKSOC) command should appear similar to that shown in Figure 91.

- Using the command WRKSOC

If you have issued the WRKSOC command press F10 to show the sphere of control Status.

For further details choose option 5.

```

                                Display Sphere of Control Status
                                System:  RALYAS4A
Position to . . . . .      Control Point
Network ID . . . . .

Type options, press Enter.
5=Display

Opt   Control   Network ID   Type of   Current Status
     Point      *NETATR
WTRFJB  USIBMRA  Default    Never active
RS60007 USIBMRAA Requested Inactive

                                Bottom
F3=Exit   F5=Refresh  F6=Print list  F11=Display new focal points
F12=Cancel F16=Repeat Position To

```

Figure 91 (Part 1 of 2). Sphere of Control Information - RS/6000 Service Point

Display Sphere of Control Entry		System: RALYAS4A
Control point . . . . .	RS60007	
Network identifier . . . . .	USIBMRAA	
Type of services . . . . .	Requested	
Current status . . . . .	Inactive	
Last status change . . . . .	09/07/93 14:44:33	
SNA sense code . . . . .	<b>08A80006</b>	
Last active . . . . .	09/07/93 14:44:32	
Press Enter to continue.		
F3=Exit F12=Cancel		

Figure 91 (Part 2 of 2). Sphere of Control Information - RS/6000 Service Point

The sense code appearing in the sphere of control entry panel shows that the RS/6000 requested a function which is not supported by the AS/400. The function is the Remote Command Support with its presentation X'23F0F1F5' and is called COMMON\_OPS\_SERVICES\_NETOP. The request appears in the MDS routing information (X'1311" GDS variable) shown in the trace Figure 92 on page 102. The official sense data definition is, Function not supported by destination. The back level destination does not support the receipt of MS messages other than MS capabilities and alert. For further detailed explanation of the trace data please refer through Figure 108 on page 118 in this chapter.

Figure 92 on page 102 presents the trace showing the dataflow during the initiation of AIX NetView Service Point:

COMMUNICATIONS TRACE			Title: SP RALYAS4A RU SYSTE	09/07/93	09:26:35	Page:	3
Record Number	S/R	Controller Name	Data Type	SNA Data: TH, RH, RU			
172	S	RS60007C	EBCDIC	TH : FID=2, MPF=Only ODAI=0, DAF'=00, OAF'=00, SNF'=0000, EFI RH : ('6B8000'X) REQ SC, FI, BCI, ECI, DR1			
		RU Command	ACTPU				
		RU Data	11020105000000000090800000000000000000	*.....*			
173	R	RS60007C	EBCDIC	TH : FID=2, MPF=Only ODAI=0, DAF'=00, OAF'=00, SNF'=0000, EFI RH : ('EB8000'X) RSP SC, FI, DR1			
		RU Command	ACTPU				
		RU Data	11124040404040404040000007010000000000000	*.. .....			
205	R	RS60007C	EBCDIC	TH : FID=2, MPF=Only ODAI=0, DAF'=00, OAF'=02, SNF'=0001, EFI RH : ('6B8000'X) REQ SC, FI, BCI, ECI, DR1			
		RU Command	BIND				
		RU Data	31001307B0B0D0B100008686800006020000000000000023000010E4E2 C9C2D4D9C1C14BD9E2F6F0F0F0F727000902E2D5C1E2E5C3D4C709030000 00000000000011104E4E2C9C2D4D9C1C14BD9E2F6F0F0F0F70010E4E2C9C2 D4D9C14BD9C1D3E8C1E2F4C1	*.....}...FF.....US* *IBMRAA.RS60007....SNASVCMG....* *.....USIBMRAA.RS60007..USIB* *MRA.RALYAS4A*			
207	S	RS60007C	EBCDIC	TH : FID=2, MPF=Only ODAI=0, DAF'=02, OAF'=00, SNF'=0001, EFI RH : ('EB8000'X) RSP SC, FI, DR1			
		RU Command	BIND				
		RU Data	31001307B0B050B10007868687000602000000000000090234000002700 0902E2D5C1E2E5C3D4C709030000000000000011105E4E2C9C2D4D9C14B D9C1D3E8C1E2F4C10000	*.....&...FFG.....* *..SNASVCMG.....USIBMRA.* *RALYAS4A..*			
208	R	RS60007C	EBCDIC	TH : FID=2, MPF=Only ODAI=0, DAF'=00, OAF'=02, SNF'=0001 RH : ('0B9120'X) REQ FMD, FI, BCI, ECI, DR1, ERI, PI, CDI			
		RU Command	FMH- 5=160502FF0003D0000000206F1000007800000063E1000	*.....}....1.....*			
		RU Data	001912100200000000000800040000000840404040404040404040	*.....*			
210	S	RS60007C	EBCDIC	TH : FID=2, MPF=Only ODAI=0, DAF'=02, OAF'=00, SNF'=0000 RH : ('830100'X) RSP FMD, PI			
		No RU data					
211	S	RS60007C	EBCDIC	TH : FID=2, MPF=Only ODAI=0, DAF'=02, OAF'=00, SNF'=0001 RH : ('039001'X) REQ FMD, BCI, ECI, DR1, ERI, CEBI			
		RU Data	001912100A04000000000800040004000840404040404040404040	*.....*			
333	R	RS60007C	EBCDIC	TH : FID=2, MPF=Only ODAI=0, DAF'=00, OAF'=02, SNF'=0002 RH : ('0A9080'X) REQ FMD, FI, BCI, DR1, ERI, BBI			
		RU Command	FMH- 5=180502FF0003D000400423F0F0F1000007800001063E1000	*.....}. .001.....*			
		RU Data	00A21310003F13111B810A01E4E2C9C2D4D9C1C10902D9E2F6F0F0F0706 0323F0F1F11B820901E4E2C9C2D4D9C10A02D9C1D3E8C1E2F4C1060323F0 F1F10590008000002E154915010A01E4E2C9C2D4D9C1C10902D9E2F6F0F0 F0F7060423F0F1F10F020000000107C9090710142754E900311212002D80 F0046302102521060123F0F1F5040200000910E4E2C9C2D4D9C10A11D9C1 D3E8C1E2F4C1061223F0F1F5	*S.....A.USIBMRAA..RS60007.* *.011.B.USIBMRA..RALYAS4A...0* *11.....USIBMRAA..RS600* *07...011.....I.....Z.....* *0.....015.....USIBMRA..RA* *LYAS4A...015*			
335	R	RS60007C	EBCDIC	TH : FID=2, MPF=Only ODAI=0, DAF'=00, OAF'=02, SNF'=0003 RH : ('009000'X) REQ FMD, DR1, ERI			
		RU Data	00A21310003F13111B810A01E4E2C9C2D4D9C1C10902D9E2F6F0F0F0706 0323F0F1F11B820901E4E2C9C2D4D9C10A02D9C1D3E8C1E2F4C1060323F0 F1F10590008000002E154915010A01E4E2C9C2D4D9C1C10902D9E2F6F0F0 F0F7060423F0F1F10F020000000107C9090710142754E900311212002D80 F0046302102521060123F0F3F1040200000910E4E2C9C2D4D9C10A11D9C1 D3E8C1E2F4C1061223F0F3F1	*S.....A.USIBMRAA..RS60007.* *.011.B.USIBMRA..RALYAS4A...0* *11.....USIBMRAA..RS600* *07...011.....I.....Z.....* *0.....031.....USIBMRA..RA* *LYAS4A...031*			

COMMUNICATIONS TRACE				Title: SP RALYAS4A RU SYSTE	09/07/93 09:26:35	Page: 4
Record Number	S/R	Controller Name	Data Type	SNA Data: TH, RH, RU		
337	R	RS60007C	EBCDIC	TH : FID=2, MPF=Only ODAI=0, DAF'=00, OAF'=02, SNF'=0004 RH : ('01A001'X) REQ FMD, ECI, DR1, DR2, CEBI No RU data		
339	S	RS60007C	EBCDIC	TH : FID=2, MPF=Only ODAI=0, DAF'=02, OAF'=00, SNF'=8002 RH : ('83A000'X) RSP FMD, DR1, DR2 No RU data		
340	S	RS60007C	EBCDIC	TH : FID=2, MPF=Only ODAI=1, DAF'=01, OAF'=01, SNF'=0000, EFI RH : ('6B8000'X) REQ SC, FI, BCI, ECI, DR1 RU Command . . . . : BIND RU Data . . . . : 31001307B0B051B3078786868707060200000000000009023400010E4E2 *.....GFFG.....US* C9C2D4D9C14BD9C1D3E8C1E2F4C127000902E2D5C1E2E5C3D4C7090301AB *IBMRA.RALYAS4A....SNASVCMG....* EEF34E0000941104E4E2C9C2D4D9C14BD9C1D3E8C1E2F4C10010E4E2C9C2 *..3+..M..USIBMRA.RALYAS4A..USIB* D4D9C1C14BD9E2F6F0F0F0F76019F64B0D2BC9CD88EA10E4E2C9C2D4D9C1 *MRAA.RS60007-.6...I.H..USIBMRA* 4BD9C1D3E8C1E2F4C12C0A04087BC3D6D5D5C5C3E32B1A01011846168015 *.RALYAS4A....#CONNECT.....* 11E4E2C9C2D4D9C1C14BD9E2F6F0F0F0F7C300 *.USIBMRAA.RS60007C. *		
341	R	RS60007C	EBCDIC	TH : FID=2, MPF=Only ODAI=1, DAF'=01, OAF'=01, SNF'=0000, EFI RH : ('EB8000'X) RSP SC, FI, DR1 RU Command . . . . : BIND RU Data . . . . : 31001307B0B0D1B1070786868707060200000000000000023000010E4E2 *.....J...FFG.....US* C9C2D4D9C14BD9C1D3E8C1E2F4C127000902E2D5C1E2E5C3D4C7090300AB *IBMRA.RALYAS4A....SNASVCMG....* EEF34E0000941105E4E2C9C2D4D9C1C14BD9E2F6F0F0F0F70010E4E2C9C2 *.3+..M..USIBMRAA.RS60007..USIB* D4D9C1C14BD9E2F6F0F0F0F7 *MRAA.RS60007 *		
343	S	RS60007C	EBCDIC	TH : FID=2, MPF=Only ODAI=1, DAF'=01, OAF'=01, SNF'=0001 RH : ('0A9100'X) REQ FMD, FI, BCI, DR1, ERI, PI RU Command . . . . : FMH- 5=110502FF0003D000400423F0F0F1000000 *.....}. ..001... *		
344	S	RS60007C	EBCDIC	TH : FID=2, MPF=Only ODAI=1, DAF'=01, OAF'=01, SNF'=0002 RH : ('01A001'X) REQ FMD, ECI, DR1, DR2, CEBI RU Data . . . . : 00A31310003F13111B810901E4E2C9C2D4D9C10A02D9C1D3E8C1E2F4C106 *.T.....A..USIBMRA..RALYAS4A.* 0323F0F1F11B820A01E4E2C9C2D4D9C1C10902D9E2F6F0F0F0F7060323F0 *. ..011.B..USIBMRAA..RS60007...0* F1F10590016000002E154915010A01E4E2C9C2D4D9C1C10902D9E2F6F0F0 *11...-.....USIBMRAA..RS600* F0F7060423F0F1F10F0200000000207C9090710142753E900321212002E80 *07...011.....I.....Z.....* F005640320022521060123F0F3F1040200000910E4E2C9C2D4D9C10A11D9 *0.....031.....USIBMRA..R* C1D3E8C1E2F4C1061223F0F3F1 *ALYAS4A...031 *		
345	R	RS60007C	EBCDIC	TH : FID=2, MPF=Only ODAI=1, DAF'=01, OAF'=01, SNF'=0000 RH : ('830100'X) RSP FMD, PI No RU data		
346	R	RS60007C	EBCDIC	TH : FID=2, MPF=Only ODAI=1, DAF'=01, OAF'=01, SNF'=8000 RH : ('879000'X) RSP FMD, SDI, DR1, RTI Sense Code . . . : 08460000, No RU data		
347	R	RS60007C	EBCDIC	TH : FID=2, MPF=Only ODAI=1, DAF'=01, OAF'=01, SNF'=0001 RH : ('0B9101'X) REQ FMD, FI, BCI, ECI, DR1, ERI, PI, CEBI RU Command . . . . : FMH- 7=07071008604100 *.....-.. *		
351	S	RS60007C	EBCDIC	TH : FID=2, MPF=Only ODAI=1, DAF'=01, OAF'=01, SNF'=0000 RH : ('830100'X) RSP FMD, PI No RU data		
352	S	RS60007C	EBCDIC	TH : FID=2, MPF=Only ODAI=1, DAF'=01, OAF'=01, SNF'=0003 RH : ('4B9000'X) REQ DFC, FI, BCI, ECI, DR1, ERI RU Command . . . . : BIS RU Data . . . . : 70 *. *		
353	R	RS60007C	EBCDIC	TH : FID=2, MPF=Only ODAI=1, DAF'=01, OAF'=01, SNF'=0002 RH : ('4B8000'X) REQ DFC, FI, BCI, ECI, DR1, DR2, ERI RU Command . . . . : BIS RU Data . . . . : 70 *. *		
355	S	RS60007C	EBCDIC	TH : FID=2, MPF=Only ODAI=1, DAF'=01, OAF'=01, SNF'=0000, EFI RH : ('6B8000'X) REQ SC, FI, BCI, ECI, DR1 RU Command . . . . : UNBIND RU Data . . . . : 3201000000000 *..... *		
356	R	RS60007C	EBCDIC	TH : FID=2, MPF=Only ODAI=1, DAF'=01, OAF'=01, SNF'=0000, EFI RH : ('EB8000'X) RSP SC, FI, DR1 RU Command . . . . : UNBIND RU Data . . . . : 32 *. *		
* * * * * E N D O F C O M P U T E R P R I N T O U T * * * * *						

Figure 92 (Part 2 of 2). Trace AIX NetView Service Point Program

The trace shows the normal flow of SNA data when a session is established. A session using SNASVCMG mode is used by default between a Network Node

and an End Node. Remember that the RS/6000 SNA Mode Profile was left blank. The session is deactivated again and only reopened when needed, for example, if alerts are sent.

During our tests we could not manage to establish an MS Transport session. The trace shows that the RS/6000 sends an FMH-7 header with sense code 10086041. The meaning of this sense code is shown in Figure 93:

NLDM.SENS	SENSE CODE DESCRIPTION	P
-----		
SENSE DATA:		
CATEGORY - (10)	Invalid FM header: The FM header was not understood	
MODIFIER - (08)	translatable by the receiver, or an FM header was	
BYTE 2 - (60)	expected but not present. For LU 6.2, this sense c	
BYTE 3 - (41)	is sent in FMH-7 or UNBIND.	
Synchronization level not supported: The FMH-5		
Attach command specifies a synchronization level		
that the receiver does not support for the		
specified transaction program. This sense data		
is sent only in FMH-7.		
ENTER 'R' TO RETURN TO PREVIOUS DISPLAY - OR COMMAND		
CMD==>		

Figure 93. Sense Code Description Received from the RS/6000

#### 2.2.2.4 IBM 3174 Establishment Controller

This section gives an overview of how an IBM 3174 can be connected to an AS/400. It also describes the types of management information a 3174 can provide. Trace and configuration details from tests that were done are included.

**Types of Connection:** The IBM 3174 can be connected to an AS/400 in two ways:

- As a remote workstation (RWS) controller with display (DSP) devices.
- As a network node (NN) in an APPN network.

The 3270 data stream is used in both cases and the AS/400 does the conversion to 5250 data stream.

The 3174 can be attached to the AS/400 via SDLC and token-ring.

**Management Information Provided by the 3174:** The following management information can be provided by a 3174:

- SNA sense codes, which can be converted into alerts when they are received by the AS/400. These alerts can be sent to NetView in NMVT format on the SSCP-PU session between the host and the AS/400.
- Alerts created by the 3174 in NMVT format and sent on the SSCP-PU session.
- Operator generated alerts which are also in NMVT format and flow on a SSCP-PU session.
- All alerts for APPN are generic in format. Each generic alert is sent in an NMVT RU. This RU contains an alert major vector and a series of subvectors

and subfields. For more information refer to *3174 Establishment Controller, Functional Description* GA23-0218-09.

**IBM 3174 Network Node (NN):** The following is a discussion of the management and LU 6.2 services provided by a 3174 NN.

An IBM 3174 Establishment Controller with Configuration Support C1.0 or higher can be customized to behave like an APPN NN (network node).

The 3174 NN provides support for the Management Services (MS) application layer and the MS transport layer for handling MS data. MS applications may reside in entry point nodes and focal point nodes. Entry point nodes may be defined as network nodes or end nodes. Multiple Domain Support (MDS) is supported as the transport layer. MDS determines whether application messages are to be routed within the node or routed externally to another node.

The following MS applications and transaction programs are supported:

- EP\_Alert
- Alert\_Netop
- MS\_Caps
- MDS Receive
- MDS Send
- MSU Handler

The CP-CP session between 3174 NN and its served end nodes is used for the transport of management services data.

Alerts received from end nodes supporting MDS are received as MDS\_MU GDS messages. The structure consists of the MDS header, UOW correlator GDS, and the CP\_MSU. When CP capabilities are exchanged between the 3174 NN and its served ENs, the CP name of the 3174 NN is indicated by the "E1" subvector of these flows.

The following functions are performed by the control point for management services in the NN:

- Receive unsolicited MDS\_MUs from served ENs and transform them to NMVT format to send to NetView on the SSCP-PU session.
- Receive unsolicited CP\_MSUs from migration CPs and transform them to NMVT format to send to NetView on the SSCP-PU session.
- Log unsolicited MS data generated by the node.
- Send all unsolicited MS data generated by the node to NetView.
- Queue alerts that flow on the SSCP-PU session between 3174 and NetView. When resources are exhausted the queues are pruned.

The 3174 NN contains a single independent LU 6.2 with parallel session capability. This LU supports the T2.1 CP and can serve as the LU for the Central Site Change Management (CSCM) function. Currently the only LU 6.2 supported is the 3174 CSCM function.

**Service Transaction Programs:** These programs differ from user-application transaction programs in that they are SNA-defined and are considered part of the LU. The 3174 NN supports the following service transaction programs:

- CNOS
- Request CP Capabilities
- CP Capabilities
- Deactivate Session
- Resource Registration
- Send Network Search
- Receive Network Search
- Broadcast TDU
- Receive TDU
- MDS Send
- MDS Receive
- MDS Handler
- SNADS SEND and RECEIVE

The 3174 supports the LU 6.2 base function for basic conversations. The 3174 also supports parallel sessions and CNOS (as a target LU), T2.1 nodes, and all the LU 6.2 towers required to support APPN.

**Test Environment:** This section describes the tests that were done on the 3174 to determine the types of management information the 3174 would forward to the AS/400.

The 3174 was at Configuration Support C3.0 and connected to the AS/400 via token-ring. It was customized as a token-ring network controller.

Option 220 on the customization panel was set to 3. This enables an operator to generate an alert from any display attached to the 3174.

For further information on customization refer to the *3174 Customization Guide*.

We created a remote workstation controller and a display device as shown in Figure 94 on page 107 and Figure 95 on page 107 respectively.



Display Controller Description			Page	1
5738SS1 V2R3MF 931105		RALYAS4A	08/12/93	14:09:04
Controller description . . . . .	CTLD	RA3174RWS		
Option . . . . .	OPTION	*ALL		
Category of controller . . . . .		*RWS		
Controller type . . . . .	TYPE	3174		
Controller model . . . . .	MODEL	0		
Link type . . . . .	LINKTYPE	*LAN		
Online at IPL . . . . .	ONLINE	*NO		
Character code . . . . .	CODE	*EBCDIC		
Maximum frame size . . . . .	MAXFRAME	1994		
SSCP identifier . . . . .	SSCPID	050000000000		
Initial connection . . . . .	INLCNN	*DIAL		
Dial initiation . . . . .	DIALINIT	*LINKTYPE		
LAN remote adapter address . . . . .	ADPTADR	400031740003		
LAN DSAP . . . . .	DSAP	04		
LAN SSAP . . . . .	SSAP	04		
Text . . . . .	TEXT	3174 as remote attached to A		
S/400				

Figure 94. 3174 Remote Workstation Controller Description Panel

Display Device Description			Page	1
5738SS1 V2R3MF 931105		RALYAS4A	08/12/93	14:09:32
Device description . . . . .	DEVD	RA3174DSP1		
Option . . . . .	OPTION	*ALL		
Category of device . . . . .		*DSP		
Device class . . . . .	DEVCLS	*RMT		
Device type . . . . .	TYPE	3278		
Device model . . . . .	MODEL	0		
Local location address . . . . .	LOCADR	02		
Online at IPL . . . . .	ONLINE	*NO		
Attached controller . . . . .	CTL	RA3174RWS		
Keyboard language type . . . . .	KBDTYPE	USB		
Drop line at signoff . . . . .	DROP	*YES		
Print device . . . . .	PRTDEV	*SYSVAL		
Output queue . . . . .	OUTQ	*DEV		
Printer file . . . . .	PRTFILE	QSYSPRT		
Library . . . . .		*LIBL		
Maximum length of request unit . . . . .	MAXLENRU	*CALC		
Application type . . . . .	APPTYPE	*NONE		
Workstation customizing object . . . . .	WSCST	*NONE		
Text . . . . .	TEXT	*BLANK		

Figure 95. 3174 Display Device Description Panel

Once the controller and device are varied on the AS/400 signon screen is displayed at the terminal connected to the 3174.

To illustrate how a sense code from the 3174 generates a message on the AS/400, the terminal connected to the 3174 was powered off. This is a very simple case but it demonstrates how the AS/400 can turn simple sense codes into alerts. These alerts can also be forwarded to NetView for further processing.

Figure 96 on page 108 shows the format of the SNA LUSTAT and NOTIFY RUs created when the terminal was powered off.

COMMUNICATIONS TRACE				Title: 3174 DISCONNECT	08/18/93 12:20:21	Page: 3
Record Number	S/R	Controller Name	Data Type	SNA Data: TH, RH, RU		
183	R	RA3174RWS	EBCDIC	TH : FID=2, MPF=Only ODAI=0, DAF'=00, OAF'=02, SNF'=0000 RH : ('0B8000'X) REQ FMD, FI, BCI, ECI, DR1		
			RU Command . . . . .	NOTIFY		
			RU Data . . . . .	8106200C06010001000100 <b>1</b> *A..... *		
184	R	RA3174RWS	EBCDIC	TH : FID=2, MPF=Only ODAI=0, DAF'=01, OAF'=02, SNF'=0001 RH : ('4B9000'X) REQ DFC, FI, BCI, ECI, DR1, ERI		
			RU Command . . . . .	LUSTAT		
			RU Data . . . . .	0408310000 <b>2</b> *..... *		

Figure 96. Extract of Trace Showing NOTIFY and LUSTAT Generated by 3174

In this figure, **1** shows the NOTIFY RU with Control Vector 0C set to "LU NOT AVAILABLE". **2** is the LUSTAT RU with sense code 0831 which indicates "POWER OFF".

When the AS/400 receives this it generates message CPF2677 as shown in Figure 97.

```

Print Key Output
5738SS1 V2R3MF 931105 RALYAS4A 08/18/93 11:54:55
Display Device . . . . . : DSP02
User . . . . . : BEFRE
Additional Message Information
Message ID . . . . . : CPF2677 Severity . . . . . : 40
Message type . . . . . : Information
Date sent . . . . . : 08/18/93 Time sent . . . . . : 11:54:07
Message . . . . . : Device RA3174DSP1 no longer communicating.
Cause . . . . . : The system was not able to communicate with the device.
Possible causes are: the power to the device was turned off, connection to
the device was broken, or the address switches on the device were altered.
Recovery . . . . . : If you can not determine the cause, then run problem
analysis (ANZPRB command).

Bottom

Press Enter to continue.
F3=Exit F6=Print F11=Display message details F12=Cancel
F21=Select assistance level

```

Figure 97. Message CPF2677 Generated by AS/400

Any AS/400 message can be made alertable. When a message has been made alertable, an alert will be generated as soon as the message is received by the AS/400. Figure 98 on page 109 illustrates the use of the CHGMSGD command to do this. The alert type is changed to UNATTEND for the specific message number to be made alertable.

Figure 98 on page 109 shows the layout of the CHGMSGD panel.

```

Change Message Description (CHGMSGD)

Type choices, press Enter.

Default reply value . . . . . DFT          *SAME


Additional Parameters

Default program to call . . . . DFTPGM      *SAME
Library . . . . .
Data to be dumped . . . . . DMPLST        *SAME
+ for more values
Alert options:                ALROPT
Alert type . . . . .                >*UNATTEND
Resource name variable . . . .        *NONE
Log problem . . . . . LOGPRB          *SAME


F3=Exit  F4=Prompt  F5=Refresh  F12=Cancel  F13=How to use this display
F24=More keys

```

Figure 98. CHGMSGD Command to Make an OS/400 Message Alertable

After a message has been made alertable it will be displayed as an alert. Figure 99 is a view of the AS/400 operator screen when the command WRKALR has been entered.

```

Print Key Output
5738SS1 V2R3MF 931105          RALYAS4A          08/18/93 12:13:38
Display Device . . . . . : DSP02
User . . . . . : BEFRE
Work with Alerts
RALYAS4A
08/18/93 12:13:13

Type options, press Enter.
2=Change  4=Delete  5=Display recommended actions  6=Print details
8=Display alert detail  9=Work with problem

Resource
Opt  Name  Type  Date  Time  Alert Description: Probable Cause
RALYAS4A  CP   08/18 12:13  Undetermined error: Undetermined
RALYAS4A  CP   08/18 12:11  Undetermined error: Undetermined
RALYAS4A* DSP 08/18 12:09 Device error: Display
RALYAS4A  CP   08/18 12:09  Undetermined error: Undetermined
RALYAS4A  CP   08/18 12:08  Undetermined error: Undetermined
RALYAS4A  CP   08/18 12:06  Undetermined error: Undetermined
RALYAS4A  CP   08/18 12:04  Undetermined error: Undetermined
RALYAS4A  CP   08/18 12:00  Undetermined error: Undetermined
RALYAS4A  CP   08/18 11:58  Undetermined error: Undetermined
RALYAS4A  CP   08/18 11:57  Undetermined error: Undetermined
RALYAS4A  CP   08/18 11:54  Undetermined error: Undetermined
RALYAS4A  CP   08/18 11:50  Undetermined error: Undetermined
More...

F3=Exit  F10=Show new alerts  F11=Display user/group  F12=Cancel
F13=Change attributes  F20=Right  F21=Automatic refresh  F24=More keys

```

Figure 99. Work with Alerts Display

Figure 100 on page 110 shows the alert detail when option 8 is selected.

Work with Alert Detail Page 1

Resource name . . . . . : RALYAS4A\*

Resource type . . . . . : DSP

Date/time . . . . . : 08/18 12:09

User assigned . . . . . :

Group assigned . . . . . :

Problem ID . . . . . :

Alert description: probable cause . . . . . : Device error : Display

-----Resource Hierarchy-----

Resource Name	Resource Type
RALYAS4A	CP
RA3174RW	CTL
RA3174DS	DSP

Failure causes . . . . . : Display

Actions . . . . . : Review sending device log  
                                   Command DSPLOG LOG(QHST)  
                                   For System message code CPF5140  
                                   Perform problem recovery procedures  
                                   If problem persists then do the following  
                                   Run the following at the reporting location  
                                   Command ANZPRB

Logged date/time . . . . . : 08/18/93 12:09:59

Problem date/time . . . . . : 08/18/93 12:09:56

User assigned . . . . . :

Group assigned . . . . . :

Alert type . . . . . : Permanent

Alert description . . . . . : Device error

Probable cause . . . . . : Display

Qualifiers . . . . . : AS/400 Message code CPF5140  
                                   AS/400 Message severity 70

Text message:

Sender ID . . . . . : Control program

Message . . . . . : Session stopped by a request from  
                                   device RA3174DSP1

Unique alert identifier:

Product ID . . . . . : 9406

Alert ID number . . . . . : ED4A AAA3

Flags:

Local/Received . . . . . : Local

Operator generated . . . . . : No

Held alert . . . . . : No

Delayed alert . . . . . : No

Analysis available . . . . . : No

Sender hardware identification:

Product classification . . . : IBM hardware

Machine type . . . . . : 9406

Model number . . . . . : E50

Plant of manufacture . . . . : 10

Sequence number . . . . . : 15078

Common name . . . . . : AS/400

Figure 100. Alert Detail - Panel 1 of 2

```

Resource hardware identification:
  Product classification . . . : IBM or non-IBM hardware
  Machine type . . . . . : 3278
Sender software identification:
  Product classification . . . : IBM software
  Program product number . . . : 5738SS1
  Version . . . . . : 02
  Release . . . . . : 03
  Level . . . . . : 0F
  Common name . . . . . : OS/400
-----Processing Nodes-----
  Resource Name      Resource Type
  RALYAS4A           FP
Alert in hex:
Major vector . . . . . : 0000
016C0000          ' .%..          '
Subvector . . . . . : 92
0B920000 011002ED 4AAAA3          ' .k.....0çit  '
Subvector . . . . . : 10
3D10001E 11011300 11F9F4F0 F6C5F5F0          ' .....9406E50'
F1F0F1F5 F0F7F840 40080EC1 E261F4F0          '1015078 ..AS/40'
F01C1104 0804F0F2 F0F3F0C6 0806D6E2          '0.....02030F..OS'
61F4F0F0 0908F5F7 F3F8E2E2 F1          ' /400..5738SS1 '
Subvector . . . . . : 10
19100016 11031300 11F3F2F7 F8404040          ' .....3278  '
00000000 00000000 00          ' .....          '
Subvector . . . . . : 01
0E010810 5D08120C 09380420 8400          ' .....d.  '
Subvector . . . . . : 4A
254A2301 01E4E2C9 C2D4D9C1 40D9C1D3          ' .ç...USIBMRA RAL'
E8C1E2F4 C1C5D76D C1D3C5D9 E37492EF          ' YAS4AEP_ALERTêkõ'
1C30C000 3A          ' ..{..          '
Subvector . . . . . : 93
04936302          ' .1Ä.          '
Subvector . . . . . : 96
40960401 63020C81 22C0F0A0 10003301          ' o..Ä..a.{0....'
00B21582 00A511C4 E2D7D3D6 C740D3D6          ' .¥.b.v.DSPLOG LO'
C74DD8C8 E2E35D02 820C8200 2211C3D7          ' G(QHST).b.b...CP'
C6F5F1F4 F00B8200 A511C1D5 E9D7D9C2          ' F5140.b.v.ANZPRB'
Subvector . . . . . : 98
15980C82 212011C3 D7C6F5F1 F4F00782          ' .q.b...CPF5140.b'
21230100 46          ' .....ã          '
Subvector . . . . . : 05
34052410 0009D9C1 D3E8C1E2 F4C120F4          ' .....RALYAS4A.4'
09D9C1F3 F1F7F4D9 E6608009 D9C1F3F1          ' . RA3174RW-Ø.RA31'
F7F4C4E2 60170E20 0009D9C1 D3E8C1E2          ' 74DS-.....RALYAS'
F4C100EF          ' 4A.Ö          '
Subvector . . . . . : 31
47310602 02B90025 06120000 00000321          ' â....¾.....'
123630E2 85A2A289 969540A2 A3969797          ' ...Session stopp'
85844082 A8408140 998598A4 85A2A340          ' ed by a request '
86999694 408485A5 89838540 D9C1F3F1          ' from device RA31'
F7F4C4E2 D7F14B          ' 74DSP1.          '

```

Figure 101. Alert Detail - Panel 2 of 2

The NMVT is then forwarded to the NetView focal point. The format of the NMVT RU is shown in Figure 102 on page 112.

COMMUNICATIONS TRACE			Title: 3174 DISCONNECT	08/18/93 12:20:43	Page: 3
S/R	Controller Name	Data Type	SNA Data: TH, RH, RU		
S	RA3HOST	EBCDIC	TH : FID=2, MPF=First ODAI=0, DAF'=00, OAF'=00, SNF'=0003 RH : ('0B8000'X) REQ FMD, FI, BCI, ECI, DR1		
		RU Command . . . . .	NMVT		
		RU Data . . . . .	41038D000000000016C00000B920000011002ED4AAA33D10001E110113 *.....%...K.....¢.T.....* 0011F9F4F0F6C5F5F0F1F0F1F5F0F7F84040080EC1E261F4F0F01C110408 *..9406E501015078 ..AS/400....* 04F0F2F0F3F0C60806D6E261F4F0F00908F5F7F3F8E2E2F1191000161103 *.02030F..OS/400..5738SS1.....* 130011F3F2F7F8404040000000000000000000E0108105D08120C131F04 *...3278 .....)*.....* 208400254A230101E4E2C9C2D4D9C140D9C1D3E8C1E2F4C1C5D76DC1D3C5 *.D..¢...USIBMRA RALYAS4AEP_ALE* D9E37492F140B40000FA049363024096040163020C8122C0F0A010003301 *RT.K1 .....L.. O.....A.{O.....* 00B2158200A511C4E2D7D3D6C740D3D6C74DD8C8E2E35D02820C82002211 *...B.V.DSPLOG LOG(QHST).B.B...* C3D7C6F5F1F4F00B8200A511C1D5E9D7D9C215980C82212011C3D7C6F5F1 *CPF5140.B.V.ANZPRB.Q.B...CPF51* F4F007822123010046340524100009D9 *40.B.....R *		
S	RA3HOST	EBCDIC	TH : FID=2, MPF=Last ODAI=0, DAF'=00, OAF'=00, SNF'=0003		
		RU Data . . . . .	C1D3E8C1E2F4C120F409D9C1F3F1F7F4D9E6608009D9C1F3F1F7F4C4E260 *ALYAS4A.4.RA3174RW-..RA3174DS-* 170E200009D9C1D3E8C1E2F4C100EF4731060202B9002506120000000003 *....RALYAS4A.....* 21123630E285A2A289969540A2A396979785844082A8408140998598A485 *...SESSION STOPPED BY A REQUE* A2A34086999694408485A589838540D9C1F3F1F7F4C4E2D7F14B *ST FROM DEVICE RA3174DSP1. *		

Figure 102. Trace of NMVT Sent to NetView

When the alert is received by NetView it is intercepted by the Hardware Monitor (NPDA) and displayed on the Alerts-Dynamic Display (ALD) panel. The ALD display is illustrated in Figure 103.

The alerts **1** and **2** are displayed by the NetView hardware monitor on the Alerts-Dynamic panel.

N E T V I E W		SESSION DOMAIN: RA3AN		MERWE	08/18/93 12:3
NPDA-30A		* ALERTS-DYNAMIC *			
DOMAIN	RESNAME	TYPE	TIME	ALERT DESCRIPTION: PROBABLE CAUSE	
RA3AN	RALYAS4A	CP	12:24	UNDETERMINED ERROR:UNDETERMINED	
RA3AN	RALYAS4A	CP	12:24	UNDETERMINED ERROR:UNDETERMINED	
RA3AN	RALYAS4A*TERM		12:19	DEVICE ERROR: DISPLAY	
RA3AN	RALYAS4A	CP	12:19	UNDETERMINED ERROR:UNDETERMINED	
RA3AN	RALYAS4A	CP	12:13	UNDETERMINED ERROR:UNDETERMINED	
RA3AN	RALYAS4A	CP	12:11	UNDETERMINED ERROR:UNDETERMINED	
RA3AN	RALYAS4A*TERM		12:10	DEVICE ERROR: DISPLAY 1	
RA3AN	RALYAS4A	CP	12:10	UNDETERMINED ERROR:UNDETERMINED 2	
RA3AN	RALYAS4A	CP	12:08	UNDETERMINED ERROR:UNDETERMINED	
RA3AN	RALYAS4A	CP	12:06	UNDETERMINED ERROR:UNDETERMINED	
RA3AN	RALYAS4A	CP	12:04	UNDETERMINED ERROR:UNDETERMINED	
RA3AN	RALYAS4A	CP	12:00	UNDETERMINED ERROR:UNDETERMINED	
RA3AN	RALYAS4A	CP	11:59	UNDETERMINED ERROR:UNDETERMINED	
RA3AN	RALYAS4A	CP	11:57	UNDETERMINED ERROR:UNDETERMINED	
RA3AN	RALYAS4A	CP	11:54	UNDETERMINED ERROR:UNDETERMINED	
DEPRESS ENTER KEY TO VIEW ALERTS-STATIC					
???					
CMD==>					

Figure 103. NPDA Alerts-Dynamic Display Panel

When you select the NetView Alerts-History panel you can find the recommended actions to rectify the situation. In this case the QHST log on the AS/400 should be investigated for further information. Figure 104 on page 113 illustrates this.

```

N E T V I E W          SESSION DOMAIN: RA3AN   MERWE   08/18/93 12:
NPDA-45A              * RECOMMENDED ACTION FOR SELECTED EVENT *   PAGE
RA3AN                RALYAS4A      RA3174RW      RA3174DS
+-----+ +-----+ +-----+
DOMAIN | CP | --- | CTRL | --- | TERM |
+-----+ +-----+ +-----+

USER      CAUSED - NONE

INSTALL CAUSED - NONE

FAILURE CAUSED - DISPLAY
ACTIONS - I252 - REVIEW SENDING DEVICE LOG --:
          COMMAND DSPLOG LOG(QHST)

          I168 - FOR SYSTEM MESSAGE CODE CPF5140
          I035 - PERFORM PROBLEM RECOVERY PROCEDURES
          I145 - IF PROBLEM PERSISTS THEN DO THE FOLLOWING

ENTER ST (MOST RECENT STATISTICS), DM (DETAIL MENU), OR D (EVENT DETAI

???
CMD==>

```

Figure 104. NPDA Recommended Action Display Panel

**Alerts from Operator-generated NMVT:** This section describes the results of what the AS/400 does when it receives an operator-generated NMVT. In this case it is not necessary to make the message at the AS/400 alertable in order to create an NMVT.

Test option A on the 3174 TEST panel was used to generate the alert NMVT shown in Figure 105.

COMMUNICATIONS TRACE				Title: 3174 OPERATOR MESSAGE	08/18/93 17:11:26	Page: 1
Record Number	S/R	Controller Name	Data Type	SNA Data: TH, RH, RU		
777	R	RA3174RWS	EBCDIC	TH : FID=2, MPF=Only ODAI=0, DAF'=00, OAF'=00, SNF'=0000 RH : ('0B800'X) REQ FMD, FI, BCI, ECI, DR1		
		RU Command . . . . :		NMVT		
		RU Data . . . . . :		41038D000000001000D400000A040100000000000021910F11611011300 12F3F1F7F4F6F3D9F2F3F0F0E5F2F6F4F50E91800A0F00FFFE20FE20FE20 007A0081938599A340A385A2A340A4A2899587409697859981A396994081 938599A34086A49583A389969540969540F3F1F7F44040404040404040 40 40 4040400AA0404040404040400AA040404040404040400AA04040404040 4040400742EF00000002		
				*.....M.....1.....* *.317463R2300V2645.J.....* *...ALERT TEST USING OPERATOR A* *LERT FUNCTION ON 3174 * * * * .. .. .. * .....		

Figure 105. 3174 Operator-generated Alert NMVT

## 2.2.2.5 PS/2 Running OS/2 Communications Manager/2

OS/2 Communications Manager/2 provides the following connection methods to AS/400:

- PC support under OS/2

Individual PS/2s running the OS/2 version of PC Support appear to the AS/400 as an APPN \*ENDNODE.

- 3270 emulation

The PS/2 will appear as a 3x74 cluster controller with an attached 327x display and printer.

- 5250 emulation

The PS/2 will appear as a 5x94 cluster controller with an attached 5250 display and printer.

- Management Services session

The OS/2 Communications Manager/2 represents a level of SNA MS architecture, which supports multiple domains and has the capability to send and receive MDS-MUs. CM/2 provides the following enhancements:

- Support for APPN networks

Management applications can be developed to reside on any node in the network, although the focal point applications must reside on a network node.

- Support for multiple MS application categories (including user- defined)
- Support for focal point hierarchy

The MS component of OS/2 Communications Manager/2 can use the AS/400 as a focal point. CM/2 can route SNA architected alerts as well as NMVTs (Network Management Vector Transports).

Two sample MS programs, ALNETOP.EXE and SOC.EXE are supplied with IBM Communications Manager/2 Version 1.0 to assist MS application developers to understand the operation of the new MS features:

- ALNETOP.EXE is a focal point management application which receives alerts, logs them locally and forwards them to any higher level Focal Point.
- SOC.EXE is an MS application which allows the user to dynamically issue the new MS configuration verbs.

**Note**

IBM has recently announced the Communications Manager/400 program product 5775-BEP. This product doesn't include Management Services functions so it doesn't support the functions we are talking about in this section.

- The AS/400 (FP) - OS/2 CM/2 (EP) relationship

Since each node has different capabilities, and possibly a different position in the hierarchy that you want to establish, there is a set of rules governing these interactions. As nodes contact each other, they exchange MS capabilities, telling each other what they are capable of doing, and establish a relationship.

- Explicit

The FP initiates the relationship and explicitly requests to be in its sphere of control. It is accomplished by the AS/400 adding the PS/2 to its sphere of control using the WRKSOC command.

- Implicit

The EP initiates the relationship and asks the FP to become its active focal point. This is done by the entry point issuing the DEFINE\_REMOTE\_FP verb. That means it is added to the SNA definition



file created for example for 5250 emulation. The name of this file ends with the extension NDF.

- Default

An FP (must be a network node) initiates a relationship negotiation with all of the NN and EN in its topology database. It is asking all of these nodes if it can be their focal point, and the nodes in question may accept or reject this request.

Whether a request from an FP will be accepted or not depends on the priority of the relationship. This means an EP which has an implicit relationship in effect with an FP, but receives a request from another focal point for an explicit relationship, will accept this since it has priority over an implicit one.

- AS/400 as focal point of a PS/2 end node

We had to take no action in either system unless the AS/400 is defined in its networks attribute as default focal point. The AS/400 took the PS/2 by default into its sphere of control.

- Getting started

To connect the PS/2 to an AS/400 we used the setup displays from OS/2 CM/2 to define the 5250 Emulation. The *Communication Manager/2 Version 1.0 New Features* GG24-3958 has the information you may need, if you are not familiar with it. If you are using Operation System/2 Version 1.3.1 or Version 2.0 you may turn to the *IBM Extended Services for OS/2\* Communication Manager New Features and Enhancements* to get the Information to define the connection between a PS/2 and the AS/400.

We changed the I-field size of the CM/2 Data Link Control (DLC) definition from minimum possible size (265) to maximum size (16393) using a token-ring connection. All worked fine, but all sizes above 1994 were negotiated to that size.

Once started, the AS/400 created the objects necessary to have a 5250 emulation running because System values QAUTOCFG and QAUTOVRT were set to on or > 0, respectively.

APPC controller and device descriptions

Virtual devices for device emulation

- PS/2 running OS/2 Communication Manager/2 sending an alert to the AS/400

The following pages will show you in detail what the information looks like when an alert is sent from an entry point to its focal point. In our case the PS/2 communications manager recognizes a problem and forwards the information to the AS/400 where it may be viewed and further action may be taken.

Starting with Figure 106 on page 116 we show you what the data looks like when an alert is sent to a focal point. In our case CM/2 reports problems of a PS/2 during the initiation of a 5250 session.

Figure 106 on page 116 keeps the record of an alert data flow.

Figure 106 (Part 1 of 2). Trace Data of an Alert Transmitted from PS/2 to AS/400

COMMUNICATIONS TRACE			Title: OLIVER2 ALERT		09/02/93 17:22:26		Page: 4	
Record Number	S/R	Controller Name	Data Type	SNA Data: TH, RH, RU				
2764	S	OLIVER2	EBCDIC	TH : FID=2, MPF=Only ODAI=0, DAF'=02, OAF'=01, SNF'=0000, EFI RH : ('830100'X) RSP FMD, PI				
			RU Data . . . . .	000001 *...				
2765	S	OLIVER2	EBCDIC	TH : FID=2, MPF=Only ODAI=0, DAF'=02, OAF'=01, SNF'=0001 RH : ('4BB100'X) REQ DFC, FI, BCI, ECI, DR1, DR2, ERI, PI				
			RU Command . . . . .	BIS *				
			RU Data . . . . .	70 *				
2768	R	OLIVER2	EBCDIC	TH : FID=2, MPF=Only ODAI=0, DAF'=01, OAF'=02, SNF'=0000, EFI RH : ('830100'X) RSP FMD, PI				
			RU Data . . . . .	000001 *...				
2769	R	OLIVER2	EBCDIC	TH : FID=2, MPF=Only ODAI=0, DAF'=01, OAF'=02, SNF'=0000, EFI RH : ('6B8000'X) REQ SC, FI, BCI, ECI, DR1				
			RU Command . . . . .	UNBIND				
			RU Data . . . . .	3201000000006018DD1B72022FF24FA0FE4E2C9C2D4D9C14BD6D3C9E5C5 *.....-.....USIBMRA.OLIVE* D9F2 *R2 *				
2772	S	OLIVER2	EBCDIC	TH : FID=2, MPF=Only ODAI=0, DAF'=02, OAF'=01, SNF'=0000, EFI RH : ('EB8000'X) RSP SC, FI, DR1				
			RU Command . . . . .	UNBIND				
			RU Data . . . . .	32 *				
* * * * * END OF COMPUTER PRINTOUT * * * * *								

Figure 106 (Part 2 of 2). Trace Data of an Alert Transmitted from PS/2 to AS/400

The data of trace record numbers 2476 and 2477 contains the Multiple Domain Support (MDS) Message Unit (MU) header which are explained in detail starting with Figure 107.

- Analyzing trace record numbers 2476 and 2477

Figure 107 highlights the parts of the MDS-MU header which are explained in Figure 108 on page 118 in detail.

```

EBCDIC TH : FID=2, MPF=First ODAI=0, DAF'=01, OAF'=02, SNF'=0001
RH : ('0BA101'X) REQ FMD, FI, BCI, ECI, DR1, DR2, PI, CEBI
FMH- 5=310502FF0003D000400423F0F0F100180FE4E2C9C2D4D9C1
4BD6D3C9E5C5D9F2DDDDDDDE50001087CF99FA741DD1391
1.01C61310 2.00491311 3.2081 4.0A01E4E2C9C2D4DC140 5.0A02D6D3C9E5C5D9F240
6.0A0323F0F3F040404040 7.2082 8.0A01E4E2C9C2D4D9C140 9.0A02D9C1D3E8C1E2
F4C1 10.0A0323F0F3F140404040 11.059000E000 12.00351549 13.1601 14.0A01E4E2C9C2D4
D9C140 15.0A02D6D3C9E5C5D9F240 16.0A0423F0F3F040404040 17.11020000000307
C90902110F22614E0000 18.01441212 19.01400000 20.0A01 08105D0902110F1E 21.1C05
1A100008D6D3C9E5C5D9F220F403F0F1602106D9C1F3C1D560F4 22.5C10 0016
1103130011F8F5F6F5F0F0F0F0F0F0F0F0F0F0F0F0F04311040E02F5
EBCDIC TH : FID=2, MPF=Last ODAI=0, DAF'=01, OAF'=02, SNF'=0001
F6F2F1F2F5F4F0F0F1F6F02006C3969494A495898381A3899695A240D481
958187859961F2F0F0F0F0F0F0120FC9C2D4000000000000000000000000000000
00 23.0B92 1000013305F52A0C01 24.2598 0982911000083E00010D8291F0114040
40404040400D82918111C8D6E2E3F0F0F0F3 25.0493 1023 26.6696 06011023F0
180881010D120032C02A82001411D7C9C4E261F5F6F2F1F2F5F4F0F040D3
E5D3E261F1F6F040D9C9C4E261C1D7D7C3404040402C82001411D7C3E2E2
61F1F0F0F3F0F240D7D9C3E261F0F0F0F0F0F0F1F740D7D9C3E261F0F0F0
F0F0F0F0F2 27.2048 0D82000911C1C3E2F4F0F9F8F80B82000911F1F0F0F3F
F2068200BC11F3

```

Figure 107. MDS-MU Relevant Fields

We highlighted the significant fields. The meaning of 1 - 27 is explained in Figure 108 on page 118 and Figure 109 on page 119.

**An MDS-MU Header Containing an MS Alert Major (X'0000'):** Figure 108 on page 118 shows the format of the MDS-MU header used by CM/2 to send an alert to the AS/400.

01C6 (454)	<b>1310</b>	MDS-MU	<b>1</b>
0049 (73)	<b>1311</b>	Routing info	<b>2</b>
20 (32)	<b>81</b>	Origin info	<b>3</b>
0A (10)	<b>01</b> E4E2C9C2D4D9C140 U S I B M R A	Origin NETID	<b>4</b>
0A (10)	<b>02</b> D6D3C9E5C5D9F240 O L I V E R 2	Origin doma	<b>5</b>
0A (10)	<b>03</b> 23F0F3F040404040 (EP_ALERT MS TP)	Origin APPL	<b>6</b>
20 (32)	<b>82</b>	Dest info	<b>7</b>
0A (10)	<b>01</b> E4E2C9C2D4D9C140 U S I B M R A	DEST NETID	<b>8</b>
0A (10)	<b>02</b> D9C1D3E8C1E2F4C1 R A L Y A S 4 A	DEST doma	<b>9</b>
0A (10)	<b>03</b> 23F0F3F140404040 (EP_NETOP MS TP)	DEST APPL	<b>10</b>
05 (5)	<b>90</b> 00E000	Flags	<b>11</b>
0035 (53)	<b>1549</b>	AUOW Correl	<b>12</b>
16 (22)	<b>01</b>	Req. Location	<b>13</b>
0A (10)	<b>01</b> E4E2C9C2D4D9C140 U S I B M R A	Req. NETID	<b>14</b>
0A (10)	<b>02</b> D6D3C9E5C5D9F240 O L I V E R 2	Req. LU name	<b>15</b>
0A (10)	<b>04</b> 23F0F3F040404040 (EP_ALERT MS TP)	Orig APPL	<b>16</b>
11 (17)	<b>02</b> 0000000307C90902110F22614E0000	Seq.no.DTM	<b>17</b>
0144 (324)	<b>1212</b>	CP-MSU	<b>18</b>
0140 (320)	<b>0000</b>	MS Alert MV	<b>19</b>

Figure 108. MDS-MU Header Containing an ALERT

Please refer to *SNA Formats*, GA27-3136 for a detailed description of the X'0000' MS Major Vector.

**Subvectors of an Alert MS Major Vector:** Figure 109 on page 119 shows the subvectors an alert (X'0000) MS Major Vector used by CM/2 to send an alert to the AS/400.

OA <b>01</b> (10)		Date/Time <b>20</b>
1C <b>05</b> (28)		Hierarchy/ Resource List <b>21</b>
5C <b>10</b> (92)		Product Set ID <b>22</b>
0B <b>92</b> (11)		Generic Alert Data <b>23</b>
25 <b>98</b> (37)		Detailed Data <b>24</b>
04 <b>93</b> (4)		Probable Cause <b>25</b>
66 <b>96</b> (102)		Failure Cause <b>26</b>
20 <b>48</b> (32)		Supporting Data Correlation <b>27</b>

Figure 109. Alert Major Vector

The following screen shows the PS/2 Communications Manager/2 Management Services panel once the EP-FP relationship has been active. We give a brief explanation of the most important information and their relation to corresponding AS/400 parameters.

Figure 110 shows the Management Services panel of CM/2.

Management Services	
Number of held MDS alerts	0
Number of focal points	<b>1</b> 2
1>MS application name	<b>2</b> ALERT_NETOP
MS category	PROBLEM_MANAGEMENT
Focal point CP name	USIBMRA.RALYAS4A
Primary focal point CP name	USIBMRA.RALYAS4A
Backup application name	
Number of backup focal points	0
Focal point type	<b>3</b> Explicit primary
Focal point status	<b>4</b> Active
Focal point routing	<b>5</b> Direct
Retry responsibility	<b>6</b> Entry Point
2>MS application name	COMMON_OPS-SERVICES_NETOP
MS category	COMMON_OPERATION_SERVICES
Focal point CP name	0000000000000000
Primary focal point CP name	USIBMRA.RALYAS4A
Backup application name	
Number of backup focal points	0
Focal point type	HOST
Focal point status	Active
Focal point routing	Default
Retry responsibility	Focal Point
Number of MS applications	0
Number of active transactions	0
Number of local focal points	0

Figure 110. Display Management Service CM/2

**1** Number of focal points known on this node.

**2** The Application used between EP and FP.

**3** The focal point type is Explicit Primary. This because the AS/400 is the primary focal point.

**4** The PS/2's focal point status is active, while the sphere of control status on the AS/400 shows inactive. It becomes active each time the connection is (re)established.

**5** The routing is direct between EP and FP.

**6** Indicates who, in an event that the relationship is terminated due to a failure, has the responsibility to re-establish the relationship.

The second part of the screen may look different in your environment. It depends which further relationship exist in the network.

#### **2.2.2.6 PS/2 Attached via Token-Ring Network Using LAN Network Manager V1.1**

The explosive growth of the use of personal systems has change the role of the LAN to that of an enterprise-wide network. Today, such an enterprise LAN may be composed of hundreds or thousands of nodes of different systems (PS/2, AS/400), which may be located over a large geographical area.

Managing a large network is a complex job involving many tasks. Among these tasks are:

- Access control
- Error isolation and recovery
- Performance monitoring
- Statistics gathering
- Change management

LAN management can be done from a single workstation in the LAN, or it can be distributed among several sites. If a host is present, it may be desirable to concentrate network management at the host. In that case the central network management agent would be the focal point. The managing element, or Service Point, in each LAN must be able to communicate with the central network management facility. The capability for the automation of some LAN management tasks is another desirable feature. In our environment we used PS/2 systems connected to the AS/400 managed by the following IBM products:

- LAN Network Manager Version 1.1
- LAN Network Manager Entry Version 1.0
- LAN Station Manager Version 1.0

**What the LAN Network Manager Provides:** With the LAN Network Manager Program, you can manage the resources of your network more effectively. You can define the stations, bridges, and IBM 8230 Controlled Access Units (CAUs) on your network and monitor events that occur on the local area network (LAN) segments and the attached devices. You can control adapter access to the LAN and enable password protection for the LAN Network Manager program. The

program also assists you in problem determination and error recovery for a LAN.

The LAN Network Manager provides:

- Management and monitoring of local area networks
- Host communication (SPCS support)
- Alert filtering
- A database interface
- A graphical user interface
- An Operating System/2\* command line interface

**Network Management:** The LAN Network Manager program manages LANs consisting of IBM Token-Ring Network and IBM PC Network segments interconnected with IBM bridges. It can manage up to 256 LAN segments connected by 255 bridges at a time. If you have more than one LAN, install a separate LAN Network Manager program for each LAN you manage. If you have more than 255 bridges in your LAN, install more than one LAN Network Manager program to manage the LAN.

To aid in network management the LAN Network Manager program:

- Manages both the LAN segment to which the LAN Network Manager adapter is attached and the remote LAN segments to which the LAN Network Manager adapter is linked by bridges (the managed domain).
- Reports errors within the managed domain.
- Receives error reports about remote LAN segments from the linked bridges on those LAN segments and reports errors it detects on the remote LAN segments.
- Monitors network traffic loads by providing:
  - Ring utilization information for a specified segment
  - Bridge performance notification data, which you can use to monitor traffic between segments
- Maintains logs and configuration information using the OS/2 Database Manager program. You can analyze this information using the OS/2 Query Manager program.
- Provides a Configuration Monitor (CM) function, which:
  - Maintains a configuration table of adapters in the network, by LAN segment, and station-identifying information.
  - Maintains a location table for stations attached to CAUs, which contains CAU attachment information.
  - Updates these tables when notifications of adapter insertions and removals are received. This includes changes to the nearest active upstream neighbor (NAUN) and CAU lobe status changes.
  - Resynchronizes the network (determines which adapters are currently inserted into the ring) one segment at a time, after a user-specified interval has expired.
  - Performs an immediate resynchronization of a single segment at your request.

- If access control is active, verifies access control information for each station, as it enters the network and during resynchronization.
  - Deletes an adapter from the tables after it has been inactive for a user specified interval.
- Provides support for stations, including:
  - Locating any defined workstation in the network by its LAN adapter
  - Displaying its profile, which includes information about the workstation, its LAN adapter, and its attached peripheral devices, if the LAN Station Manager program is installed in the workstation
  - Configuring workstations remotely by adding new station definitions or by changing or deleting existing definitions
  - Defining LAN Station Manager information from the LAN Network Manager program, if the LAN Station Manager program is installed in the workstation
- Provides support for bridges, including:
  - An automatic link option in which the LAN Network Manager program attempts to link to specified bridges at start up and attempts to re-establish a link to any bridge with which it loses communication
  - A link status report
  - Logging of successful linking and unlinking activity
  - Logging performance counter notifications
  - Support for IBM 8209 Local Area Network Bridge
  - Support for the 3174 Establishment Controller with Peer Communication bridge
- Provides support for CAUs, including:
  - Processing requests for CAU information and status
  - Enabling directed reconfiguration of a CAU
  - Processing requests to reset a CAU
  - Handling unsolicited events from a CAU
- Support functions for:
  - Viewing a list of events that is updated dynamically, as events are received by the LAN Network Manager program
  - Access control, which provides the detection and removal of unauthorized adapters
  - Asset management, which captures location information about adapters and sends a notification if an adapter is moved

**Host Communication (SPCS Support):** The LAN Network Manager program can also communicate with a NetView host. If you establish this communication, the LAN Network Manager program can forward alerts to the host and can receive LAN Network Manager command lists from the host.

The LAN Network Manager program can generate alerts and send them to a host. This host can be an AS/400.



**Alert Filtering:** With LAN Network Manager Program, you can define filters or specify a user-written program to filter alerts that are sent to the host.

### Database Interface

The LAN Network Manager program uses the OS/2 Database Manager to store the data. Database tables include:

- A list of all adapters that are known to the LAN Network Manager and the latest known status of each adapter
- Station bridge, and CAU definitions
- Station locations
- The event log

**Graphical Interface:** You have the choice of using the LAN Network Manager program with either a graphical user interface or a textual user interface.

**OS/2 Command Line Interface:** In addition to using the graphical or textual user interface, you can also monitor and manage your network from the OS/2 command line. From the command line interface, you can issue commands to:

- Obtain the current status of adapters, bridges, and CAUs
- Remove an adapter from the network
- Add, change, and delete definitions for adapters, bridges, and CAUs

**LAN Network Manager Program and the AS/400:** In many of today's customer environments there are PS/2s connected to one or more AS/400s. Sometimes these PS/2 systems are connected in a separate network, managed by the LAN Network Manager program. We wanted to see which information the AS/400 can get from the LAN Network Manager and what it can do with it.

In our environment we connected a PS/2 running LAN Network Manager program via the 5250 emulation. To know more about the installation of the LAN Network Manager program, please refer to *LAN Network Manager V1.1 LAN Network Entry V1.0 and LAN Station Manager V1.0* GG24-3942. The configuration you have to carry out to connect a PS/2 to an AS/400 is described in *Communications Manager/2 Version 1.0 New Features*.

We expected the LAN Network Manager to send alerts to the AS/400. These alerts should be handled by the AS/400 and routed to NetView as well.

- Alerts arising

To get alerts from the LAN Network Manager program we dropped a connection to a specific adapter and ran a path test. We traced the dataflow and saw it looked exactly like what we decrypted in detail in 2.2.2.5, "PS/2 Running OS/2 Communications Manager/2" on page 113. earlier in this chapter. Therefore we show in the following figures which information you can get, if you trace the failure using AS/400 and NetView screens. The corresponding panels dealing with the alert sent by the LAN Network Manager start with Figure 111 on page 124. This panel shows what the information looks like in the AS/400 and how they are presented in the different NetView screens. The time difference in AS/400 and NetView displays is due to unsynchronized system times.

Figure 111 on page 124 presents the alert sent by LAN Network Manager displayed with the AS/400 WRKALR command:

```

Work with Alerts                                RALYAS4A
                                           09/14/93  2
Type options, press Enter.
 2=Change  4=Delete  5=Display recommended actions  6=Print detail
 8=Display alert detail  9=Work with problem

Resource
Opt  Name    Type  Date   Time  Alert Description: Probable Cause
LANNET    LAN   09/14 17:32 Monitored station left LAN: Remote
RALYAS4A    CP    09/14  17:11  Software program error: Configurati
RINGOBB2    RNG    09/14  16:19  Excessive token-ring errors: Token-
RALYAS4A    CP    09/14  14:34  Undetermined error: Undetermined
RALYAS4A    CP    09/14  14:34  Device error: Display
RALYAS4A    CP    09/14  14:34  Device error: Display
RALYAS4A    CP    09/14  14:34  Undetermined error: Undetermined
RALYAS4C    CP    09/14  10:59  Resource nearing capacity: Auxiliar
RALYAS4A    CP    09/14  10:26  Software program error: Configurati
RALYAS4A*   PRT    09/14  10:22  Operator intervention required: Pri
RALYAS4A    CP    09/14  10:22  Undetermined error: Undetermined
RALYAS4A*   PRT    09/14  10:22  Operator intervention required: Pri
RALYAS4A    CP    09/14  10:22  Undetermined error: Undetermined
RALYAS4A*   PRT    09/14  10:22  Operator intervention required: Pri

F3=Exit  F10=Show new alerts  F11=Display user/group  F12=Cancel
F13=Change attributes  F20=Right  F21=Automatic refresh  F24=More keys

```

Figure 111. LAN Network Manager Alert Displayed with WRKALR Command

Figure 112 refers to the corresponding NetView screen.

```

N E T V I E W      SESSION DOMAIN: RA3AN  MERWE  09/14/93 20:5
NPDA-41A           * MOST RECENT EVENTS *      PAGE  1

RA3AN      LNMAS400  RAYLNM  LANMGR  LANNET
+-----+ +-----+ +-----+ +-----+
DOMAIN    | CP  | --- | SP  | --- | TP  | --- ( LAN )
+-----+ +-----+ +-----+ +-----+

SEL#  DATE/TIME  EVENT DESCRIPTION  PROBABLE CAUSE
( 1 ) 09/14 17:27 MONITORED STATION LEFT LAN REM SYSTEM OPERATOR  PE
( 2 ) 09/14 10:54 COMMUNICATIONS OVERRUN TOKEN-RING ADPT INTF      PE
( 3 ) 09/14 10:54 MONITORED STATION LEFT LAN REM SYSTEM OPERATOR  + PE
( 4 ) 09/14 10:54 COMMUNICATIONS OVERRUN TOKEN-RING ADPT INTF      PE
( 5 ) 09/14 10:54 MONITORED STATION LEFT LAN REM SYSTEM OPERATOR  + PE
( 6 ) 09/14 10:54 MONITORED STATION LEFT LAN REM SYSTEM OPERATOR  + PE
( 7 ) 09/14 10:54 COMMUNICATIONS OVERRUN TOKEN-RING ADPT INTF      PE
( 8 ) 09/14 10:54 MONITORED STATION LEFT LAN REM SYSTEM OPERATOR  + PE
( 9 ) 09/14 10:54 COMMUNICATIONS OVERRUN TOKEN-RING ADPT INTF      PE
(10 ) 09/14 10:54 COMMUNICATIONS OVERRUN TOKEN-RING ADPT INTF      PE
(11 ) 09/14 10:54 MONITORED STATION LEFT LAN REM SYSTEM OPERATOR  + PE
(12 ) 09/14 10:54 COMMUNICATIONS OVERRUN TOKEN-RING ADPT INTF      PE
ENTER ST (STAT), SEL# (ACTION), OR SEL# PLUS D (EVENT DETAIL)

???
CMD==> 1 d

```

Figure 112. LAN Network Manager Alert on NetView's MOST RECENT EVENT Display

The selection :1 d from NetView Most Recent Event screen takes us to the Event detail panel shown in Figure 113 on page 125. As you can see, several components were involved when this incident occurred. **1** the control point (CP) LNMAS400 (AS/400 control unit description), the service point program **2**

(LAN Network Manager Entry), and **3** the transaction program (LAN Network Manager). **4** shows it has been happening on a LAN network (LANNET).

```

N E T V I E W          SESSION DOMAIN: RA3AN  MERWE  09/14/93 20:50:55
NPDA-43S                * EVENT DETAIL *          PAGE 1 OF 1

  RA3AN      LNMA400      RAYLNM      LANMGR      LANNET
  +-----+   +-----+   +-----+   +-----+
DOMAIN |  CP  |---|  SP  |---|  TP  |---| ( LAN )
  +-----+   +-----+   +-----+   +-----+
           1           2           3           4.

DATE/TIME RECORDED - 09/14 17:27      CREATED - 09/14/93 17:26:59

PROBABLE CAUSES:
  REMOTE SYSTEM OPERATOR
  REMOTE TOKEN-RING ADAPTER
  REMOTE CSMA/CD ADAPTER

ENTER A (ACTION) OR DM (DETAIL MENU)

???
CMD==> a

```

Figure 113. LAN Network Manager Alert on EVENT DETAIL in NetView

Type A on the command line of the panel shown in Figure 113 and you will see the NetView recommended action display shown in Figure 114.

```

N E T V I E W          SESSION DOMAIN: RA3AN  MERWE  09/14/93 21:0
NPDA-45A                * RECOMMENDED ACTION FOR SELECTED EVENT *  PAGE
  RA3AN      LNMA400      RAYLNM      LANMGR      LANNET
  +-----+   +-----+   +-----+   +-----+
DOMAIN |  CP  |---|  SP  |---|  TP  |---| ( LAN )
  +-----+   +-----+   +-----+   +-----+

USER   CAUSED - REMOTE NODE POWER OFF
        TOKEN-RING REMOVE ADAPTER COMMAND RECEIVED
        CSMA/CD REMOVE ADAPTER COMMAND RECEIVED
ACTIONS - I017 - CHECK POWER
          I120 - REVIEW LINK DETAILED DATA
          I176 - CONTACT LAN ADMINISTRATOR RESPONSIBLE FOR THIS

INSTALL CAUSED - NONE

FAILURE CAUSED - REMOTE TOKEN-RING ADAPTER
                REMOTE CSMA/CD ADAPTER
ACTIONS - I120 - REVIEW LINK DETAILED DATA

ENTER ST (MOST RECENT STATISTICS), DM (DETAIL MENU), OR D (EVENT DETAIL)

???
CMD==> dm

```

Figure 114. LAN Network Manager Alert Recommended Action in NetView

Figure 115 on page 126 has the corresponding information on the AS/400 Display Recommended Actions screens.

```

                                Display Recommended Actions
                                09/14/93  R 2
-----Resource Hierarchy-----
Resource Name      Resource Type
LNMAS400           CP
RAYLNM             SP
LANMGR             TPN
LANNET             LAN

User causes . . . . . : Remote node power off
                        Token-ring remove adapter command received
                        CSMA/CD remove adapter command received
Actions . . . . . : Check power
                        Review link detailed data
                        Contact LAN administrator responsible for t
                        LAN
                        Contact LAN administrator responsible for t
                        LAN
Failure causes . . . . : Remote token-ring adapter
                        Remote CSMA/CD adapter

Press Enter to continue.

F3=Exit  F12=Cancel  F17=Display detail

```

Figure 115 (Part 1 of 2). LAN Network Manager Alert Recommended Action AS/400 Panel

```

                                Display Recommended Actions
                                09/14/93
-----Resource Hierarchy-----
Resource Name      Resource Type
LNMAS400           CP
RAYLNM             SP
LANMGR             TPN
LANNET             LAN

Actions . . . . . : Review link detailed data
                        Contact LAN administrator responsible for
                        LAN

```

Figure 115 (Part 2 of 2). LAN Network Manager Alert Recommended Action AS/400 Panel

Option DM from NetView's Recommended Action for Selected Event panel gives you the opportunity to choose more information available with the problem. You will see this screen with Figure 116 on page 127 on NetView's Event Detail Menu.

```

N E T V I E W          SESSION DOMAIN: RA3AN   FREITAG   09/14/93 18:10:24
NPDA-43R                * EVENT DETAIL MENU *                                PAGE 1 of 1

  RA3AN      LNMA400      RAYLNM      LANMGR      LANNET
  +-----+ +-----+ +-----+ +-----+
  DOMAIN    | CP  |---| SP  |---| TP  |---( LAN )
  +-----+ +-----+ +-----+ +-----+

DATE/TIME: 09/17 09:26

SEL#  PRODUCES:
( 1)  EVENT DETAIL DISPLAY
( 2)  PRODUCT SET IDENTIFICATION DISPLAY
( 3)  HEXADECIMAL DISPLAY OF DATA RECORD
( 4)  LINK CONFIGURATION DISPLAY

ENTER SEL# OR A (ACTION)

???
CMD==> 4

```

Figure 116. NetView's EVENT DETAIL MENU

We wanted to know which adapter is involved. Option 4 of Figure 116 brings up the Link Configuration screen shown with Figure 117:

```

N E T V I E W          SESSION DOMAIN: RA3AN   MERWE      09/14/93 21:0
NPDA-45A                * LINK CONFIGURATION *                                PAGE
  RA3AN      LNMA400      RAYLNM      LANMGR      LANNET
  +-----+ +-----+ +-----+ +-----+
  DOMAIN    | CP  |---| SP  |---| TP  |---( LAN )
  +-----+ +-----+ +-----+ +-----+

          I176 - CONTACT LAN ADMINISTRATOR RESPONSIBLE FOR THIS
                   ***** ADAPTER ADDRESS *****
          NAME          SEL#  HEX FORMAT  TYPE      ADMIN  NUM
SINGLE ADAPTER: COLLINS      (1) 4000000CC111 SPECIFIC  LOCAL 000C

ENTER SEL# TO VIEW MOST RECENT EVENTS BY ADAPTER ADDRESS

???
CMD==>

```

Figure 117. LAN Network Manager Alert in NetView's LINK CONFIGURATION

You get the same information with the corresponding AS/400 display.

Figure 119 on page 128 shows AS/400 Display LAN Link Connection Data.

To show this information please choose option 8 from the screen shown in Figure 111 on page 124. Leave the next screen by pressing F11. You are now on the Display Detail Menu screen:

```

                                Display Detail Menu
                                09/21/93 11:54:43 RALYAS4A

-----Resource Hierarchy-----
Resource Name      Resource Type
LNMAS400           CP
RAYLNM             SP
LANMGR             TPN
LANNET             LAN

Select one of the following:

    1. Display flags
    2. Display product identification
    3. Display supporting data
    4. Display processing nodes
    5. Display LAN link connection data
    6. Display alert in hexadecimal

Selection or command
===> 5
F3=Exit  F4=Prompt  F9=Retrieve  F12=Cancel

                                Bottom

```

Figure 118. AS/400 Alert Display Detail Menu

To get the link connection data displayed, please choose option 5.

```

                                Display LAN Link Connection Data
                                09/16/93 1 R

-----Resource Hierarchy-----
Resource Name      Resource Type
LNMAS400           CP
RAYLNM             SP
LANMGR             TPN
LANNET             LAN

LAN link connection data:
Single MAC address . . . . : 4000000CC111
Single MAC name . . . . . : COLLINS

Press Enter to continue.

F3=Exit  F12=Cancel

```

Figure 119. AS/400 Display LAN LINK Connection Data

### 2.2.2.7 PS/2 Attached via TRN Using OS/400 LAN Network Manager

- IBM LAN Network Manager versus OS/400 Token-Ring Network Manager

Table 5 on page 129 shows a comparison of function between the OS/400 V2R3.0 TRN Manager and the LAN Network Manager V1.1. As you can see, the LAN Network Manager has much more function than the OS/400 Token-Ring Network Manager. In many, less complicated situations, the extensive capabilities of the LAN Network Manager are not required. In these cases, the OS/400 TRN Network Manager will be a good solution,

especially since it is included with the base operating system at no additional charge.

<i>Table 5. OS/400 TRN Manager Compared to LAN Network Manager V1.1</i>			
Function	Description	OS/400	PC LAN Manager
Assign names to adapters	Assign descriptive names to adapters and use the names in messages. The descriptive names will be more meaningful to the operator than the addresses.	Yes	Yes
Log errors	Inform the local operator of errors or potential error situations on the LAN.	Yes	Yes
View active ring stations	See which stations are currently active on the immediate ring	Yes	Yes
Log Configuration changes	Notify the local operator of an adapter insertion into or leaving from the ring.	Yes	Yes
Alert support	Generate SNA alerts from conditions detected on the ring	Yes	Yes
Path test	Test a specific path to another station, most likely across 1 or more bridges.	No	Yes
Monitor network traffic loads	provide ring utilization for specified segment, bridge performance notification data	No	Yes
Display adapters with soft error condition.	Display error conditions at another station.	No	Yes
support for bridges	Automatic link option, link status report	No	Yes
Support for CAUs	Direct reconfiguration of a CAU, reset a CAU, handling unsolicited events from a CAU	No	Yes
Support for stations	Locating any defined Workstation in the network by its LAN adapter, displaying its profile, configure Workstations remotely	No	Yes
Trace control	Removed trace adapters when tracing is prevented, and to log trace, adapter insertion.	No	Yes
Multiple LAN segments	Span bridges	No	Yes
NetView SPCS support	Receive commands from NetView, carry out the request, and send the response back to NetView.	No	Yes
Critical resource monitor	Define any station as a critical resource and generate an SNA alert whenever this critical resource is lost on the LAN.	No	Yes

- Using the OS/400 Token-Ring Network Manager

The OS/400 TRN Network Manager provides the capabilities to manage a small to medium size token-ring with no bridges or requirements for advanced management tasks. However, when the TRN, needed to be managed, includes a large number of systems or bridges, then the PC LAN Manager would be the best solution to handle this.

When managing a remote token-ring, the most useful function of the TRN Manager is its ability to generate alerts and sent them to a focal point. All

other token-ring network manager functions require an operator at the central site. This may be impractical if for example a large number of remote token-rings are involved.

Viewing the active adapters on a TRN is most useful when problems are encountered inserting a new system onto the ring. You can quickly determine where the problem is located; for example the adapter card is defect, or the configuration is wrong.

The controlling station can easily remove an adapter from the ring, but there is nothing to prevent that station from re-inserting on the ring. For an AS/400, the controller merely has to be varied on again.

**OS/400 LAN Management Commands:** With OS/400 Version 2 Release 3 there is a new set of token-ring commands available. The current manager component will be upgraded and migrated from a specific token-ring LAN manager to a more generic LAN manager.

- New OS/400 LAN Manager Commands mapping TRN commands

Table 6 shows the mapping of the new command names and the token-ring command names that will be replaced.

<i>Table 6. Mapping of LAN Commands for OS/400 V2R3 and V2R2 TRN Commands</i>	
<b>V2R3 commands</b>	<b>V2R2 commands to be replaced</b>
ADDTRAINF	ADDLANADPI
CHGTRAINF	CHGLANADPI
DSPTRAPRF	DSPLANADPP
RMVTRAINF	RMVLANADPI
DSPTRNSTS	DSPLANSTS
RMVTRA	RMVLANADPT
WRKTRA	WRKLANADPT

The new set of commands will support all the current function. In most cases there is a one-for-one mapping function for FDDI and token-ring. The exception is the RMVLANADPT command (RMVTRA replacement).

In a future release, a new set of CL commands will be introduced to provide a LAN management function for a generic set of LAN environments. The new CL commands will be implemented to support the new FDDI LAN. It is intended that these new CL commands will support the token-ring LAN with the equivalent support provided today by the set of token-ring CL commands.

In a future release the DSPHDWRSC and WRKHDWRSC commands will change to allow a user to specify a resource type of \*LAN. When this parameter is specified, you will also be prompted for a line description name which defines specific LAN information the user wishes to access. The user will be able to access either FDDI or Token-Ring LAN information through the \*LAN resource type.

- The Add TRLAN adapter information command (ADDTRAINF)

The Add IBM Token-Ring Network Adapter Information (ADDTRAINF) command adds an adapter name entry in the adapter file.

- Adapter (ADPTNAME)



Specifies the unique adapter name to add in the adapter file. This is a required parameter.

- Adapter address (ADPTADR)

Specifies the 12-character hexadecimal adapter address. This is a required parameter.

- Change TRLAN adapter information command (CHGTRAINF)

The Change IBM Token-Ring Network Adapter Information (CHGTRAINF) command changes an adapter address and the description associated with that adapter name in the adapter file.

- Adapter (ADPTNAME)

Specifies the unique adapter name to change in the adapter file. This is a required parameter.

- Adapter address (ADPTADR)

Specifies the 12-character hexadecimal adapter address.

- \*SAME

The adapter address does not change.

- Adapter address

Specify the adapter address you want to change.

- The Display TRLAN adapter profile command (DSPTRAPRF)

The Display IBM Token-Ring Network Adapter Profile (DSPTRAPRF) command displays an active adapter's profile.

- Line description (LINE)

Specifies the Token-Ring network line to which the TRLAN adapter is attached.

This is a required parameter.

- Adapter (ADPTNAME)

Specifies the unique adapter name you want to display.

- \*ADPTADR

The adapter address is used to identify the adapter.

- Adapter name

Specify the name of the adapter you want to display. This is a required parameter.

- Adapter address (ADPTADR)

Specifies the 12-character hexadecimal adapter address.

- Output (OUTPUT)

Specifies whether the output from the command is displayed at the requesting workstation or printed with the job's spooled output.

- \*

Output requested by an interactive job is shown on the display.

Output requested by a batch job is printed with the job's spooled output.

- \*PRINT

The output is printed with the job's spooled output.

Figure 120 shows the display of a DSPTRAINF command.

Display Adapter Profile		System: RALYAS4A
Product ID . . . . .	:	00000000000000000000000000000000
Licensed internal code . . . . .	:	F0F0F0F8F4F4F0F1F540
Group address . . . . .	:	C00080000000
Adapter address . . . . .	:	400010020001
Adapter name . . . . .	:	RALYAS4A
Adapter description . . . . .	:	Token-Ring Adapter System RALY
NAUN address . . . . .	:	10005A20F0EC
NAUN name . . . . .	:	
NAUN description . . . . .	:	
Function		Functional
Ring error monitor		Address
Configuration report server		C00000000008
		C00000000010
		Bottom
Press Enter to continue.		
F3=Exit F5=Refresh F6=Print F12=Cancel		

Figure 120. The Display Adapter Profile Panel

- Display TRN status command (DSPTRNSTS)

The Display Token-Ring Network Status (DSPTRNSTS) command displays the TRN status for an active token-ring network line.

- Line description (LINE)  
Specifies the line description name that the IBM Token-Ring Network manager is using.  
This is a required parameter.
- Output (OUTPUT)  
Specifies whether the output from the command is displayed at the requesting workstation or printed with the job's spooled output.
- \*  
Output requested by an interactive job is shown on the display.  
Output requested by a batch job is printed with the job's spooled output.
- \*PRINT  
The output is printed with the job's spooled output.

Figure 121 on page 133 shows the display of a DSPTRNSTS command.

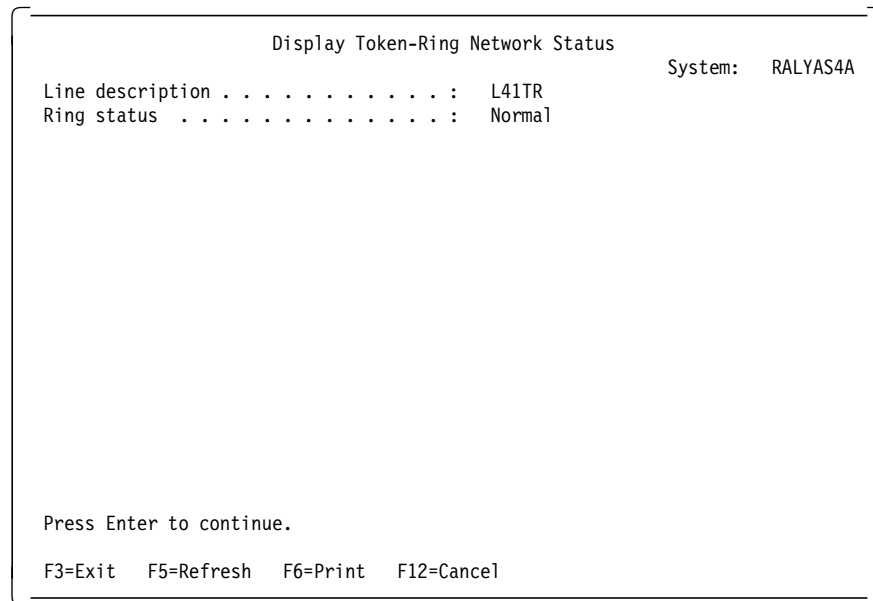


Figure 121. Display Token-Ring Status Panel

- Remove TRLAN adapter command (RMVTRA)

The Remove IBM Token-Ring Network Adapter (RMVTRA) command removes an active adapter from a varied-on token-ring line description.

**Restriction!**

You must have QSECOFR authority and the TRLAN manager must have been configured as controlling.

- Line description (LINE)  
Specifies the name of the line description to which the adapter is connected.  
This is a required parameter.
- Adapter (ADPTNAME)  
Specifies the unique adapter name you want to remove.
- \*ADPTADR  
The adapter address is used to identify the adapter.
- adapter-name  
Specify the name of the adapter to be removed.  
This is a required parameter.
- Adapter address (ADPTADR)  
Specifies the 12-character hexadecimal adapter address.
- Remove TRLAN adapter information command (RMVTRAINF)  
The Remove IBM Token-Ring Network Adapter Information (RMVTRAINF) command removes an adapter entry from the adapter database.
  - Adapter (ADPTNAME)  
Specifies the 1 to 10-character adapter name to remove.

This is a required parameter.

- Work with the TRLAN adapters (WRKTRA) command

The Work with IBM Token-Ring Network Adapters (WRKTRA) command allows you to work with a list of TRLAN adapters currently active on the token-ring.

- Line description (LINE)

Specifies the name of the line description on which to run IBM Token-Ring Network manager.

This is a required parameter.

- Output (OUTPUT)

Specifies whether the output from the command is displayed at the requesting workstation or printed with the job's spooled output.

- \*

Output requested by an interactive job is shown on the display. Output requested by a batch job is printed with the job's spooled output.

- \*PRINT

The output is printed with the job's spooled output.

Figure 122 shows the WRKTRA command.

Work with TRLAN Adapters

System: RALYAS4A

Position to . . . . . Address

Line description . . . . . : L41TR

Type options, press Enter.  
4=Remove information 5=Display adapter profile 6=Add information

Opt	Address	Adapter Name	Description
	400010020001	RALYAS4A	Token-Ring Adapter System RALYAS4A
	10005A20F0EC		
	400031740003		
	400030012525		
	400001260000		
	400001260001		

More

Command  
====>

F3=Exit F4=Prompt F5=Refresh F6=Print F9=Retrieve  
F10=Display TRN status F12=Cancel F13=Work with TRLAN adapter information

Figure 122. The Display Adapter Profile Panel

---

## Chapter 3. Remote Operation

This chapter describes the use of various systems and products to provide remote operation support to a network of downstream-connected systems.

---

### 3.1 Introduction

Remote Operation refers to the ability to control a system indirectly from another system which is connected to the first system by means of a communication line. This indirect control is achieved by submitting commands to the first system via the communications line for execution by the first system. The term "Remote Operation" in this context needs to be distinguished from the situation where a system is controlled via a *terminal* connected to the system via a communications line.

The ability to operate a system remotely is important because of the flexibility which this offers to an organization. All the information processing skills can be concentrated at one site rather than being dispersed thinly throughout the organization.

---

### 3.2 AS/400 as a Focal Point

Although OS/400 has not implemented remote management as described in the SystemView discipline (as NetView has), AS/400 applications are able to send commands to other systems. SystemView System Manager/400 is a good example. In OS/400 Version 3, SystemView System Management includes a new OPERATE command which uses the Management Services architecture. This command was initially used by NetView Remote Operations for AS/400 and currently can only be used to manage AS/400 systems from NetView or from an AS/400 focal point.

Because the OPERATE command doesn't currently work with other systems, we have written a RUNCMD-like application using the Management Services Transport APIs as an example to communicate with the PS/2 running Communications Manager/2. The LAN Network Manager, RS/6000 Service Point, NetView/6000, NetView for OS/2 are other applications that can be communicated with using a modified version the program.

#### 3.2.1 AS/400 Connected via SystemView System Manager/400 V2

This is strictly speaking not *downstream* of the AS/400 as defined in Chapter 2, "Alert Support Implementation and Downstream Information" on page 21, because SystemView System Manager/400 can only operate across AS/400 systems participating in an APPN network. This section shows how SystemView System Manager/400 can be used to perform the problem and change management of a network of AS/400 systems from a central AS/400 system. In this context, *problem management* is defined as the identification, logging, and resolution of problems in a network environment. *Change management* refers to the maintenance, distribution and tracking of PTF save files and cover letters stored on this central AS/400 system.

This central AS/400 system needs to have the SystemView System Manager/400 licensed program installed and is known as a *service provider*. There can be

more than one service provider in the network. The other category of AS/400 system in the System Manager/400 network is a *service requester*. The service requester requires or asks for problem handling support from the service provider.

Service requesters are registered at the service provider. The operator on the service provider can specify the list of products, product options and language features for which service is provided. An AS/400 system acting only as a service requester, does not need to have SystemView System Manager/400 installed to request service from an AS/400 service provider. The problem management component of SystemView System Manager/400 requires AS/400 alert support to be implemented on all AS/400 systems in the network for which problem management support is required.

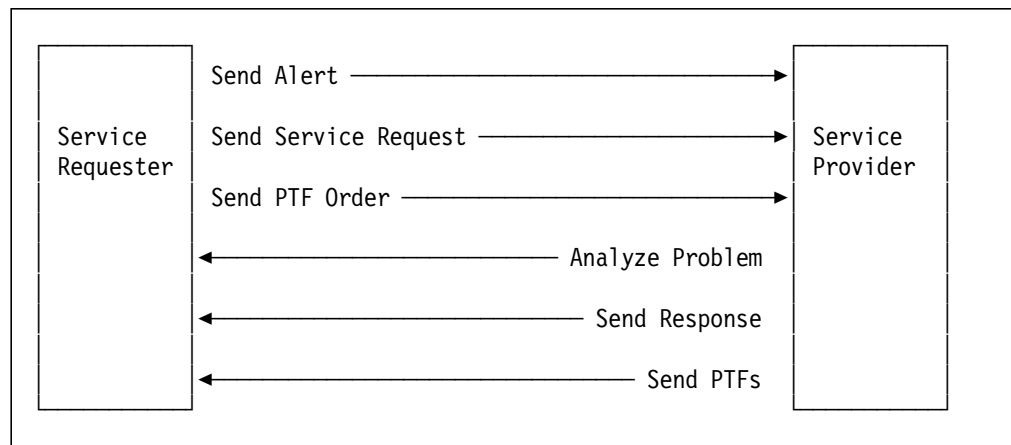


Figure 123. SystemView System Manager/400 Problem and Change Management

Figure 123 shows the relationship between the service requester and service provider. A problem on the service requester causes an alert to be sent to the service provider which logs this alert. If the message identifier on which the alert is based specifies it, a problem record will also be created.

RALYAS4A  
 08/18/93 09:23:28

Work with Alerts

Type options, press Enter.

2=Change   4=Delete   5=Display recommended actions   6=Print detail  
 8=Display alert detail   9=Work with problem

Opt	Resource Name	Type	User Assigned	Group Assigned	Problem ID
	RALYAS4A	CP			
	RALYAS4A*	TAP			
	RALYAS4A	CP			
	RALYAS4A	CP			
	IBMCOMM	PGM			
	RALYAS4A	CP			
	RALYAS4A	CP			
9	RALYAS4A	CP			9322836712
	RALYAS4A	CP			
	RALYAS4A	CP			

F3=Exit   F6=Print list   F10=Show new alerts   F11=Display date/time  
 F12=Cancel   F13=Change attributes   F21=Automatic refresh   F24=More keys

Figure 124. Work with Alerts Panel

In Figure 124, the option has been selected to work with the problem record created by an alert which has been logged.

```

                                     Work with Problem
                                     System:  RALYAS4A
Problem ID . . . . . : 9322836712
Origin . . . . . : USIBMRA.RALYAS4A
Current status . . . . . : READY
Problem . . . . . : Software problem detected in QAPALCON.

Select one of the following:.

    1. Analyze problem
    2. Report problem

    4. Verify problem corrected
    5. Answer problem

    20. Close problem

Selection
    1

F3=Exit  F12=Cancel
```

Figure 125. Work with Problem Panel

The resulting panel shown in Figure 126 shows the choices which are available for this particular problem. We selected Option 1, Analyze Problem.

```

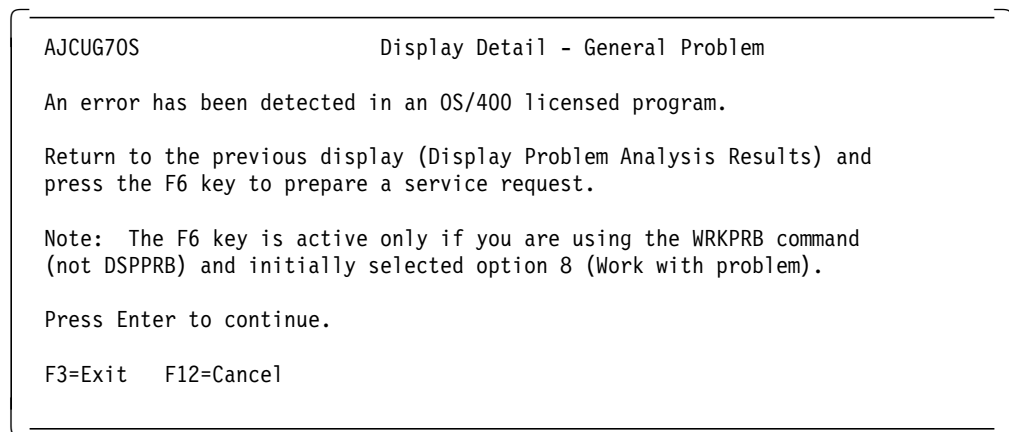
                                     Display Problem Analysis Results
                                     System:  RALYAS4A
List type . . . . . : Isolation

Type options, press Enter. Press F6 to report the problem.
    5=Display detail

Opt  Probability  Possible Cause
  5      100      Error detected in OS/400 licensed program
```

Figure 126. Display Problem Results Analysis Panel

Analysis of the problem has completed as shown in Figure 127 on page 138. The option to display the analysis results is selected.



*Figure 127. Display Problem Analysis Detail Panel*

The resulting panel is shown in Figure 127. The operator is instructed to return to the previous display in Figure 126 on page 137 to prepare a service request which will be forwarded in this case, to IBM Service support.

The system provider will automatically search a PTF database for possible answers to a problem based on a symptom string constructed during problem analysis.

If the alert had been received from a supported service requester, the option to analyze the problem would have automatically started a display station pass-through session to the service requester to start problem analysis. On conclusion of the problem analysis procedure, the service provider would have been searched by SystemView System Manager/400 to determine if the PTFs required to correct the problem were available on the service provider. If they were, these would have been automatically downloaded to the service requester.

SystemView System Manager/400 will automatically update the problem log on both the service provider and service requester systems following remote problem analysis.

It is essential that a service provider be running the most current release level of the OS/400 licensed program so that it can provide support for service requester systems that are at the same or previous release levels.

The Service Provider can create an authorized program analysis report (APAR) for a specific local or remote problem and mail the problem information collected to IBM service support.

The following OS/400 functions can be used together with SystemView System Manager/400 to provide ease of use and system control in implementing remote problem and change management operations:

- AS/400 Alert support **1**
- Display station pass-through **1**
- Remote workstation support
- Systems Network Architecture distribution services (SNADS) **1**
- Object Distribution
- Distributed systems node executive (DSNX)
- Distributed host command facility



**1** indicates that the function is used by SystemView System Manager/400.

### 3.2.2 AS/400 as a Focal Point using an AS/400 RUNCMD

The OPERATE command included in SystemView System Manager/400 V3R1 doesn't currently work with other systems. Thus we have written a "RUNCMD" like application using the Management Services Transport APIs as an example to dialog with the PS/2 running Communications Manager/2. The LAN Network Manager, RS/6000 Service Point, NetView/6000, NetView for OS/2 are other applications reachable after adaptation of the same program.

The RUNCMD program is written in C and is shown in Appendix H, "AS/400 RUNCMD Program Listing" on page 291.

#### 3.2.2.1 AS/400 as a Focal Point using an AS/400 RUNCMD to an OS/2 CM/2

The SNA Management Service is available for OS/2 with IBM Extended Services for OS/2 and includes two applications : Service Point Application Router (SPA Router) and Remote Operations Service (ROP Service). The initial idea was to manage OS/2 from NetView using a command:

RUNCMD SP=WTR32214,APPL=REMOTEOP,OP=OPER1;OS/2 Command.

The AS/400 implementation differs from the NetView only to simplify the command typing. The RUNCMD can use only OS/2 or CM/2 batch commands, except if within the command, you can send a pre-estimated response using the following data stream "& ECHO Y|" where Y is the pre-estimated response to a OS/2 "ERASE" command for example.

If you need additional information about the commands available when using the RUNCMD, check the following publications:

- *IBM Extended Services for OS/2 Communications Manager New Features and Enhancements*, GG24-3876
- *Communications Manager/2 Version 1.0 New Features*, GG24-3958
- *Communications Manager/2 Version 1.1 Version 1.1 Enhancements*, GG24-4142

Before using the RUNCMD, you have to start, on the OS/2 platform, the required function called:

- Service Point Application Router
- Remote Operation Service

Figure 128 on page 140 and Figure 131 on page 141 show where to double-click to start the Service Point Application Router (SPA router) and the Remote Operation Service (ROP service).

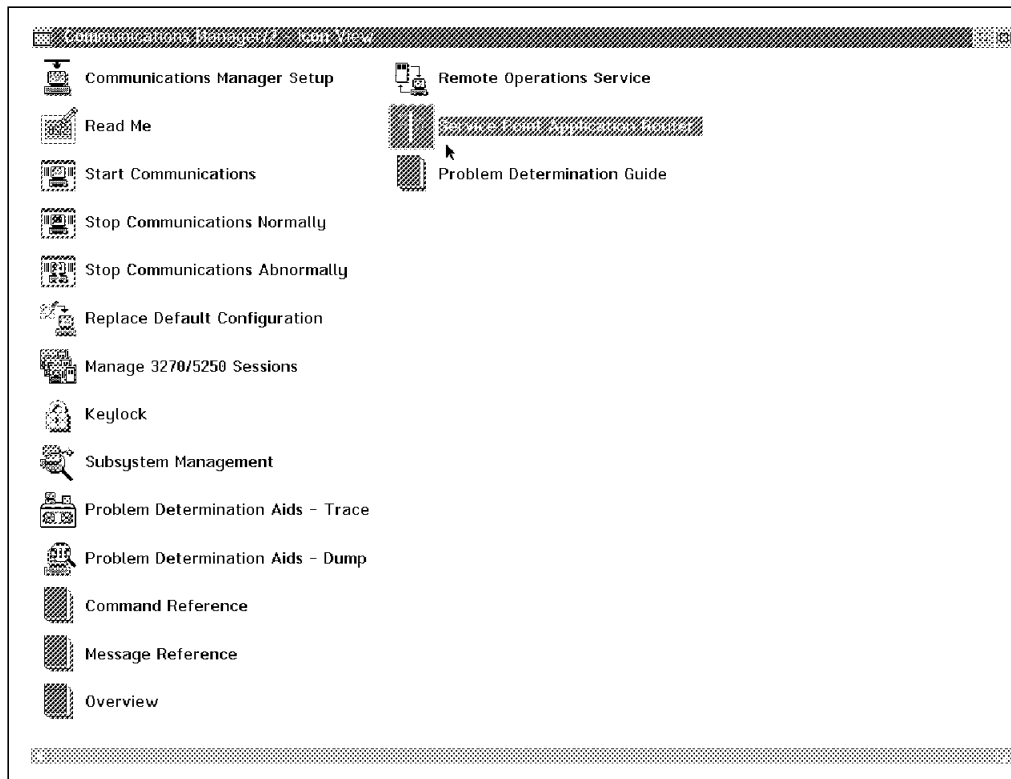


Figure 128. Service Point Application Router Startup

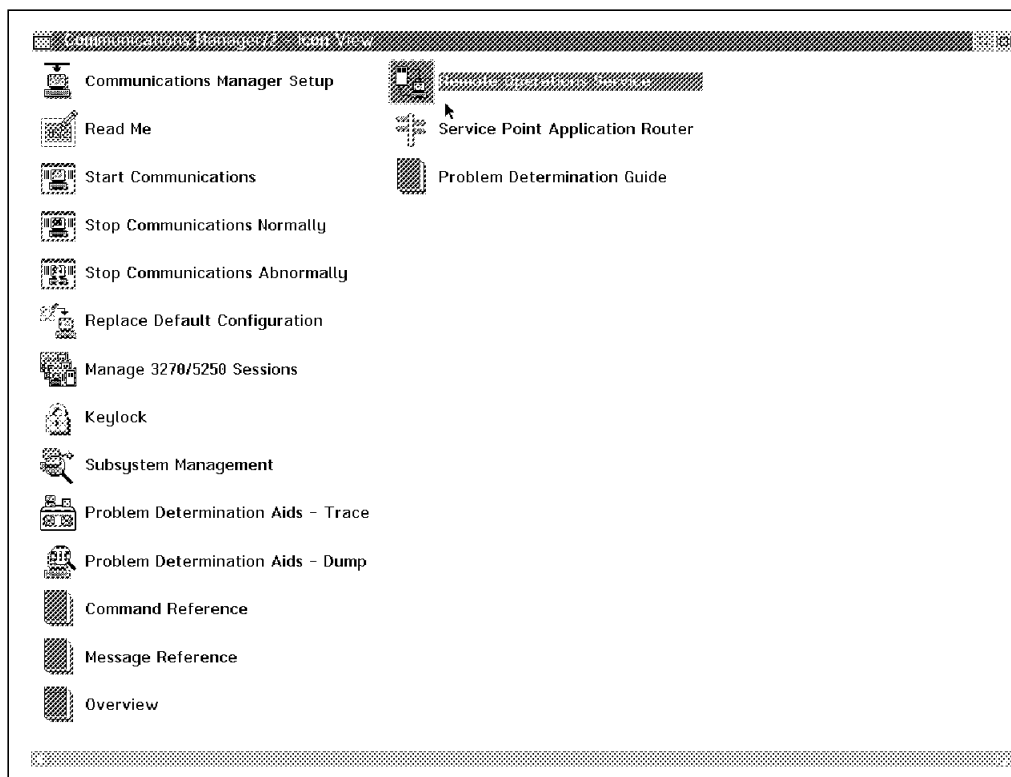


Figure 129. Remote Operation Service Startup

Figure 130 on page 141 and Figure 131 on page 141 show the windows open for the SPA router and ROP service. Figure 130 on page 141 shows that the ROP

service has registered itself as an application available for the Service Point Application router.

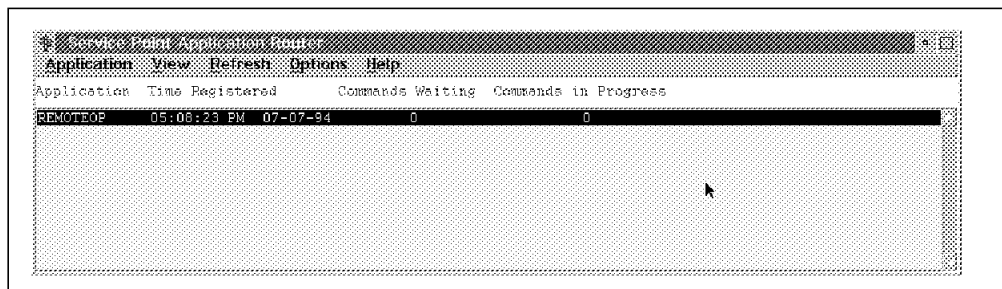


Figure 130. Service Point Application Router Window

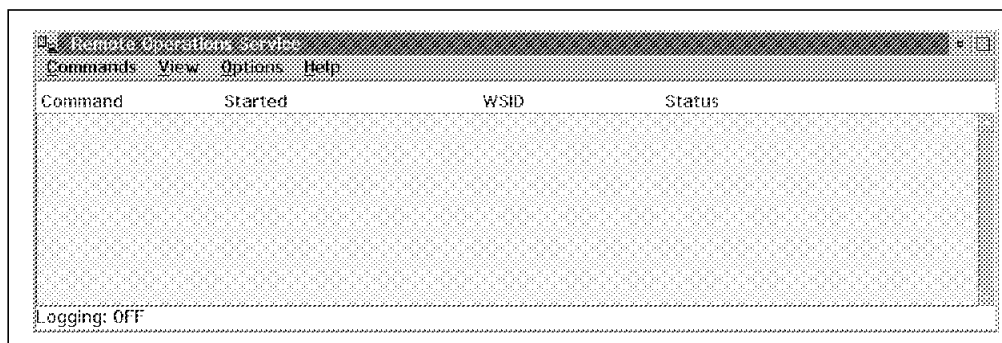


Figure 131. Remote Operation Service Window

Now from the AS/400 start the RUNCMD program by typing on a command line, the following request:

Call AUTOMATION/RUNCMD

The complete RUNCMD program can be found in Appendix H, "AS/400 RUNCMD Program Listing" on page 291.

**DIR \*.NDF RUNCMD Example:** Figure 132 shows the different parameters required by the program before to send the RUNCMD to the CM/2.

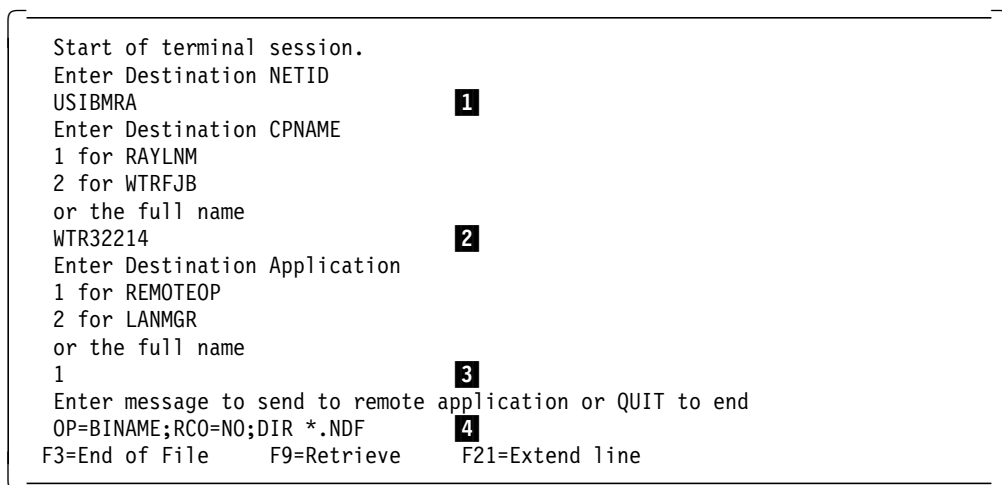


Figure 132. Parameters for the RUNCMD Program

**1** The NETID of the destination node.

**2** The CPname of the controlled node. To simplify the parameter entry, we have already coded some entries and you can use them by typing the reference number or by typing the full name in case of a non-coded Destination CPname.

**3** The destination application. In the case of Remote Operation Service, you have to use REMOTEOP as an application name. For the LAN Network Manager, during the next example, you will have to use LANMGR.

**4** Finally, type the RUNCMD accepted by the Communication Manager/2, Remote Operation Service. The ROP service will pass the command to OS/2 for execution. Figure 133 shows the response to the "DIR \*.NDF" command.

```
Enter message to send to remote application or QUIT to end
OP=BINAME;RCO=NO;DIR *.NDF
Received reply(s):
Start of Output  WTR32214  DIR *.NDF

The volume label in drive D is D_DRIVE.
The Volume Serial Number is 261F.F415
Directory of D:\CMLIB

7-18-92  9:57a      2760          0  ENSAMP.NDF
7-25-92  12:37p     2762          0  NNSAMP.NDF
2-16-94  11:56p     6911          0  USIBMRA.NDF
2-17-94   3:31a     2152          0  wtrbak.NDF
7-06-94   4:11p     6169          0  WTRMODEL.NDF
      5 file(s)          20754 bytes used
                          13137920 bytes free

End of Output  WTR32214  DIR *.NDF
Enter message to send to remote application
Enter NEW to change initial parameters
QUIT to end

F3=End of File      F9=Retrieve      F21=Extend line
```

Figure 133. DIR \*.NDF RUNCMD Example

Figure 134 on page 143 shows the FMH-5 and the MDS-MU used to send the previous example command to the Communications Manager/2.

11	05	FMH- 5
	02FF	Attach
	00	Security Indicators
	03 D00040	
	04 23F0F0F1 . 0 0 1	Transaction Program Name
00A1	1310	MDS-MU
	003F 1311	Routing Info.
	1B 81	Origin Info.
	09 01 E4E2C9C2D4D9C1 U S I B M R A	Origin NetId
	0A 02 D9C1D3E8C1E2F4C2 R A L Y A S 4 B	Origin Domain
	06 03 23F0F1F5 . 0 1 5	Origin Application.
	1B 82	Destination Info.
	09 01 E4E2C9C2D4D9C1 U S I B M R A	Dest. NetID
	0A 02 E6E3D9F3F2F2F1F4 W T R 3 2 2 1 4	Dest. Domain
	06 03 23F0F1F4 . 0 1 4	Dest. Application
	05 90 00A000	Flags
002E	1549	AUOW Correl.
	15 01	Req. Location
	09 01 E4E2C9C2D4D9C1 U S I B M R A	Req. NetId
	0A 02 D9C1D3E8C1E2F4C2 R A L Y A S 4 B	Req. LU Name
	06 04 23F0F1F5 . 0 1 5	Origin Application
	0F 02 0000090607CA0712100D312DE9	Seq. NO. DTM
0030	1212	CP-MSU
	002C 8061	Execute Command
	0C 06	Name List Subvector
	0A 50 D9C5D4D6E3C5D6D7 R E M O T E O P	Dest. Appl. Name
	1C 31 D6D77EC2C9D5C1D4C55ED9C3D67ED5D65EC4C9D9405C4B958486 O P = B I N A M E ; R C O = N O ; D I R * . N D F	

Figure 134. MDS-MU for RUNCMD Request

Figure 135 on page 144 shows the FMH-5 and the MDS-MU used to answer the command previously sent to OS/2 Communication Manager/2.

32	05		FMH- 5
	02FF		Attach
	00		Security Indicators
	03D00040		
	0423F0F0F1		Transaction Program Name
	. 0 0 1		
	00		
	19		
	10	E4E2C9C2D4D9C14BE6E3D9F3F2F2F1F4	
		U S I B M R A . W T R 3 2 2 1 4	
		DDDDDDDDDE50001	
		082A1C879FABF23579	
02A3	1310		MDS-MU
	0049	1311	Routing Info.
	20	81	Origin Info.
	0A	01	Origin NetId
		E4E2C9C2D4D9C140	
		U S I B M R A	
	0A	02	Origin Domain
		E6E3D9F3F2F2F1F4	
		W T R 3 2 2 1 4	
	0A	03	Origin Application.
		23F0F1F440404040	
		. 0 1 4	
	20	82	Destination Info.
	0A	01	Dest. NetID
		E4E2C9C2D4D9C140	
		U S I B M R A	
	0A	02	Dest. Domain
		D9C1D3E8C1E2F4C2	
		R A L Y A S 4 B	
	0A	03	Dest. Application
		23F0F1F540404040	
		. 0 1 5	
	05	90	Flags
		016000	
	002E	1549	AUOW Correl.
	15	01	Req. Location
	09	01	Req. NetId
		E4E2C9C2D4D9C1	
		U S I B M R A	
	0A	02	Req. LU Name
		D9C1D3E8C1E2F4C2	
		R A L Y A S 4 B	
	06	04	Origin Application
		23F0F1F5	
		. 0 1 5	
	0F	02	Seq. NO. DTM
		0000090607CA0712100D312DE9	

Figure 135 (Part 1 of 2). MDS-MU for RUNCMD Response

Figure 135 (Part 2 of 2). MDS-MU for RUNCMD Response

Figure 136 (Part 1 of 3). SNA Trace for RUNCMD

Figure 136 (Part 2 of 3). SNA Trace for RUNCMD



Figure 136 (Part 3 of 3). SNA Trace for RUNCMD

```

Enter message to send to remote application
Enter NEW to change initial parameters
QUIT to end
OP=BINAME;RCO=NO;CMLINKS
Received reply(s):
Start of Output 'WTR32214' CMLINKS

      Link      DLC      Partner
      Name      Name  #      FQName      Type  Sess      State
-----
*   HOST$1   IBMTRNET 0  USIBMMK.MK34      LEN  9   Active
*   TORALY4A IBMTRNET 0  USIBMRA.RALYAS4A  LEN  2   Active
*   TORALY4B IBMTRNET 0  USIBMRA.RALYAS4B  NN   3   Active

End of Output 'WTR32214' CMLINKS
Enter message to send to remote application
Enter NEW to change initial parameters
QUIT to end

F3=End of File      F9=Retrieve      F21=Extend line

```

*Figure 137. CMLINKS RUNCMD Example*

Figure 138 on page 148 shows the command "CMNETB" sent to OS/2 and the response.

```

Enter message to send to remote application
Enter NEW to change initial parameters
QUIT to end
OP=BINAME;RCO=NO;CMNETB
Received reply(s):
Start of Output -WTR32214' CMNETB

```

NetBIOS Name	NCB_NUM	Type	Name	Status
WTR32214	02	Unique		Registered name
WTR32214	03	Unique		Registered name
WTRDM	04	Group		Registered name
ROPPPIPE.WTR32214	05	Unique		Registered name

```

End of Output -WTR32214' CMNETB
Enter message to send to remote application
Enter NEW to change initial parameters
QUIT to end

```

F3=End of File      F9=Retrieve      F21=Extend line

Figure 138. CMNETB RUNCMD Example

### 3.2.2.2 AS/400 as a Focal Point using RUNCMD to LAN Network Manager

Even if the LAN Network Manager uses the SSCP-PU session to dialog with NetView, the new SPA router available in CM/2, is able to migrate NVMTs using SSCP-PU session to MDS-MU using LU 6.2 session. After the migration, the AS/400 Management Services transport can deal with LU 6.2 SNASVCMG session and receive Alerts from the LAN Network Manager and send RUNCMD commands using the same program than for OS/2 Remote Operation Services.

Using this facility, an AS/400 operator will be able to send:

- Adapter commands
- Bridge commands
- Event commands
- Help commands

That will allow an AS/400 operator to control a token-ring network with bridges, 82XX systems, using the all functions available from the LAN Network Manager application.

If you need additional information about the commands available when using the RUNCMD, please, check the following manual:

- *LAN Network Manager V1.1, LAN Station Manager Entry V1.0 and LAN Station Manager V1.0*, GG24-3942

Figure 139 on page 149 and Figure 140 on page 149 show examples of AS/400 RUNCMD for the LAN Network Manager.

```

Enter Destination NETID
USIBMRA
Enter Destination CPNAME
1 for RAYLNM
2 for WTRFJB
or the full name
1
Enter Destination Application
1 for REMOTEOP
2 for LANMGR
or the full name
2
Enter message to send to remote application or QUIT to end
adp query adp=400010020001
Received reply(s):
DFI950 .                      STATION PROFILE
DFI950 ADAPTER ADDRESS/NAME.....: 400010020001/
DFI950 LAN SEGMENT NUMBER.....: BB3
DFI950 LAN SEGMENT TYPE.....: TOKEN-RING 4MBPS
DFI950 NAUN ADDRESS/NAME.....: 400031740001/
DFI950 MICROCODE LEVEL.....: F0F0F0844015
DFI950 UNIVERSAL ADDRESS.....: 10005AF87B69
DFI950 GROUP ADDRESS.....: 80000000
DFI950 FUNCTIONAL ADDRESSES.....: 00000018
DFI950 MONITORED.....: NO
DFI950 TRACING AUTHORIZED.....: NO
DFI950 TIME AUTHORIZED.....: 0000-2400
DFI950 DAYS AUTHORIZED.....: SUNDAY      - SATURDAY
DFI950 COMMENTS.....:
DFI999 OPERATION COMPLETED SUCCESSFULLY.

```

Figure 139. LAN Network Manager Adapter Query RUNCMD Example

```

Enter message to send to remote application
Enter NEW to change initial parameters
QUIT to end
Network Status
Received reply(s):
DFI950 .                      NETWORK STATUS
DFI950 SEGMENT  SEGMENT STATUS  SEGMENT TYPE      LINKED BRIDGES
DFI950 -----  -
DFI950 * 580    NORMAL          TOKEN-RING 4MBPS   0
DFI950 582     NORMAL          TOKEN-RING 4MBPS   3
DFI950 B14     NORMAL          TOKEN-RING 16MBPS  1
DFI950 BB2     NORMAL          TOKEN-RING 4MBPS   1
DFI950 BB3     NORMAL          TOKEN-RING 4MBPS   1
DFI999 OPERATION COMPLETED SUCCESSFULLY.
Enter message to send to remote application
Enter NEW to change initial parameters
QUIT to end
QUIT
Press ENTER to end terminal session.

```

Figure 140. LAN Network Manager Network Status RUNCMD Example

### 3.2.2.3 AS/400 as a Focal Point Using RUNCMD to RS/6000 and NetView/6000

RISC/6000 system using AIX Service/6000 supports the Management Services LU 6.2 for Alerts or remote operation. AIX SNA Service via a customer developed catcher program or via the catcher program provided by NetView/6000 is able to received RUNCMDs, to execute them or to reroute them to NetView/6000 for execution. Due to connection error, we haven't been able to connect the RISC/6000 AIX SNA Service to the AS/400 using MS/Transport for remote operation, but nothing can avoid this type of interaction to work and, from the AS/400 point of view, to manage NetView/6000 and all networks manageable from NetView/6000.

### 3.2.2.4 AS/400 as a Focal Point Using RUNCMD to AS/400

As we said at the beginning of this chapter, AS/400 with version 3 is going to use an "OPERATE" command for remote operation between AS/400s, but nothing can avoid, for standardization to use RUNCMD from an AS/400 focal point to manage other AS/400s.

We are not going to develop this approach but if you need additional information about the MS/transport functions and how to use AS/400 APIs to modify the RUNCMD program, please, check the following manual:

- *AS/400 Automation Using NetView and the SNA MS Transport*, GG24-3841

See a list of the RUNCMD program in Appendix H, "AS/400 RUNCMD Program Listing" on page 291.

---

## 3.3 NetView as a Focal Point for AS/400

Prior to the development of the SMAO (System Management Automation Offering), see Appendix E, "Systems Management Automation Offering (SMAO)" on page 253, and NetView Remote Operations, see Appendix D, "NetView Remote Operations for AS/400" on page 223, products, NetView was able to manage an AS/400 network in the following ways:

- NetView hardware monitor with AS/400 alert support. The AS/400 is able to act as an intermediate focal point for alerts. These alerts can be forwarded to a NetView focal point for action and logging.
- NetView Distribution Manager with AS/400 DSNX. Using AS/400 DSNX (Distributed Systems Node Executive) an AS/400 can receive distributions directly from NetView Distribution Manager and act as an intermediate node for other AS/400s, S/36s and personal computers using PC/DSNX.
- HCF/DHCF (Host Command Facility/Distributed HCF). A NetView operator using HCF/DHCF can acquire a full screen session to an adjacent AS/400. From this adjacent AS/400, the operator can log on to other peer connected systems, like AS/400s, System/36s, System/38s by using 5250 DSPT (Display Station Pass Through) function.
- NRF (Network Routing Facility). NRF is software that is running from NCP (Network Control Program). NRF is able to acquire a session between an LU2 device and an AS/400 using VTAM to set up the bind.
- SPLS (SNA Primary LU Support). With SPLS the AS/400 can attach to the SNA network as a Primary Logical Unit T2.1 node. Using the VTAM LOGON command any 3270 (LU2) display can request a signon with any AS/400

attached to the network. Although SPLS is similar in function to both DHCF/HCF and NRF it has the following advantages:

- No host software except for SPLS in the AS/400 whereas HCF had software in both VTAM and the AS/400 and NRF runs in the NCP (Network Control Program) software of the 37xx IBM (Communication Controller). As a result, performance should be better.
- No need to license the product. It is shipped with OS/400 V2R3, unlike both HCF and NRF, which are both licensed products for VTAM and NCP.

### 3.3.1 Using SMAO

SMAO provides management for an AS/400 network from a NetView host by providing a MENU driven command interface. In conjunction with the monitoring facilities provided by SMAO, this enables the NetView operator to take action at the AS/400 using the SMAO provided command interface. See Appendix E, “Systems Management Automation Offering (SMAO)” on page 253 for more details on the SMAO product.

### 3.3.2 Using the NetView Remote Operations Product

The NetView Remote Operations product provides the following facilities for managing an AS/400 from NetView:

- Command Line Interface. The NetView operator can send a command to an AS/400 from the NetView command line.
- Automation. Using the NetView Automation table to trap alerts, the NetView Remote Operations Manager can be invoked by a CLIST or RODM method to take action at an AS/400.
- Monitoring. With some customization at the NetView host, NetView can be used to monitor an AS/400 network, for example, by setting up a CLIST to query status at the AS/400 periodically and then monitoring the response received.

Problem Management is the only category of management we have addressed here. The NetView Remote Operations product uses MS Transport to accomplish this. See Appendix D, “NetView Remote Operations for AS/400” on page 223 for more details on the NetView Remote Operations product.

### 3.3.3 NetView Remote Operations for AS/400

NetView Remote Operations for the AS/400 will be shipped as two separate licensed products.

- NetView Remote Operations Manager MVS/ESA runs on a system where NetView is installed, and enables you to send AS/400 commands to a remote AS/400 system from the NetView system.
- NetView Remote Operations Agent/400 runs on an AS/400 system, executes these commands, and sends the response data back to NetView Remote Operations Manager MVS/ESA.

In this topic we will be discussing using the NetView Remote Operations package running on a NetView host as a focal point to an AS/400. We will provide an operational scenario for varying on a control unit on the AS/400 from NetView. For a more detailed description of the complete product, NetView

Remote Operations for AS/400, see Appendix D, “NetView Remote Operations for AS/400” on page 223.

### 3.3.3.1 Scenario to Vary On a Control Unit

In this scenario, an operator is monitoring a network including AS/400’s from NetView. The operator has received a notification that a controller attached to the AS/400 has failed. The operator has to vary the controller off and then back on again. We will describe the steps required to setup NetView Remote Operations Manager MVS/ESA and NetView Remote Operations Agent/400 to achieve the above.

#### **Customization Steps for NetView Remote Operations Manager MVS/ESA**

1. Copy samples from SYS1.SFNASAMP data set to NetView DSIPARM data set.
2. Update NetView startup procedure CNMPROC.
3. Update member DSICMD in NetView data set DSIPARM.
4. Update the DSIOPF member in NetView data set DSIPARM.
5. Update the FNAPROFA member in NetView data set DSIPRF.
6. Update the HELPMAP member in NetView data set DSIPARM.

The above steps are described in detail in *NetView Remote Operations Manager MVS/ESA NetView remote Operations Agent/400 User’s Guide*, SC31-7177.

#### **Customization Steps for NetView Remote Operations Agent/400**

1. Installing the code on your AS/400.
2. Starting or ending the Request File Journal.
3. Modifying the job descriptions.
4. Writing security user exit.
5. Customizing the Security Table file.

The above steps are described in detail in *NetView Remote Operations Manager MVS/ESA NetView remote Operations Agent/400 User’s Guide*, SC31-7177.

**Executing the Scenario:** Once the product is installed and working the operator is able to communicate with the AS/400 from NetView. Before he can issue any commands The operator needs to initialize the variables that will be used by the OPSMGMT environment. The operator does this by typing in FNAINIT on the command line. The operator will see a similar response to the following. For more information on the above environments see Appendix D, “NetView Remote Operations for AS/400” on page 223

```
NCCF                                N E T V I E W    RA3AN FORTUIN 08/18/93 16:16
* RA3AN  FNAINIT
- RA3AN  DSI041I  FNAAUTO ALREADY ACTIVE OR IN PROCESS OF BECOMING ACTIVE
- RA3AN  FNA567I  OPSMGMT COMMAND ENVIRONMENT INITIALIZATION HAS COMPLETED
                SUCCESSFULLY
-----
```

The operator can now display what the variables are set to for his task by typing the command:

FNADSPV. (that is FNADSPV followed by a dot).

The operator can override any variables using the FNASETV command list.

```
NCCF                      N E T V I E W      RA3AN FORTUIN  08/18/93 16:50
* RA3AN    FNADSPV .
C RA3AN    Default group:
C RA3AN    FNATIMEOUT.      = 120
C RA3AN    FNAREPLY.       = ALL
C RA3AN    FNANETID.       = USIBMRA
C RA3AN    FNALU.         = RALYAS4A
C RA3AN    FNADESTLIST.   =
C RA3AN    FNAAPPL.       = EP_OPS
C RA3AN    FNAPRI.        = M
C RA3AN    FNADEBUG       = NO
C RA3AN    FNACANCEL      = NO
-----
```

Due to the command list, FNAGVARS, being customized, the operator's task variables are set to the default values as shown above. He can now enter the following command on the NetView command line to vary the controller off. The controller is RA5494RWS.

OPSMGMT VRYCFG RA5494RWS \*CTL \*OFF

```
NCCF                      N E T V I E W      RA3AN FORTUIN  08/18/93 17:30
* RA3AN    OPSMGMT VRYCFG RA5494RWS *CTL *OFF
- RA3AN    FNA550I 8, OPSMGMT COMMAND ACCEPTED, REPLY=ALL, NETID=USIBMRA
            LU=RALYAS4A, APPL=EP_OPS, BEGTIME=*, ENDTIME=*, CMD=' VRYCFG
            RA5494RWS *CTL *OFF'
- RA3AN    FNA558I 8, OPSMGMT COMMAND ACCEPTED BY THE REMOTE SYSTEM,
            CMD=' VRYCFG RA5494RWS *CTL *OFF'
- RA3AN    FNA555I 8, COMMAND COMPLETED SUCCESSFULLY
- RA3AN    FNA591I 8, NO MORE REPLIES ARE EXPECTED FOR THIS REQUEST
-----
```

To see the results of the vary off command the operator would enter the following:

OPSMGMT WRKCFGSTS \*CTL RA5494RWS

```

NCCF                      N E T V I E W      RA3AN FORTUIN 08/18/93 17:33
* RA3AN  OPSMGMT WRKCFGSTS *CTL RA5494RWS
- RA3AN  FNA550I 9, OPSMGMT COMMAND ACCEPTED, REPLY=ALL, NETID=USIBMRA
        LU=RALYAS4A, APPL=EP_OPS, BEGTIME=*, ENDTIME=*, CMD='WRKCFGST
        RA5494RWS'
- RA3AN  FNA558I 9, OPSMGMT COMMAND ACCEPTED BY THE REMOTE SYSTEM,
        CMD='WRKCFGSTS *CTL RA5494RWS'
- RA3AN  FNA556I 9,                      Work with Configuration Status
        Page          1
- RA3AN  FNA556I 9, 5738SS1 V2R3MF 931105
        RALYAS4A 08/18/93 17:33:24
- RA3AN  FNA556I 9, Description          Type          Status
        -----Job-----
- RA3AN  FNA556I 9, RA5494RWS             *CTL          VARIED OFF
- RA3AN  FNA556I 9, RA5494DSP1            *DEV          VARIED OFF
- RA3AN  FNA556I 9, RA5494DSP2            *DEV          VARIED OFF
- RA3AN  FNA556I 9,                      * * * * * E N D   O F   L I S T I
        -----

```

The next step would be to vary the controller back on again using the following command:

```
OPSMGMT VRYCFG RA5494RWS *CTL *ON
```

```

NCCF                      N E T V I E W      RA3AN FORTUIN 08/18/93 17:38
* RA3AN  OPSMGMT VRYCFG RA5494RWS *CTL *ON
- RA3AN  FNA550I 10, OPSMGMT COMMAND ACCEPTED, REPLY=ALL, NETID=USIBMR
        LU=RALYAS4A, APPL=EP_OPS, BEGTIME=*, ENDTIME=*, CMD='VRYCFG
        RA5494RWS *CTL *ON'
- RA3AN  FNA558I 10, OPSMGMT COMMAND ACCEPTED BY THE REMOTE SYSTEM,
        CMD='VRYCFG RA5494RWS *CTL *ON'
- RA3AN  FNA555I 10, COMMAND COMPLETED SUCCESSFULLY
- RA3AN  FNA591I 10, NO MORE REPLIES ARE EXPECTED FOR THIS REQUEST
        -----

```

The final step would be to see that the controller has activated successfully:

```
OPSMGMT WRKCFGSTS *CTL RA5494RWS
```



```

NCCF                                N E T V I E W    RA3AN FORTUIN 08/18/93 17:43
* RA3AN    OPSMGMT WRKCFGSTS *CTL RA5494RWS
- RA3AN    FNA550I 11, OPSMGMT COMMAND ACCEPTED, REPLY=ALL, NETID=USIBMR
            LU=RALYAS4A, APPL=EP_OPS, BEGTIME=*, ENDTIME=*, CMD='WRKCFGST
            RA5494RWS'
- RA3AN    FNA558I 11, OPSMGMT COMMAND ACCEPTED BY THE REMOTE SYSTEM,
            CMD='WRKCFGSTS *CTL RA5494RWS'
- RA3AN    FNA556I 11,                                Work with Configuration Status
            Page      1
- RA3AN    FNA556I 11, 5738SS1 V2R3MF 931105
            RALYAS4A 08/18/93 17:43:25
- RA3AN    FNA556I 11, Description                    Type      Status
            -----Job-----
- RA3AN    FNA556I 11, RA5494RWS                        *CTL    ACTIVE
- RA3AN    FNA556I 11, RA5494DSP1                       *DEV    SIGNON DISPLAY
- RA3AN    FNA556I 11, RA5494DSP2                       *DEV    SIGNON DISPLAY
- RA3AN    FNA556I 11,                                * * * * * E N D   O F   L I S T I
            -----

```

The operator has managed to resolve the problem at the AS/400 by entering commands on the NetView command line.

### 3.3.4 SMAO/400 Remote Operations

SMAO/400 Remote Operations includes two functions, the Remote Command Facility and the SMAO/400 OPC/ESA Interface. For general information about SMAO, see Appendix E, "Systems Management Automation Offering (SMAO)" on page 253.

#### 3.3.4.1 SMAO/400 Remote Command Facility

This part includes a test scenario which is using the configuration shown in Figure 141.

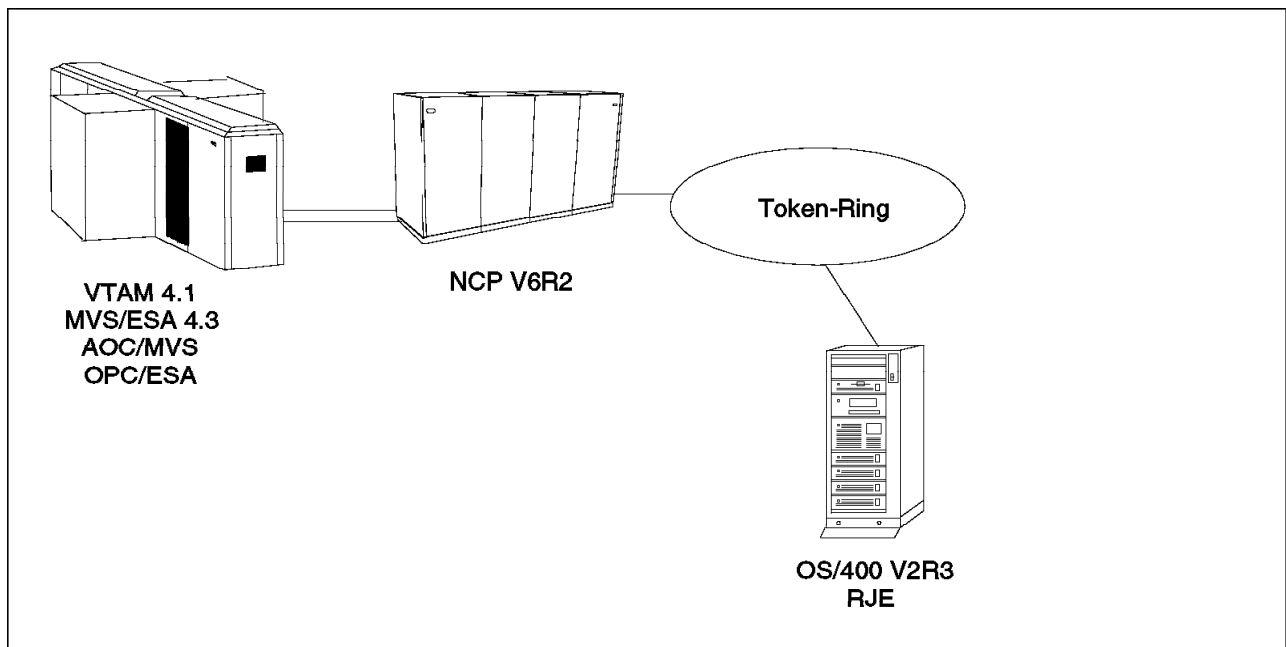


Figure 141. Basic Software Configuration Scenario for SMAO/400 Remote Command Facility

**Function Overview:** The function enables sending of line commands from a NetView panel and receiving of the feedback from the AS/400. The AS/400 command is invoked from a NetView panel. The command is submitted via JES2 and Remote Job Entry(RJE) to an AS/400 intermediate focal point. SMAO routes the command to the remote system that is to execute the command. This is accomplished using SNADS. When the command execution has completed the response is sent to NetView and displayed.

The AS/400 commands that are applicable for this function, are those which do not return any output. There is no feature for receiving any AS/400 screens, printouts or outfiles included in this function. It sends the command to a command processor at a remote AS/400 location, executes the command, traps messages caused by the command and returns the first of these messages to NetView.

**NetView Panels:** The NetView command AMOFECMD will prompt you for information about destination node and the command to execute. See Figure 142.

```
AMOFPCMD                S M A O / 4 0 0                13:39:10

                        C O M M A N D   P A N E L

Press PF1 for help on AS/400 command syntax

System

Command          sent

-----
Command Response received

Status

Action===>
          PF1= Help  PF2= End   PF3= Return  PF4= Browse
          PF6= Roll  PF7= Send CMD
```

Figure 142. SMAO Remote Command Facility Panel

By pressing PF1 you will get the AS/400 command syntax help. See Figure 143 on page 157. The help function can include a maximum of 16 commands per operator. For setup, the syntax information is retrieved from the AS/400 and put into a dataset member.

```

AMOFPC1             S M A O / 4 0 0

                      C O M M A N D S Y N T A X H E L P

1  SNDHBT   Send a heartbeat to the host
2  CHGHBT   Change heartbeat value
3  CPYF     Copy a file
4  WRKJOB   Display Job Information
5  STRSBS   Start a subsystem
6  ENDSBS   End a subsystem normally
7  ENDSBS   End a subsystem immediately
8  VRYCFG   Activate/Deactivate configuration object
9  STRPRTWTR Start printer/writer program
10 ENDWTR   Stop printer/writer program
11 SNDFPRDTA Send Performance Data mm is minutes
12 SNDBRKMSG Send break message
13 SNDNETMSG Send net message
14 SBMJOB   Submit job
15 STRPFRMON Start performance monitor
16 CRTUSRPRF Create user profile

Action==> 8

                      PF2= End   PF3= Return
                      PF6= Roll

```

Figure 143. HELP Panel for AS/400 Command Syntax

By selecting an option number, you will get the command with its parameter and possible values returned to the prompt panel. See Figure 145 on page 158.

```

AMOFPCMD             S M A O / 4 0 0                               13:39:10

                      C O M M A N D   P A N E L

Press PF1 for help on AS/400 command syntax

System

Command      sent
VRYCFG CFGOBJ(OBJNAME) CFGTYPE(*LIN/*CTL/*DEV) STATUS(*ON/*OFF)

-----
Command Response received

Status

Action==>
          PF1= Help   PF2= End   PF3= Return   PF4= Browse
          PF6= Roll   PF7= Send CMD

```

Figure 144. Retrieved Command Syntax for the Vary Configuration Command

Next, type in the destination node and complete the command. Press PF7 to send the command. The status will change to W. See Figure 145 on page 158. This panel is updated every 20 seconds or whenever you press Enter.

```

AMOFPCMD                      S M A O / 4 0 0                      14:45:16

                                C O M M A N D   P A N E L

Press PF1 for help on AS/400 command syntax

System
RALYAS4A
Command      sent      14:45:16
VRYCFG CFGOBJ(AURELLS1) CFGTYPE(*DEV) STATUS(*OFF)

-----
Command Response received

Status W
Command pending - wait
Action==>
      PF1= Help  PF2= End   PF3= Return  PF4= Browse
      PF6= Roll  PF7= Send CMD

```

Figure 145. Waiting for the AS/400 to Respond

When the command (VRYCFG) has been executed at the AS/400, the complete system generated message will be displayed and the status will change to C for completed. See Figure 146.

```

AMOFPCMD                      S M A O / 4 0 0                      14:45:37

                                C O M M A N D   P A N E L

Press PF1 for help on AS/400 command syntax

System
RALYAS4A
Command      sent      14:45:16
VRYCFG CFGOBJ(AURELLS1) CFGTYPE(*DEV) STATUS(*OFF)

-----
Command Response received 14:45:37
CPC2606 VARY OFF COMPLETED FOR DEVICE AURELLS1.

Status C

Action==>
      PF1= Help  PF2= End   PF3= Return  PF4= Browse
      PF6= Roll  PF7= Send CMD

```

Figure 146. Command Completed

**AS/400 Jobs:** The basic set of SMAO jobs execute in the subsystem AMO. For the remote command facility, two jobs are utilized. The catcher job, AMOSRV, and the command processing job, CMDSRV. See Appendix E, “Systems Management Automation Offering (SMAO)” on page 253 for information about the SMAO jobs in the AS/400.

```

Work with Active Jobs
S44AA647
08/13/93 14:46:23
CPU %: 7.4 Elapsed time: 00:00:19 Active jobs: 50

Type options, press Enter.
2=Change 3=Hold 4=End 5=Work with 6=Release 7=Display message
8=Work with spooled files 13=Disconnect ...

Opt Subsystem/Job User Type CPU % Function Status
AMO QSYS SBS .0 DEQW
ALRSRV SMA0400 BCH .0 PGM-AM0999I DEQW
AMOSRV SMA0400 BCH .3 PGM-AM0735A MSGW
CMDSRV SMA0400 BCH .2 PGM-AM0723I RUN
HBTSRV SMA0400 BCH .0 PGM-AM0502I DEQW
JOBSRV SMA0400 BCH .0 PGM-AM0722I DEQW
PFRSRV SMA0400 BCH .0 PGM-AM0807I DEQW
QBATCH QSYS SBS .0 DEQW
QCMN QSYS SBS .0 DEQW
More

Parameters or command
===>
F3=Exit F5=Refresh F10=Restart statistics F11=Display elapsed data
F12=Cancel F23=More options F24=More keys

```

Figure 147. The SMAO Command Processing Job is CMDSRV

### 3.3.4.2 The SMAO/400 OPC/ESA Interface

This function enables you to utilize all scheduling capabilities of OPC/ESA for managing AS/400 jobs. It also provides a way for intermixing jobs that will run on an MVS system with jobs running on AS/400 systems.

**AS/400 Job in an OPC/ESA Environment:** An AS/400 activity can be started in two ways, that is the active code can be stored either on the MVS system or on an AS/400 system.

The commands that make up an AS/400 job are distributed to the node where the job will be executed. The result of every single command is checked by the SMAO job tracker and if an abnormal end is discovered, OPC/ESA will be notified. Messages that are received, are sent to NetView and the complete message text of each message is displayed by SDF.

```
BROWSE -- SMIO.OPCESA.JOBLIB(AS400J3) - 01.00 ----- LINE 00000000 COL 001 080
COMMAND ==>                                SCROLL ==> CSR
***** TOP OF DATA *****
//AS400J3 JOB CLASS=A,MSGCLASS=Z,PERFORM=3
//*%OPC SCAN
//*%OPC FETCH MEMBER=AMOINC
//*%OPC BEGIN ACTION=NOSCAN
//*
//      DD DATA,DLM=$$
CPYF FROMFILE(QGPL/QCLSRC) TOFILE(QTEMP/QCLSRC) CRTFILE(*YES)
CALL PGM(AMOLIB/AM0001A) PARM('RUN')
$$
//*%OPC END ACTION=NOSCAN
***** BOTTOM OF DATA *****

F13=HELP    F14=SPLIT    F15=END      F16=RETURN   F17=RFIND    F18=RCH
F19=UP      F20=DOWN    F21=SWAP    F22=LEFT    F23=RIGHT    F24=RET
```

Figure 148. OPC/ESA JCL Sample for an AS/400 Job

AS/400 commands that will be executed are prepared in a OPC/ESA joblib member. This preparation could be a complete job stream including a number of AS/400 commands or a call to invoke a program residing on the AS/400 system or a combination of both. See Figure 148.

**Adding an Occurrence to OPC's Current Plan:** To exemplify the function we are looking at an OPC application that includes four jobs. Three of them execute on three different AS/400 systems and the fourth executes on an MVS system. There are dependencies between the jobs so that they have to execute sequentially and the predecessor of each job have to end normally before any further execution is started. Figure 149 on page 161 shows the OPC operations that is included in this application. The S column shows the status of the operations.

The work station (ws) column defines the system that will be the target for the operation. AC04, AC05 and AC06 are AS/400 systems and CPU is an MVS system. In this example the jobs executing on AC04 and AC05 has completed normally. The job on AC06 has ended in an error and will hold following jobs.

To solve the problem and rerun the job you use SDF and the error handling function in OPC/ESA.

```

----- MODIFYING OPERATIONS IN THE CURRENT PLAN   ROW 1 TO 9 OF 11
Command ==>                                       Scroll ==> PAGE

Enter the GRAPH command above to view list graphically, or,
enter any of the following row commands:
J - Edit JCL, O - Browse operator instructions, M - Modify operation details
D - Delete Operation, B - Browse operation details, DEL - Delete Occurrence

Row  Application id  Operation Jobname  Input Arrival  Dura-  Opt  Depen  S
cmd                                     ws  no.  Date    Time  tion  S  T  Su  Pr
'''  AS400A4          AC04  010  AS400J3  93/08/25  19.49  0.01  Y  N  1  0  C
'''  AS400A4          AG04  011  AS400J3  93/08/25  19.49  0.01  Y  N  2  1  C
'''  AS400A4          AC05  020  AS400J3  93/08/25  19.49  0.01  Y  N  1  1  C
'''  AS400A4          AG05  021  AS400J3  93/08/25  19.49  0.01  Y  N  1  1  C
'''  AS400A4          AC06  030  AS400J3  93/08/25  19.49  0.01  Y  N  1  1  C
'''  AS400A4          AG06  031  AS400J3  93/08/25  19.49  0.01  Y  N  1  1  E
'''  AS400A4          CPU   040  VERIFY1  93/08/25  19.49  0.01  Y  N  0  1  W

F13=HELP    F14=SPLIT    F15=END     F16=RETURN   F17=RFIND   F18=RCHANGE
F19=UP      F20=DOWN     F21=SWAP    F22=LEFT     F23=RIGHT   F24=RETRIEVE

```

Figure 149. This Application Intermixes AS/400 Jobs and an MVS Job

**Error Recovery:** SDF supplies the complete message which has been sent from the AS/400 as a result of the unsuccessful execution of a command. OPC error handling enables you to correct the JCL and to set a starting point for a rerun.

**SDF Job Monitoring.** When an error occurs the highest level of SDF will turn red. Figure 150 shows the second level SDF job information. This entry is also red.

```
AM0JOB                S M A 0 / 4 0 0

AS/400 JOBS
SEIBMM06  13:40 : ADNAME=AS400A4 WSNAME=AG06 OPNUM=31 TYPE=E ERRCODE=CPF2863 M

09/15/93 13:56

====>
1=HELP 2=DETAIL 3=RET 4=DELETE 5= 6=ROLL 7=UP 8=DN 9=TAPE 10=LF 11=RT 12=TOP
```

Figure 150. OPC Job that has Ended in Error is Colored Red

Figure 151 displays the message the AS/400 sent as a response to the Copy File command with the parameter CRTFILE(\*YES). As the file already exists, the command must be changed to succeed.

```
----- DETAIL STATUS DISPLAY -----                                1 OF 1

COMPONENT: SEIBMM05          SYSTEM   : MCC
COLOR      : RED             PRIORITY : 130
DATE       : 09/15/93        TIME     : 13:40:38
REPORTER   : AUTOAM0         NODE      : DSKA0
REFERENCE VALUE: AS400A431

13:40 : ADNAME=AS400A4 WSNAME=AG06 OPNUM=31 TYPE=E ERRCODE=CPF2863
MBROPT(*ADD) OR (*REPLACE) REQUIRED FOR EXISTING TO-FILE

====>
1=HELP 3=RETURN 6=ROLL 7=UP 8=DOWN 9=ASSIST 10=DELETE 11=BOTTOM
```

Figure 151. Detailed Job Information

The detail screen displays the complete OS/400 message text.



*OPC/ESA Error Handling.* Error handling enables you to correct the cause of the error and set the restart point. See Figure 152 on page 163.

```

----- RERUNNING AN OCCURRENCE IN THE CURRENT PLAN ROW 6 TO
Command ==>                               Scroll ==> PAGE

Enter/change data below and/or
enter any of the following row commands:
0 - Browse operator instructions J - Edit JCL, S - Set restart point

Application      : AS400A4          SAMP4 AS/400 COPY FILE
Input arrival    : 93/09/15 13.38

DEADLINE DATE    ==> 93/09/15      Date in format YY/MM/DD
DEADLINE TIME    ==> 14.00         Time in format HH.MM
PRIORITY         ==> 5             1-9 where 1=low, 8=high and 9=urgent
ERROR CODE       ==> _____   For reporting purposes

Row  Operation                               Jobname  Status Error
cmd  ws   no. text                               code
'    AG05 031                               AS400J3   E    U063
'    AC06 040                               AS400J3   W
'    AG06 041                               AS400J3   W
'    CPU 050                               VERIFY1   W
***** BOTTOM OF DATA *****
F13=HELP      F14=SPLIT  F15=END      F16=RETURN  F17=RFIND  F18=RCHA
F19=UP        F20=DOWN   F21=SWAP    F22=LEFT   F23=RIGHT  F24=RETR

```

Figure 152. Error Handling of JCL that has Ended Abnormally

Figure 153 shows the edited JCL with the new parameter settings. When this change has been done you rerun the application from this point. SDF will be updated and the color of the job entry will change to yellow when the job is received at the destination node and then to green when the execution starts. A job that ends normally is not displayed by SDF, but the completion status column of OPC/ESA is updated.

```

----- EDITING JCL FOR AN MVS JOB -----
Command ==>                               Scroll ==> PAGE

Edit JCL below and press END to finish or CANCEL to reject:

Application      : AS400A4          SAMP4 AS/400 COPY FILE
Operation        : AC06 30
Status of operation : Completed
Jobname          : AS400J3          JCL last updated by: AURELL

000010 SEIBMM05
000011 AS400A4 AC06 030
000012 //*OPC BEGIN ACTION=NOSCAN
000013 /*
000014 //      DD DATA,DLM=$$
000015 CPYF FILE(QGPL/QCLSRC) TOFILE(AMOLIB/QCLSRC) MBROPT(*REPLACE)
000016 CALL PGM(AMOLIB/AM0001A) PARM(' RUN')
000017 $$
000018 //*OPC END ACTION=NOSCAN
***** BOTTOM OF DATA *****
F13=HELP      F14=SPLIT  F15=END      F16=RETURN  F17=RFIND  F18=RCHANGE
F19=UP        F20=DOWN   F21=SWAP    F22=LEFT   F23=RIGHT  F24=RETRIEVE

```

Figure 153. Editing the AS/400 Command

**AS/400 Job Tracker Function:** The AS/400 catcher job is AMOSRV. It routes the job data from OPC to the job server(JOBSRV) which executes the job and tracks the result.

Routing of jobs is performed in the same way as described for the SMAO/400 Remote Command Facility. See "Function Overview" on page 156.

```

                                Work with Active Jobs                                S44AA647
                                                08/13/93  14:46:23
CPU %:      7.4      Elapsed time:  00:00:19      Active jobs:   50

Type options, press Enter.
  2=Change  3=Hold  4=End  5=Work with  6=Release  7=Display message
  8=Work with spooled files  13=Disconnect ...

Opt  Subsystem/Job  User      Type  CPU %  Function      Status
  AMO              QSYS      SBS    .0      DEQW
  ALRSRV           SMA0400   BCH    .0      PGM-AM0999I   DEQW
  AMOSRV           SMA0400   BCH    .3      PGM-AM0735A   MSGW
  CMDSRV           SMA0400   BCH    .0      PGM-AM0723I   DEQW
  HBTSRV           SMA0400   BCH    .0      PGM-AM0502I   DEQW
  JOBSRV           SMA0400   BCH    .5      PGM-AM0722I   RUN
  PFRSRV           SMA0400   BCH    .0      PGM-AM0807I   DEQW
  QBATCH           QSYS      SBS    .0      DEQW
  QCMN             QSYS      SBS    .0      DEQW

                                                                More

Parameters or command
====>
F3=Exit      F5=Refresh  F10=Restart statistics  F11=Display elapsed data
F12=Cancel   F23=More options  F24=More keys

```

Figure 154. AS/400 Job Server

---

## Chapter 4. Remote Monitoring

It is often desirable to concentrate the control of a network at a central site. One of the reasons for doing this is to concentrate all the skills within an organization at one site rather than have them spread out thinly throughout the organization.

---

### 4.1 NetView Remote Operations for AS/400 Monitoring

In this topic we will be discussing using the NetView Remote Operations product to monitor an AS/400 or network of AS/400s.

To successfully implement any sort of monitoring of your AS/400 network from NetView some customization must be done at NetView. The reason for this is that the NetView Remote Operations for AS/400 product does not supply ready made solutions for monitoring. It is up to the local support staff to implement monitoring using the available NetView facilities in conjunction with the NetView Remote Operations for AS/400 product. Here are some possibilities:

- Set up CLIST (Command List) to monitor required resource.
- Set NetView Timer to periodically execute monitor CLIST.
- Take required action based on result.

#### 4.1.1 Scenario to Check Subsystem Status

In this scenario, we have created two CLISTs which we have added to our NetView CLIST library. This CLIST checks the status of subsystem QSNADS every 15 minutes. If the subsystem is found to be inactive, an attempt is made to automatically restart the subsystem.

##### 4.1.1.1 CLIST to set NetView Timer

This is the sample CLIST to set a timer in NetView to execute CLIST SBSCHK every fifteen minutes.

```
/******  
/* TRIGGER: */  
/* CLIST to set NetView Timer to call CLIST */  
/* SBSCHK every 15 minutes */  
/******  
'LOADCL SBSCHK' /* LOAD CLIST INTO MAIN */  
/* STORAGE */  
'EVERY 00:15:00,SBSCHK' /* SET TIMER TO EXECUTE */  
/* CLIST SBSCHK */
```

##### 4.1.1.2 CLIST to Check AS/400 Subsystem

This is the sample CLIST to check subsystem QSNADS every 15 minutes and recover if the subsystem is inactive.

```
/******  
/* SBSCHK */  
/* CLIST TO MONITOR SUBSYSTEM QSNADS */  
/* Parameters: */  
/* CLIST called from CLIST TRIGGER which sets NetView Timer */  
/* to check subsystem every 15 minutes */  
/******  
'TRAP AND SUPPRESS MESSAGES FNA556I' /* TRAP RESULTS OF COMMAND */
```

```

'OPSMGMT DSPSBSD QSNADS'                /* SEND COMMAND TO AS/400 */
'WAIT 30 SECONDS FOR MESSAGES'           /* WAIT FOR MESSAGES      */
'MSGREAD'                                /* READ FIRST MESSAGE ON Q */
'MSGREAD'                                /* READ SECOND MESSAGE ON Q*/
STATUS = MSGVAR(22)                      /* SET VARIABLE STATUS TO  */
                                           /* VALUE OF 22ND TOKEN     */
UPPER STATUS                             /* UPPERCASE STATUS        */
IF STATUS=' INACTIVE'                    /* CHECK SUBSYSTEM STATUS  */
  THEN DO
    SAY 'SUBSYSTEM QSNADS INACTIVE, ATTEMPTING RECOVERY'
    'OPSMGMT STRSBS QSNADS'              /* IF INACTIVE - RESTART  */
  END
ELSE IF STATUS=' ACTIVE' THEN SAY 'QSNADS CURRENTLY ACTIVE'

```

### 4.1.2 Executing the Scenario

In our scenario of monitoring subsystem QSNADS the following sequence of events will occur:

1. The operator logs on and issues CLIST TRIGGER.

This will load CLIST SBSCHK into main storage. The reason for this is that the CLIST SBSCHK will be called often during the operator session and the CLIST will not have to be reloaded into main storage at every invocation. A NetView timer is set under the operator OST (Operator Station Task) to execute CLIST SBSCHK every fifteen minutes.

2. CLIST SBSCHK is executed every fifteen minutes.
3. If the subsystem is inactive, the CLIST attempts to restart it.
4. The status of the subsystem is reported to the operator.

Events 2 to 4 are repeated every 15 minutes of the operator session. The operator logs on and types TRIGGER on the command line.

```

                                N E T V I E W   RA3AN FORTUIN  09/09/93 14:32:38
TRIGGER
CNM408I COMMAND LIST SBSCHK ALREADY LOADED - REPLACE NOT SPECIFIED
DSI034I COMMAND SCHEDULED BY AT/EVERY/AFTER COMMAND - 'SBSCHK'
DSI201I TIMER REQUEST SCHEDULED FOR EXECUTION 'ID=SYS00002'

```

By entering the NetView command LIST TIMER=ALL the operator can see the timer that has been scheduled for running CLIST SBSCHK.

```

NCCF                                N E T V I E W    RA3AN FORTUIN  09/09/93 14:34
* RA3AN      LIST TIMER=ALL
' RA3AN P
DISPLAY OF OUTSTANDING TIMER REQUESTS
TYPE: EVERY      TIME: 09/09/93 14:47:29      INTERVAL: 00:15:00
COMMAND: SBSCHK
OP: FORTUIN      ID: SYS00002
001  TIMER ELEMENT(S) FOUND FOR FORTUIN

END OF DISPLAY

```

By entering the NetView command MAPCL SBSCHK the operator can see the CLIST SBSCHK loaded in main storage, the date and time that it was loaded and how much memory the CLIST is using.

```

NCCF                                N E T V I E W    RA3AN FORTUIN  09/09/93 14:37
* RA3AN      MAPCL SBSCHK
' RA3AN
CNM429I MAPCL DISPLAY
NAME      USAGE      RECORDS  BYTES    DATE      TIME      DP  R/C
-----
SBSCHK      7          21      2640    09/09/93  13:42:42  --  R
1            7          21      2640    --TOTALS--
-----

```

After expiration of the NetView timer the CLIST SBSCHK is executed with the result that subsystem QSNADS is found to be inactive and is restarted by the CLIST.

```

                                N E T V I E W    RA3AN FORTUIN  09/09/93 15:47:29
DSI208I TIME EXPIRATION - ID= 'SYS00002' - CMD= 'SBSCHK'
SBSCHK
FNA550I 31, OPSMGMT COMMAND ACCEPTED, REPLY=ALL, NETID=USIBMRA,
LU=RALYAS4A, APPL=EP_OPS, BEGTIME=*, ENDTIME=*, CMD='DSPSBSD QSNADS'
SUBSYSTEM QSNADS INACTIVE, ATTEMPTING RECOVERY
FNA550I 32, OPSMGMT COMMAND ACCEPTED, REPLY=ALL, NETID=USIBMRA,
LU=RALYAS4A, APPL=EP_OPS, BEGTIME=*, ENDTIME=*, CMD='STRSBS QSNADS'
FNA558I 31, OPSMGMT COMMAND ACCEPTED BY THE REMOTE SYSTEM,
CMD='DSPSBSD QSNADS'
FNA558I 32, OPSMGMT COMMAND ACCEPTED BY THE REMOTE SYSTEM,
CMD='STRSBS QSNADS'
FNA555I 31, COMMAND COMPLETED SUCCESSFULLY
FNA591I 31, NO MORE REPLIES ARE EXPECTED FOR THIS REQUEST
FNA555I 32, COMMAND COMPLETED SUCCESSFULLY
FNA591I 32, NO MORE REPLIES ARE EXPECTED FOR THIS REQUEST
-----

```

After the second execution of the CLIST, the operator sees that the subsystem QSNADS has been successfully recovered.

```
      N E T V I E W   RA3AN FORTUIN  09/09/93 15:02:30
DSI208I TIME EXPIRATION - ID= 'SYS00002' - CMD= 'SBSCHK'
SBSCHK
FNA550I 33, OPSMGMT COMMAND ACCEPTED, REPLY=ALL, NETID=USIBMRA,
LU=RALYAS4A, APPL=EP_OPS, BEGTIME=*, ENDTIME=*, CMD='DSPSBSD QSNADS'

QSNADS CURRENTLY ACTIVE

FNA558I 33, OPSMGMT COMMAND ACCEPTED BY THE REMOTE SYSTEM,
CMD='DSPSBSD QSNADS'
FNA555I 33, COMMAND COMPLETED SUCCESSFULLY
FNA591I 33, NO MORE REPLIES ARE EXPECTED FOR THIS REQUEST
```

This scenario is just an attempt to show that with a little customization it is possible to set up the NetView Remote Operations product for effective remote operations.

## 4.2 SMAO/400 Remote Subsystem Monitoring

This section will describe a scenario where the objective is real-time monitoring of AS/400 subsystems from a MVS focal point. The SMAO functions that are used and described in this scenario are monitoring and automation. For general information about SMAO, see Appendix E, "Systems Management Automation Offering (SMAO)" on page 253.

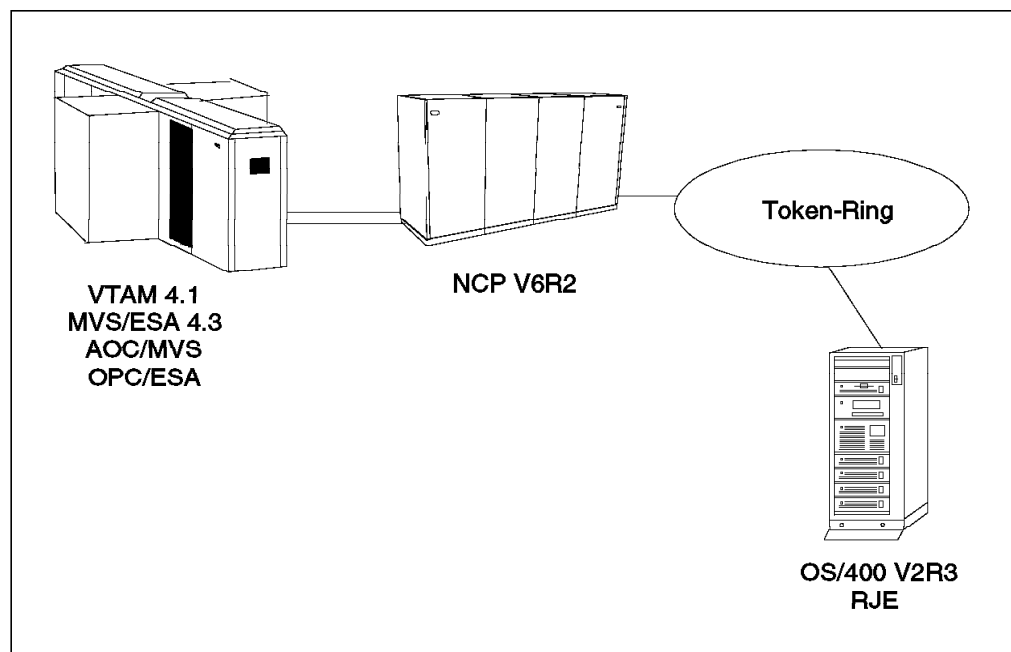


Figure 155. Basic Software Configuration for SMAO/400 Remote Subsystem Monitoring

## 4.2.1 Function Overview

The control point for the SMAO/400 monitoring function is the SDF screen in NetView. This screen receives data from the AS/400 network. The data is retrieved at each AS/400, with SMAO installed, and is transported to NetView in an alert and contains the names of the active subsystems of the specific AS/400 node. This is executed within a parameter set time interval and is referred to as the heartbeat function. The data is displayed and color coded by SDF. A green entry means all subsystems are running, a yellow entry means one or more subsystems are inactive, and red entry means that no information has been received within the heartbeat time interval.

## 4.2.2 AS/400 Setup

This section presents the preparation you have to do in the AS/400.

### 4.2.2.1 Work with Message Table (WRKMSGTBL)

As the snapshot of active subsystems is taken every 10th or 30th minute or with any time interval, there is always a delay in time before the information is sent to the host. To benefit from a real time monitoring of the subsystems you have to enable the automation function of SMAO. This function is set up and managed locally. You have to add the appropriate entries to message table. These entries include message IDs you want the system to act upon and the action that is to be taken. The message table can be sent to other nodes.

In this scenario we will add some entries handling subsystem status. See Appendix E, "Systems Management Automation Offering (SMAO)" on page 253 for further information.

**SMAO/400 Main Menu.** By entering GO SMAOMAIN on the command line the main menu for SMAO/400 will be displayed. For a description of all the options, see Appendix E, "Systems Management Automation Offering (SMAO)" on page 253. Select option 1 to work with the message automation table.

```
SMAOMAIN                      SMAO/400 Main Menu                      System:  S44AA467

Select one of the following:

    1. Work with message table
    2. Work with SLR/400
    3. Start SLR/400 monitor
    4. Select SMAO/400 command
    5. Work with SMAO/400 installation

    90. Signoff

Selection or command
===> _____

F3=Exit  F4=Prompt  F9=Retrieve  F12=Cancel
(C) COPYRIGHT IBM CORP. 1993.
```

Figure 156. SMAO Main Menu

**Add message table entry.** This describes the sequence of screens that is used for maintaining the automation table. When you have entered the WRKMSGTBL command or selected option 1 from SMAOMAIN, the present entries in the table will be displayed. See Figure 157 on page 170.

```

Work with Message Automation Table

Position to . . . . . Message-ID
Type options, press Enter.
2=Change 4=Remove 5=Display Message Description

Opt Message ID Action
_ CAE0002 STRSBS QBATCH

F3=Exit F12=Cancel F9=System Command F6=Add Entry

```

Figure 157. SMAO Command WRKMSGTBL

By pressing F6 for adding a new entry the Add Message Table Entry will display. If you have all the parameter values, just enter them and press Enter and your new entry will be added. But if you are not familiar with the message ID or want support for the command syntax these two parameters have prompt support. See Figure 158.

```

Add Message Table Entry (ADDMSGTBLE)

Type choices, press Enter.

Message ID . . . . . _____
Sequence number . . . . . ____
Comparison data . . . . . _____
Start position . . . . . ____
Command to execute . . . . . _____
Text . . . . . _____

F3=Exit F4=Prompt F6=Work with reply list F9=System Command F12=Cancel

```

Figure 158. SMAO Command ADDMSGTBLE

Figure 159 on page 171 is the screen that is displayed when you request the prompt support for the message ID parameter. From this screen you can either position to a specific message ID or search for a string in the message description. If you are interested in subsystem monitoring you need to get the appropriate message ID with descriptions containing the word subsystem. Type the searched character string in the description input field and press Enter. You



will receive the correct message IDs and are able to make a selection. This is made by typing 1 in the option field and press Enter.

```

Display message description

Position to . . . . . Description
Type options, press Enter.
1=Select 5=Work with Message Description

Opt Message ID Description
1 CPF0927 Subsystem &1 ended.
_ CPF0929 Function check during subsystem ending.
_ CPF0933 Controlling subsystem ended unexpectedly.System is ending
_ CPF0943 Ending of subsystem &1 in progress.
_ CPF0969 Controlling subsystem ended to restricted condition.
_ CPF0970 Subsystem &1 ended.
_ CPF0993 Start of controlling subsystem in progress during IPL.
_ CPF0995 Subsystem &1 ending in progress.
_ CPF1003 Subsystem &1 not active.
_ CPF1004 Function check occurred during start subsystem.
_ CPF1010 Subsystem name &1 active.
_ CPF1011 Start subsystem failed for SBS&1 in library &2.

F3=Exit F12=Cancel F6=Work with Alert Table F9=System Command

```

Figure 159. String Search of Message Description is Enabled by Prompt Support

The message ID is transferred to the previous screen and the sequence number is incremented. You complete the command by typing the rest of the parameter values.

```

Add Message Table Entry (ADDMSGTBLE)

Type choices, press Enter.

Message ID . . . . . CPF0927
Sequence number . . . . _1
Comparison data . . . . QBATCH
Start position . . . . _1
Command to execute . . . . SNDHBT

Text . . . . . Send heartbeat with subsystem information to host

F3=Exit F4=Prompt F6=Work with reply list F9=System Command F12=Cancel

```

Figure 160. Add Message Table Entry with the Retrieved Prompt Information

#### 4.2.2.2 Start the Message Server (STRMSGSRV)

To activate the automation function you have to start the message server. This job should be submitted to the controlling subsystem and the default job queue value is QSYS/QCTL. This command can initiate a number of jobs that each will receive messages from the specified message queues. In this scenario we will only be receiving messages from the system operator message queue. This is

the default message queue for the system to send information about status changes of the subsystems.

Start Message Server Function (STRMSGSRV)

Type choices, press Enter.

Message queue . . . . .

Library . . . . .

+ for more values

QSYSOPR\_\_

\*LIBL\_\_

\_\_\_\_\_

\*LIBL\_\_

Name

Name, \*LIBL

Job queue . . . . .

Library . . . . .

QCTL\_\_

QSYS\_\_

Name

Name

F3=Exit

F4=Prompt

F5=Refresh

F12=Cancel

F13=How to use this display

Figure 161. Start of Message Server Job that will Monitor the QSYSOPR Queue

### 4.2.3 Scenario

With everything set in the AS/400 we can start the scenario.

In this scenario the only applicable entry is the Systems entry in the AS/400 column. As this entry is red we have one or more systems inactive at the moment. See Figure 162.

Complete information about the AS/400 entries on the SDF screen is covered by Appendix E, “Systems Management Automation Offering (SMAO)” on page 253.

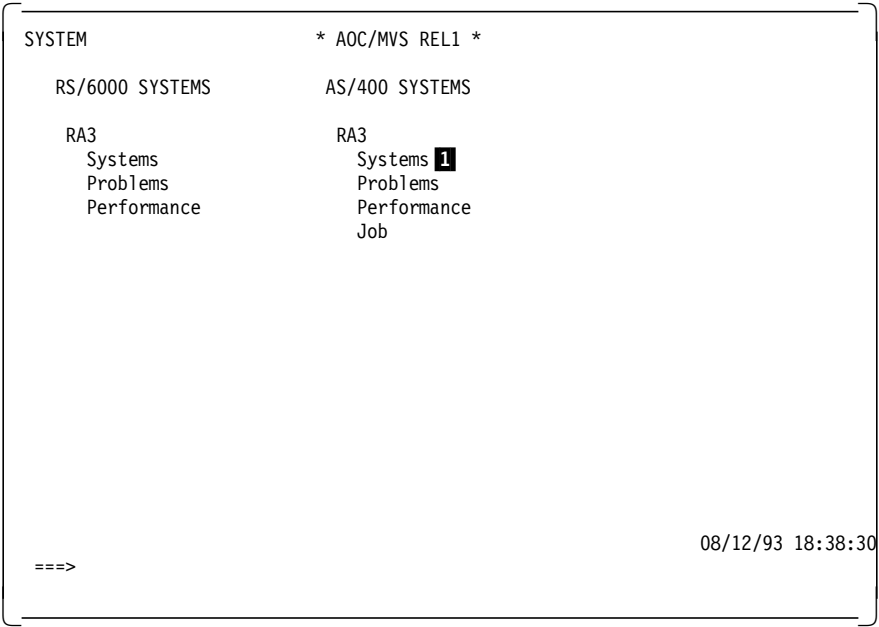


Figure 162. The Single Point of Control SDF Screen

To look at details you position the cursor on the Systems entry and press PF8. See Figure 163.

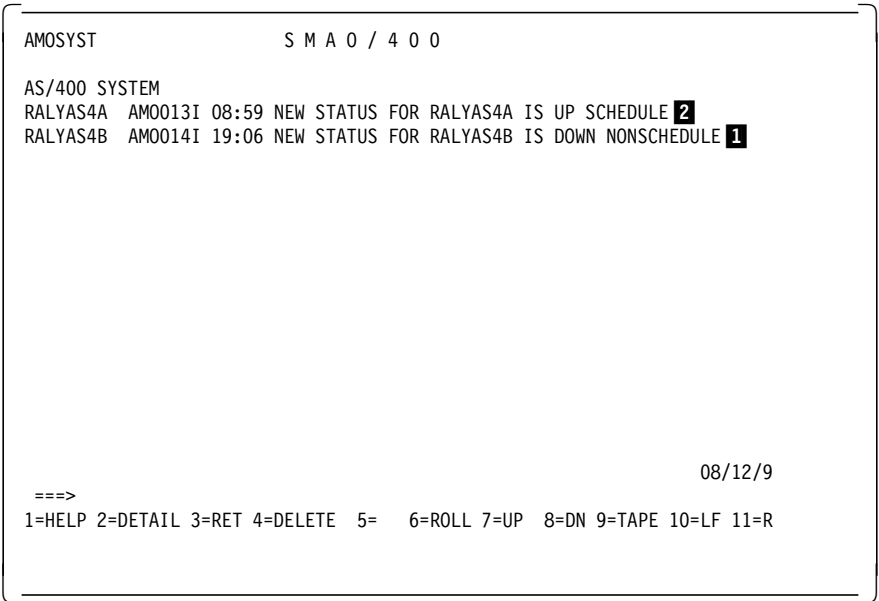


Figure 163. SDF Detailed Information of Monitored AS/400s

Our test AS/400 is RALYAS4A and it is coded green. Then we end subsystem QSNADS in this system.

```

                                End Subsystem (ENDSBS)

Type choices, press Enter.

Subsystem . . . . . QSNADS_____ Name, *ALL
How to end . . . . . *IMMED          *CNTRLD, *IMMED
Delay time, if *CNTRLD . . . . . *NOLIMIT      Seconds, *NOLIMIT


                                                                    Bottom
F3=Exit  F4=Prompt  F5=Refresh  F12=Cancel  F13=How to use this display
F24=More keys

```

Figure 164. Immediate Ending of the QSNADS Subsystem

The SDF screen responds with a change of color and text for the RALYAS4A entry. On the highest level screen there will be no change of color as the worst condition still is a system that is not reporting.

```

AMOSYST                      S M A 0 / 4 0 0

AS/400 SYSTEM
RALYAS4A AM0013I 08:59 SUBSYSTEM QSNADS AT RALYAS4A IS DOWN SCHEDULE 3
RALYAS4B AM0014I 19:06 NEW STATUS FOR RALYAS4B IS DOWN NONSCHEDULE 1


                                                                    08/12/93 18:39:40
====>
1=HELP 2=DETAIL 3=RET 4=DELETE 5= 6=ROLL 7=UP 8=DN 9=TAPE 10=LF 11=RT 12=TOP

```

Figure 165. SDF Second Level Information

#### Colors:

- 1** Red
- 2** Green
- 3** Yellow

After a restart of QSNADS you should look at the second level system the SDF screen. The RALYAS4A entry has changed to green meaning that all monitored subsystems are running.

**When an action has been executed, a message is sent to the QHST log.** The data is put into the AMO0003 message and contains information about monitored message queue and what action that has executed. This message can be analyzed, by using SLR reports, for tracking and follow-up on the degree of automation. See Figure 166.

Additional Message Information

Message ID . . . . . : AMO0003      Severity . . . . . : 00

Message type . . . . . : Information

Job . . : QSYSOPR      User . . : SMA0400      Number . . . : 022445

Date sent . . . . . : 08/15/93      Time sent . . . . . : 18:22:40

Message . . . . . : Message-ID CPF0927 received from message queue QSYSOPR

Library \*LIBL. Message text : Subsystem QSNADS ended.. The following action

has been taken : SNDHBT

Press Enter to continue.

F3=Exit   F6=Print   F12=Cancel   F21=Select assistance level

Figure 166. Follow-up on Local Automation



## Chapter 5. Automation

The ability to automate operations on systems throughout the network means that certain repetitive tasks can be performed by a system rather than a human operator. This means that the human operator can be more effectively deployed in situations where judgement is required.

### 5.1 AUTOMATION CENTER/400

In this section, the use of SystemView AUTOMATION CENTER/400 to automate network management operations on the AS/400 will be examined.

The automation scenario that will be used calls for monitoring disk utilization greater than 85% in the system ASP (Auxiliary Storage Pool).

In order to do this, a "situation" has to be created in OMEGAMON/400. OMEGAMON/400 monitors events on the AS/400 and passes the information to OMEGAVIEW/400 and/or to AUTOMATION FACILITIES/400. OMEGAVIEW/400 runs on an AS/400-attached PS/2 under OS/2.

Entering the command G0 OMSRV brings up the OMEGAMON/400 main menu.

OMSRV

IBM OMEGAMON/400

System: RALYAS4A

Select one of the following:

1. Display situation status
2. Work with situations
3. Display log
4. Start IBM OMEGAMON/400
5. End IBM OMEGAMON/400
6. Display policy status
7. Work with policies
8. Work with ranking groups
9. Start AUTOMATED FACILITIES/400
10. End AUTOMATED FACILITIES/400
21. Configure IBM OMEGAMON/400

Selection or command  
==> 2

---

F3=Exit F4=Prompt F9=Retrieve F12=Cancel F13=Information Assistant  
F16=AS/400 Main menu

Figure 167. OMEGAMON/400 Main Menu

Type 2 and press Enter to work with situations.

Work with Situations			
Type options, press enter.			
1=Create   2=Change   4=Delete   5=Display   6=Print   9=Start   10=End			
Opt	Situation	Active	Text
<u>1</u>	<u>CHECK ASP1</u>		
—	CHECK_LINE	No	
—	CHECK_SBS	No	
—	FIND_LINE01	No	
—	HIGH_JOB_CPU	No	
—	STATUS_LINE	No	
<b>Bottom</b>			
Parameters for option 2 or command:			
====> _____			
F3=Exit   F4=Prompt   F5=Refresh   F6=Print   F9=Retrieve			
F11=Alternate view   F12=Cancel			

Figure 168. OMEGAMON/400 Work with Situations Panel

Option 1 to create a situation is entered and the name "CHECK\_ASP1" is entered as the name of the situation to monitor for a disk usage of more than 85% in the AS/400 system ASP.

Create Situation (CRTOMSIT)			
Type choices, press Enter.			
Situation . . . . .	> 'CHECK_ASP1'	Character value	
Predicate relation . . . . .	<u>*SNGPDT</u>	*AND, *OR, *SNGPDT	
Predicate data:			
Function . . . . .	<u>*VALUE</u>	*VALUE, *AVG, *COUNT, *MAX...	
Attribute or situation . . . . .	<u>*STS ASP PCT USED</u>		
Relational operator . . . . .	<u>*GT</u>	*EQ, *GE, *GT, *LE, *LT, *NE	
Compare value . . . . .	<u>85</u>		
_____ + for more values _____			
Autostart . . . . .	<u>*NO</u>	*YES, *NO	
Monitor interval:			
Days . . . . .	<u>0</u>	Days	
Time . . . . .	<u>000500</u>	000030-235959	
Send alert . . . . .	<u>*YES</u>	*NO, *YES	
Message queue . . . . .	<u>*NONE</u>	Name, *NONE	
Library . . . . .	_____	Name, *LIBL, *CURLIB	
<b>More...</b>			
F3=Exit   F4=Prompt   F5=Refresh   F12=Cancel   F13=How to use this display			
F24=More keys			

Figure 169. OMEGAMON/400 Create Situation - Panel 1 of 2

The Autostart field should be changed to \*NO as the situation should not be started when IBM OMEGAMON/400 starts. The Send Alert field should be



Create Situation (CRTOMSIIT)

Type choices, press Enter.

Text . . . . .

CHECK SYSTEM ASP > 85%

F3=Exit

F4=Prompt

F5=Refresh

F12=Cancel

F13=How to use this display

F24=More keys

Bottom

The next step in the process is to create a simple policy. A policy evaluates the situation that has been created (CHECK\_ASP1). It has been decided that if this particular situation is evaluated as being true, then save files on the system should be deleted to free up disk space in the system ASP.

Figure 171. OMEGAMON/400 Main Menu

Chapter 5. Automation **179**

```

Work with Policies (WRKAFCY)

Type choices, press Enter.

Policy . . . . . *ALL
F3=Exit  F4=Prompt  F5=Refresh  F12=Cancel  F13=How to use this display
F24=More keys
Bottom

```

Figure 172. Work with Policies - Panel 1 of 2

Press Enter to work with all the currently created policies.

The next Work with Policies panel is displayed:

```

Work with Policies

Type options, press enter.
  1=Create  2=Change  4=Delete  5=Display  6=Print
  8=Work with activities  9=Start  10=End

Opt Policy Active Text
1 DELETE_SAVF
Parameters for option 2 or command:
===>
F3=Exit  F4=Prompt  F5=Refresh  F6=Print  F9=Retrieve
F11=Alternate view  F12=Cancel
Bottom

```

Figure 173. Work with Policies - Panel 2 of 2

Enter Option 1 to create a policy and call it DELETE\_SAVF (Delete Save Files).

```

Create Policy (CRTAFPCY)

Type choices, press Enter.

Policy . . . . . > 'DELETE_SAVF'
Autostart . . . . . *NO *NO, *YES
Restart after error . . . . . *YES *NO, *YES
Limit excessive restarts . . . . . *NO *NO, *YES
Text . . . . . If System-ASP > 85% - delete SAVF
F3=Exit  F4=Prompt  F5=Refresh  F12=Cancel  F13=How to use this display
F24=More keys
Bottom

```

Figure 174. Create Policy Panel

Policies should usually be started manually, instead of by using the Autostart option, because system performance degradation may be experienced if all policies within OMEGAMON/400 are started automatically. The STRAFPCY (Start Policy) command can be used to start a policy manually.

Specify Restart after error as \*YES. This parameter ensures that when the policy reaches the last activity it will automatically restart again at the first activity.

The Limit excessive restarts parameter should be changed to \*NO. If \*YES is specified, the policy will only restart five times.

The next step in automating the scenario is to specify what activities must take place if the policy evaluates the situation of disk utilization in the system ASP as being true. Pressing Enter from the panel shown in Figure 174 on page 180 brings up the following panel:

Work with Activities

Policy . . . . . : DELETE\_SAVF

Type options, press enter.  
1=Add 2=Change 4=Remove

Opt	Activity	Type
<u>1</u>	ACT 1	

Parameters for option 2 or command:  
===>

F3=Exit F4=Prompt F5=Refresh F6=Print F9=Retrieve  
F11=Alternate view F12=Cancel F15=Verify Policy

Bottom

Figure 175. Work with Activities Panel

It has been determined that three activities are necessary to implement the policy. The names of these three activities are ACT\_1 to ACT\_3.

The first activity, ACT\_1, is entered.

**Please Note!**

The Activity input field is case sensitive. Therefore, act\_1 and ACT\_1 are regarded by OMEGAMON/400 as being two completely different activities.

Press Enter from the Work with Activities panel in Figure 175 to bring up the Add Activity panel:

**Add Activity (ADDAFACT)**

Type choices, press Enter.

Activity . . . . . > 'ACT\_1'      Character value

Policy . . . . . > 'DELETE\_SAVF'

Activity type . . . . . \*ACTPGM      \*ACTPGM, \*PCY, \*SIT

Activity object . . . . . > \*EVALUATE\_SITUATION

Predecessor:

    Predecessor activity . . . . . > \*FIRST

    Proceed to this activity . . . . . \*ALWAYS      \*ALWAYS, \*FALSE, \*NOACT...

        + for more values

Program parameters . . . . . CHECK\_ASP2

        + for more values

**Bottom**

F3=Exit    F4=Prompt    F5=Refresh    F12=Cancel    F13=How to use this display

F24=More keys

Figure 176. Add Activity Panel

The following parameters are entered:

- Activity  
'ACT\_1'. This is an activity program that evaluates the situation to determine whether or not the event is occurring.
- Policy  
'DELETE\_SAVF'. This is the name of the policy.
- Activity type  
\*ACTPGM. This specifies that the type of activity is a program.
- Activity object.  
\*EVALUATE\_SITUATION. This is the name of the activity program.
- Predecessor activity  
\*FIRST. This is the first activity in the policy.
- Proceed to this activity  
\*ALWAYS. This activity within the policy must always be proceeded to.
- Program parameters  
CHECK\_ASP2. This specifies which activity program parameters the activity program must use.

The second activity, ACT\_2 is added.

**Work with Activities**

Policy . . . . . : DELETE\_SAVF

Type options, press enter.  
1=Add 2=Change 4=Remove

Opt	Activity	Type
1	ACT_2	
_	ACT_1	*ACTPGM

**Bottom**

Parameters for option 2 or command:  
==>

---

F3=Exit F4=Prompt F5=Refresh F6=Print F9=Retrieve  
F11=Alternate view F12=Cancel F15=Verify Policy

Figure 177. Work with Activities Panel

**Add Activity (ADDAFACT)**

Type choices, press Enter.

Activity . . . . . > 'ACT\_2' Character value

Policy . . . . . > 'DELETE\_SAVF'

Activity type . . . . . \*ACTPGM \*ACTPGM, \*PCY, \*SIT

Activity object . . . . . > DELETE FILE

Predecessor:

Predecessor activity . . . . . > ACT\_1

Proceed to this activity . . . > \*TRUE \*ALWAYS, \*FALSE, \*NOACT...

+ for more values \_

Program parameters . . . . . SAVFIL

+ for more values SAVFLIB

**Bottom**

F3=Exit F4=Prompt F5=Refresh F12=Cancel F13=How to use this display  
F24=More keys

Figure 178. Add Activities Panel

Activity two (ACT\_2) is an activity program that deletes files. The save file name and the library in which it resides are specified in the program parameters.

This activity must only be proceeded to if ACT\_1 was evaluated as being true.

The third activity, ACT\_3 is added.

Work with Activities		
Policy . . . . . : DELETE_SAVF		
Type options, press enter. 1=Add 2=Change 4=Remove		
Opt	Activity	Type
<u>1</u>	<u>ACT_3</u>	
-	ACT_2	*ACTPGM
-	ACT_1	*ACTPGM
		<b>Bottom</b>
Parameters for option 2 or command: ==>		
F3=Exit F4=Prompt F5=Refresh F6=Print F9=Retrieve F11=Alternate view F12=Cancel F15=Verify Policy		

Figure 179. Work with Activities Panel

Add activity three (ACT\_3).

Add Activity (ADDAFACT)		
Type choices, press Enter.		
Activity . . . . .	> 'ACT_3'	Character value
Policy . . . . .	> 'DELETE_SAVF'	
Activity type . . . . .	<u>*ACTPGM</u>	*ACTPGM, *PCY, *SIT
Activity object . . . . .	> <u>*CHANGE POLICY</u>	
Predecessor:		
Predecessor activity . . . . .	> <u>ACT_1</u>	
Proceed to this activity . . .	> <u>*FALSE</u>	*ALWAYS, *FALSE, *NOACT...
+ for more values -		
Program parameters . . . . .	<u>DELETE SAVF</u>	
+ for more values <u>*INACTIVE</u>		
		<b>Bottom</b>
F3=Exit F4=Prompt F5=Refresh F12=Cancel F13=How to use this display F24=More keys		

Figure 180. Add Activities Panel

Select the activity program CHANGE\_POLICY. This activity is used to end the policy if there are no files to be deleted. It causes the activity to become inactive. This activity must be proceeded to when ACT\_1 is evaluated as being false.

Once this procedure is completed, the policy can be started by selecting option 9 from the Work with Policies panel shown in Figure 181 on page 185.

**Work with Policies**

Type options, press enter.

1=Create   2=Change   4=Delete   5=Display   6=Print  
8=Work with activities   9=Start   10=End

Opt	Policy	Active	Text
9	DELETE_SAVF	No	If System-ASP > 85% - delete S

**Bottom**

Parameters for option 2 or command:  
===>

F3=Exit   F4=Prompt   F5=Refresh   F6=Print   F9=Retrieve  
F11=Alternate view   F12=Cancel

Figure 181. Work with Policies Panel

## 5.2 NetView Remote Operations for AS/400 Automation

In this topic we will be discussing using the NetView Remote Operations package running on a NetView host as a focal point to an AS/400. We will provide an automation scenario using NetView and the NetView automation table.

To successfully provide automation using AS/400 alerts the following conditions must be met:

- To receive alerts from an AS/400, a NetView focal point, which is where the automation will occur, must be specified. The AS/400 remote systems may have intermediate focal points (such as AS/400 focal point systems) as long as the intermediate focal points ultimately send the alerts to the NetView focal point.
- To receive AS/400 messages as alerts, you must specify that alerts are to be forwarded when the messages are issued at the remote AS/400 system. Refer to the *Communications and Systems Management Guide (Alerts and Distributed Systems Node Executive)*, SC41-9661 for more information about generating alerts from messages.

### 5.2.1 Scenario to Reset Operator Profile

In this scenario, an AS/400 operator has exceeded the maximum allowable logon attempts. As a result the operators profile has been disabled. The AS/400 issued message number CPF1393 to the system operator who automatically generated an alert to the appropriate NetView focal point. Having received the alert, the focal point attempts to recover, so that the local AS/400 operator can re-attempt the logon without having to call the help desk.

#### 5.2.1.1 Automation Table Entry

This is the sample automation table entry for trapping and analyzing the alert and then calling the FNAARSTP sample command list.

```

*****
* 5696-583 (C) COPYRIGHT IBM CORPORATION 1993 *
* ALL RIGHTS RESERVED. *
* NAME(FNASATB1) SAMPLE(FNASATB1) *
* DESCRIPTION: SAMPLE AUTOMATION TABLE ENTRY FOR USING NETVIEW *
* REMOTE OPERATIONS MANAGER MVS/ESA. *
*****
* Trap on message ID CPF1393 in the alert major vector. *
* Message text: *
* *
* Subsystem QINTER disabled user profile &1 on device &2 *
* *
* Save the origin netid and lu from which the alert was sent, as *
* well as the user profile in error. Then call command list *
* FNASCL1 to process the alert. *
*****

```

```

IF MSUSEG(0000.98.82 3) = HEX('212011') . &
  MSUSEG(0000.98.82 6) = 'CPF1393' . &
  MSUSEG(0000.4A.01 4) = ORIG &
  MSUSEG(0000.31.30 3) = . 'profile' PROFILE 'on' . THEN
  EXEC(
    CMD('FNAARSTP ' PROFILE ' ' ORIG)
    ROUTE(ONE FNAAUTO));

```

### 5.2.1.2 FNAARSTP Sample CLIST

```

/*****/
/* FNAARSTP */
/* CLISTA cmd list parameters: */
/* Parameters: */
/* profile: user profile */
/* orig : origin : NETID (8 bytes) */
/* LU (8 bytes) */
/* APPL (8 bytes) */
/*****/

```

```

arg profile orig
if profile='' | profile='?' then do
  say 'Format: FNASCL1 profile netid||lu'
  exit 0
end

cur_date=date('j')
onetid=strip(substr(orig,2,8))
olu=strip(substr(orig,10,8))
profile=strip(profile)
variable_name='FNA999'onetid_'olu_'profile
'GLOBALV GETC' variable_name

parse value value(variable_name) with val date_val

if val='' | -datatype(val,'W') |,
  date_val <> cur_date then do

  val=0
  date_val=cur_date
end

```



```

if val = 3 then do
    'MSG LOG FNA901 AS/400 user profile ' profile ' at LU 'olu,
    'in NETID ' onetid ' exceeded ' val ' logon retry attempts'
    'MSG LOG FNA902 Issue 'FNASRSTP profile lu netid' to reset profile'
end
else if val < 3 then do
    'MSG LOG FNA903 Sending OPSMGMT request to ' olu ' at 'onetid,
    'for user profile' profile
    'OPSMGMT REPLY=all NETID='onetid 'LU='olu 'CMD=CHGUSRPRF ',
    'USRPRF('profile') STATUS(*ENABLED)'
end
val = val + 1
if val <= 4 then do
    interpret variable_name='val date_val
    'GLOBALV PUTC' variable_name
end
return 0

```

## 5.2.2 Executing the Scenario

AS/400 operator, JOHNDOE, has made three invalid attempts to sign on to the AS/400. As a result his user profile has been disabled. Due to the implementation described above, the following has occurred. Message CPF1393 has been issued by the AS/400, generating an alert. The alert has been forwarded to the focal point system, in this case NetView. The NetView automation table has trapped and analyzed the alert and as a result has invoked FNAARSTP. We see the result in the NetView log:

```

CNM493I DSITBL01 : (NO SEQ) : FNAARSTP JOHNDOE USIBMRA RALYAS4AEP_ALERT
FNA903 SENDING OPSMGMT REQUEST TO RALYAS4A AT USIBMRA FOR USER PROFILE
JOHNDOE
FNA550I 2, OPSMGMT COMMAND ACCEPTED, REPLY=ALL, NETID=USIBMRA, LU=RALYAS4A
FNA558I 2, OPSMGMT COMMAND ACCEPTED BY THE REMOTE SYSTEM, CMD='CHGUSRPRF
USRPRF(JOHNDOE) STATUS(*ENABLED)'
FNA555I 2, COMMAND COMPLETED SUCCESSFULLY
FNA591I 2, NO MORE REPLIES ARE EXPECTED FOR THIS REQUEST

```

As a result the operator's user profile has been enabled. We see this by displaying the user profile on the AS/400 using CL command DSPUSRPRF JOHNDOE.

```
User profile . . . . . : JOHNDOE  
Previous sign-on . . . . . : 08/24/93 15:43:30  
Sign-on attempts not valid . . . . . : 0  
Status . . . . . : *ENABLED  
Date password last changed . . . . . : 08/24/93
```

:

---

## 5.3 NetView Remote Operations Using RODM Method

In this topic we will be discussing using the NetView Remote Operations for AS/400 product in conjunction with RODM (Resource Object Data Manager). Due to time constraints we were unable to implement a scenario using RODM, therefore, we used a theoretical approach.

### 5.3.1 Understanding RODM

Basically RODM has it's own address space. It is a data cache stored in high speed memory. As a result, all data stored in RODM is made available very rapidly upon request. Using the various APIs supplied with RODM, all data stored in RODM is available to NetView and user written applications. For more information on RODM please consult *Applied Use of IBM NetView Resource Object Data Manager (RODM) and Automation*, GG24-4018.

### 5.3.2 Scenario

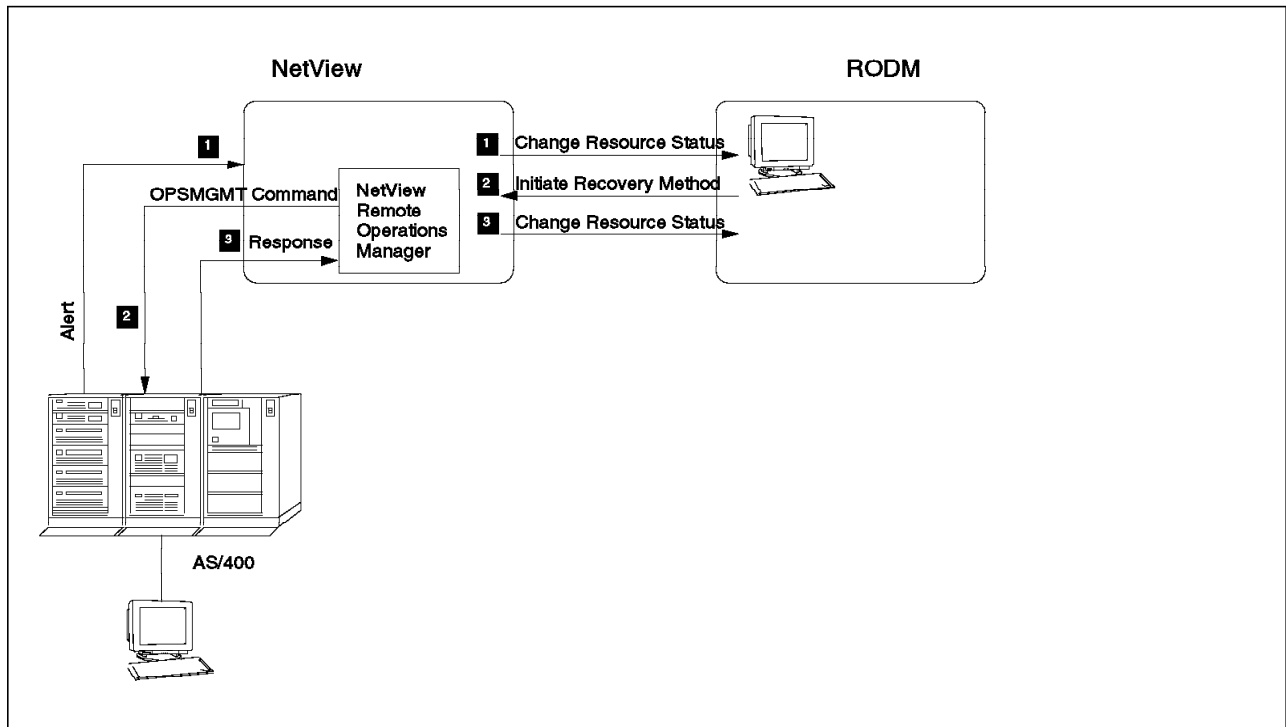


Figure 182. RODM Scenario

In our scenario the AS/400 has been setup to forward alerts to NetView, please consult Figure 182. We could trap these alerts and then update the status of the affected resource in RODM **1**.

As a result of the status update, RODM is able to execute some code known as a method. This could be in the form of an action initiated in NetView, for example, invoking the OPSMGMT command in the NetView Remote Operations Manager code and sending a command down to the AS/400 to recover the affected resource **2**.

The results of the above action could then be analyzed and if the recovery was successful, the status of the resource can then be changed in RODM to reflect this **3**.

This was just a very simple scenario, it would be possible to do much more complex processing using the RODM capabilities. In conjunction with GMFHS (Graphic Monitor Facility Host Subsystem) it is possible to give the operator a graphical view of what is happening in the network.

## 5.4 Sending an Alert Using OS/400 APIs

In this section, Application Program Interfaces (APIs), QALGENA and QALSND are used to generate an alert from an existing error message and send this generated alert to the OS/400 alert processing function. Please refer to the *AS/400 System Programmer's Interface Reference*, SC41-8223-02, for details on OS/400 Application Programming Interfaces.

Figure 183 on page 190 shows the text of the message in message file QCPFMSG, which was used as the basis for this automated alert processing application.

```

                                Display Formatted Message Text
                                System:  RALYAS4A
Message ID . . . . . :  CPF0A02
Message file . . . . . :  QCPFMSG
Library . . . . . :  QSYS

Message . . . . . :  Performance monitor not started.
Cause . . . . . :  Errors occurred while processing the request to star
                    performance monitor.
Recovery . . . . . :  See the previously displayed messages. Correct the e
                    and try the Start Performance Monitor (STRPFRMON) command again.

```

Figure 183. Text of Message CPF0A02

There was no alert table entry for message CPF0A02 so one had to be added. Figure 184 shows the details. Please note the code points:

- Alert Type - Code Point 11
- Alert Description - Code Point 2100
- Probable Cause - Code Point 7000

```

                                Display Alert Detail
                                System:  RALYAS4A
Message ID . . . . . :  CPF0A02
Message text . . . . . :  Performance monitor not started.
Alert type . . . . . :  (11) Impending problem
Alert description . . . . . :  (2100) Software program error
Alert option . . . . . :  *NO
Alert ID . . . . . :  3B49 5B35

Probable
Cause   Probable Cause Text
7000   Personnel

```

Figure 184. Alert Table Entry for Message CPF0A02

### 5.4.1 Alert Generation Application Description

Please see Appendix G, “Alert Automation Applications” on page 285 for details of the source code used for this application.

A query has been written to process the performance data file, QAPMSYS residing in library QSYS and to produce a summary report at the end of each working day in the installation. The performance data will not be available unless the Performance Monitor has been started each morning. The following programs comprise this automated alert application:

- QPFRMONCHK

This Control Language program is called during the system startup. It checks to see whether or not the Performance Monitor is active by copying the spooled output from a WRKACTJOB command to a file and then reading the file to determine if the QPFRMON job is included. If no record is found in

the file for QPFRMON, QPFRMONCHK calls the Control Language program, QALSNDCLP.

- QALSNDCLP

This Control Language program retrieves the first-level message text from message CPF0A02 and the length of this message text and calls the RPG program, QALSNDA.

- QALSNDA

This RPG program calls the Application Programming Interface, QALGENA passing the required input and output parameters. QALGENA generates an alert from the message CPF0A02, and returns the updated output parameters back to QALSNDA. QALSNDA then calls the QALSNDA API passing the required input and output parameters. QALSNDA uses this data to send the generated alert to the OS/400 alert processing function.

The following series of panels shows the operation of the application:

Work with Active Jobs						RALYAS4A
						09/16/93 10:14:06
CPU %:	.0	Elapsed time:	00:00:00	Active jobs:	48	
Type options, press Enter.						
2=Change 3=Hold 4=End 5=Work with 6=Release 7=Display message						
8=Work with spooled files 13=Disconnect ...						
Opt	Subsystem/Job	User	Type	CPU %	Function	
	QCTL	QSYS	SBS	.0	Status	
					DEQW	
Bottom						

Figure 185. WRKACTJOB Showing Jobs Running in QCTL

Figure 185 shows that the performance monitor job, QPFRMON, has not been started in the controlling subsystem, QCTL. The Control Language program, QPFRMONCHK detects this and triggers the alert generation application. Figure 186 on page 192 shows the job log that is generated as a result of the process:

```

2 > call qpfrmonchk
      1000 - RTVJOBA JOB(&JOBNAME) USER(&USERPRF) NBR(&NBR) OUTQ(&OUTQ)
            OUTQLIB(&OUTQLIB)
      1200 - HLDOUTQ OUTQ(GRAHAMA/GRAHAMA)
      1500 - WRKACTJOB OUTPUT(*PRINT) SBS(QCTL)
      1900 - CPYSPLF FILE(QPDSPAJB) TOFILE(QALSND/CPYSPLF)
            JOB('042197'/GRAHAMA/GRAHAM2D) SPLNBR(*LAST)
      Some data not copied to file CPYSPLF in QALSND.
      11 records copied to file CPYSPLF in QALSND.

      2400 - RCVF DEV(*FILE) RCDfmt(*FILE) WAIT(*YES)          /* File name is
QALSND/LCPYSPL. */
End of file detected for file LCPYSPL in QALSND.
      3000 - CALL PGM(QALSND/QALSNDCLP)
      1400 - RTVMSG MSGID(CPFOA02) MSGF(QSYS/QCPFMSG) MSG(&MSGDTA)
            MSGLEN(&MSGDLN)
      1800 - CALL PGM(QALSND/QALSND)          /* The CALL command contains
parameters */
            - RETURN          /* RETURN due to end of CL program */
      3900 - RLSOUTQ OUTQ(GRAHAMA/GRAHAMA)
            - RETURN          /* RETURN due to end of CL program */

```

Figure 186. Joblog of Process to Send Alert Using APIs

Figure 187 shows the alert that has been sent to the OS/400 alert processing function:

```

                                Work with Alerts                                RALYAS4A
                                                                09/16/93 10:20:01
Type options, press Enter.
  2=Change  4=Delete  5=Display recommended actions  6=Print details
  8=Display alert detail  9=Work with problem

Resource
Opt  Name      Type  Date   Time   Alert Description: Probable Cause
  8  RALYAS4A  CP    09/16 10:22  Software program error: Configuration
    BRIDGE3   BRG    09/16 09:42  Error to traffic ratio exceeded: LAN
    LANNET    LAN    09/16 08:49  Access unit corrected token-ring error

```

Figure 187. WRKALR Panel Showing Alert Sent by QALGENA and QALSND APIs

Figure 188 on page 193 shows the first alert detail panel:

Display Alert Detail		RALYAS4A
		09/16/93 10:25:33
-----Resource Hierarchy-----		
Resource Name	Resource Type	
RALYAS4A	CP	
Logged date/time . . . . .	09/16/93 10:22:42	
Problem date/time . . . . .	09/16/93 10:22:42	
User assigned . . . . .		
Group assigned . . . . .		
Alert type . . . . .	Impending problem <b>1</b>	
Alert description . . . . .	Software program error <b>2</b>	
Probable cause . . . . .	Personnel <b>3</b>	
Qualifiers . . . . .	AS/400 Message code CPF0A02	
	AS/400 Message severity 0	
		More
Press Enter to continue.		
F3=Exit F11=Display detail menu F12=Cancel F18=Display actions		

Figure 188. Display Alert Detail Panel of API-Generated Alert - Panel 1 of 2

**1** OS/400 alert processing derives this description from the alert type code point 11 that was used when adding the alert entry for message CPF0A02 to the alert table. Please see Figure 184 on page 190. The alert is likely to give rise to a problem later on the system. In this instance, the daily performance query will not be able to be run.

**2** This description is derived from the alert description code point 2100 that was used when adding the alert entry for message CPF0A02 to the alert table. A software-related error has caused the alert.

**3** This description is derived from the probable cause code point 7000, which was used when adding the alert entry for message CPF0A02 to the alert table. This indicates that the alert was probably caused by an action or omission on the part of the operating personnel.

Display Alert Detail		RALYAS4A
		09/16/93 10:26:47
-----Resource Hierarchy-----		
Resource Name	Resource Type	
RALYAS4A	CP	
Text message:		
Sender ID . . . . .	Control program	
Message . . . . .	Performance monitor not started.	
Unique alert identifier:		
Product ID . . . . .	9406	
Alert ID number . . . . .	3B49 5B35	

Figure 189. Display Alert Detail Panel of API-Generated Alert - Panel 2 of 2

Figure 189 shows the resource hierarchy and unique identifier of the alert which the application produced.

## 5.5 Processing an Alert Sent to a Data Queue

In this section, the Application Program Interface (API), QQRCVDTAQ is used to process an alert that has been sent to a data queue as a result of an action entry in the system alert filter. Please refer to 2.1.2.6, "Implementation and Use of Alert Filters on AS/400" on page 62 for more details on AS/400 alert filters.

The automated data queue processing application extends the application described in 5.4, "Sending an Alert Using OS/400 APIs" on page 189. The alert that is sent to the OS/400 alert processing function by the QALSNDATA API is sent to a data queue for processing by a user-written application.

Details of the particular selection and action entries are shown in the following set of panels:

Display Filter Selection		System: RALYAS4A
Filter . . . . .	AS400NET	
Library . . . . .	QALSNDATA	
Type . . . . .	*ALR	
Sequence Number . . . . .	0001	
Group . . . . .	SOFTWARE	
Relationship . . . . .	*IF	
Attribute . . . . .	*ALRID	
Operator . . . . .	*EQ	
Value . . . . .	3B495B35	

Figure 190. Selection Entry in AS400NET Alert Filter



Display Filter Action Entry		System: RALYAS4A
Filter . . . . .	:	AS400NET
Library . . . . .	:	QALSNDA
Type . . . . .	:	*ALR
Group . . . . .	:	SOFTWARE
Type options, press Enter.		
5=Display		
Opt	Action	Parameters
	LOG	*YES
	ASNUSER	*NONE
	SEND	*NONE
	SNDDTAQ	QALSNDA/PERFORM *NONE

Figure 191. Action Entry in AS400NET Alert Filter

Figure 192 shows the command used to create the data queue used in the application.

Create Data Queue (CRTDTAQ)		
Type choices, press Enter.		
Data queue . . . . .	> PERFORM	Name
Library . . . . .	> QALSNDA	Name, *CURLIB
Maximum entry length . . . . .	> 256	1-64512
Sequence . . . . .	*FIFO	*FIFO, *LIFO, *KEYED
Text 'description' . . . . .	Data queue for QPFRMON alerts from AS filter	
Additional Parameters		
Force to auxiliary storage . . .	*NO	*NO, *YES
Include sender ID . . . . .	*NO	*NO, *YES
Authority . . . . .	*LIBCRTAUT	Name, *LIBCRTAUT, *CHAN
F3=Exit F4=Prompt F5=Refresh F12=Cancel F13=How to use this display		
F24=More keys		

Figure 192. Creation of Data Queue for Automated Alert Processing

### 5.5.1 Alert Data Queue Application Description

Please see G.1, "Automating The Generating and Sending of an Alert" on page 285 for details of the source code used for this application.

If the performance monitor has not been started during system startup, the application described in 5.4.1, "Alert Generation Application Description" on page 190 will generate and send an alert to the OS/400 alert processing function. The network attributes of the system have been changed to include the

use of an alert filter, AS400NET. This filter has a selection entry that assigns any alert with an identifier of 3B495B35 to an alert group called SOFTWARE.

An action entry has been added to the AS400NET alert filter, which sends any alerts in the alert group SOFTWARE, to a data queue called PERFORM in library QALSNDAL.

A Control Language program, RCVDTAQ checks this data queue every five minutes during a specified period at the beginning of each day to determine if there is an entry in the data queue. If there is, this means that the Performance Monitor has not been started. The Performance Monitor is then started and a message is sent to QSYSOPR.

The following series of panels shows the operation of the application:

```

                                Work with Active Jobs                                RALYAS4A
                                                                                   09/16/93 09:46:06
CPU %:      .0      Elapsed time:  00:00:00      Active jobs:  48

Type options, press Enter.
  2=Change  3=Hold  4=End  5=Work with  6=Release  7=Display message
  8=Work with spooled files 13=Disconnect ...

Opt  Subsystem/Job  User      Type  CPU %  Function      Status
   QCTL              QSYS      SBS    .0                DEQW

                                                                                   Bottom
  
```

Figure 193. WRKACTJOB Showing Jobs Running in QCTL

Figure 193 shows that the performance monitor job, QPFRMON, has not been started in the controlling subsystem, QCTL.

```

                                Work with Alerts                                RALYAS4A
                                                                                   09/17/93 09:50:55
Type options, press Enter.
  2=Change  4=Delete  5=Display recommended actions  6=Print detaila
  8=Display alert detail  9=Work with problem

Resource
Opt  Name      Type  Date   Time   Alert Description: Probable Cause
   RALYAS4A    CP    09/17  09:51  Software program error: Personnel
  
```

Figure 194. Work With Alerts Panel Showing Application-Generated Alert

The user-written alert generation application then sends an alert to OS/400 alert processing as shown in Figure 194.

Display Alert Detail		RALYAS4A
		09/17/93 09:51:58
-----Resource Hierarchy-----		
Resource Name	Resource Type	
RALYAS4A	CP	
Logged date/time . . . . .	:	09/17/93 09:51:58
Problem date/time . . . . .	:	09/17/93 09:51:58
User assigned . . . . .	:	
Group assigned . . . . .	:	SOFTWARE
Filter . . . . .	:	AS400NET
Library . . . . .	:	QALSND
Alert type . . . . .	:	Impending problem
Alert description . . . . .	:	Software program error
Probable cause . . . . .	:	Personnel
		More
Press Enter to continue.		
F3=Exit F11=Display detail menu F12=Cancel F18=Display actions		

Figure 195. Detail of Application-Generated Alert - Panel 1 of 2

Display Alert Detail		RALYAS4A
		09/17/93 09:51:58
-----Resource Hierarchy-----		
Resource Name	Resource Type	
RALYAS4A	CP	
Qualifiers . . . . .	:	AS/400 Message code CPF0A02
	:	AS/400 Message severity 0
Text message:		
Sender ID . . . . .	:	Control program
Message . . . . .	:	Performance monitor not started.
Unique alert identifier:		
Product ID . . . . .	:	9406
Alert ID number . . . . .	:	<b>3B49 5B35</b>
Press Enter to continue.		
F3=Exit F11=Display detail menu F12=Cancel F18=Display actions		

Figure 196. Detail of Application-Generated Alert - Panel 2 of 2

Figure 195 and Figure 196 show the details of this alert. The selection entry in the alert filter AS400NET is set up to select an alert with the identifier of 3B495B35, and assigns this alert to the group, SOFTWARE. The action entry in alert filter AS400NET is set up to send all alerts in the SOFTWARE group to the data queue PERFORM in library QALSND.

The RCVDTAQ control language checks the PERFORM data queue in library QALSND and detects that there is an entry on the data queue, which means that the performance monitor has not been started.

RCVDTAQ then starts the performance monitor and sends a message to the system operator to the effect that the performance monitor was not started.

This message is shown in Figure 197:

```

                                Display Messages
                                System:  RALYAS4A
Queue . . . . . : QSYSOPR          Program . . . . : *DSPMSG
Library . . . . : QSYS             Library . . . . :
Severity . . . . : 99              Delivery . . . . : *HOLD

Type reply (if required), press Enter.
New alert focal point is USIBMRA.RA3AN.
Controller AURELL contacted on line L41TR.
System is alert focal point for USIBMRA.AURELL.
Communications device PRPQALERT was allocated to subsystem QCMN.
Controller CLAUDE failed. Automatic recovery started.
Default alert focal point request rejected.
Default alert focal point request rejected.
Controller CLAUDE contact not successful. Probable remote station problem.
(C R)
Reply . . .
Network session unavailable to remote control point CLAUDE.
Attention! The Performance Monitor was not started.
Performance monitor 042214/QPGMR/QPFRMON started at 09:58:43 09/17/93.
                                Bottom
3=Exit          F11=Remove a message      F12=Cancel
13=Remove all   F16=Remove all except unanswered  F24=More keys

```

Figure 197. QSYSOPR Message Queue Showing Application-Generated Message

Figure 198 shows the additional information for this message:

```

                                Additional Message Information
Message ID . . . . . : CPI2401      Severity . . . . . : 70
Message type . . . . : Information
Date sent . . . . . : 09/17/93     Time sent . . . . . : 09:58:43

Message . . . . . : Attention! The Performance Monitor was not started.
Cause . . . . . : The message was sent by the SNDUSRMSG command.

```

Figure 198. Application-Generated Message: Additional Information

The Work with Active Jobs (WRKACTJOB) command is used to confirm that the performance monitor is now running in the controlling subsystem, QCTL, as shown in Figure 199 on page 199.

Work with Active Jobs					RALYAS4A	
					09/17/93	10:01:42
CPU %:	.5	Elapsed time:	23:52:34	Active jobs:	47	
Type options, press Enter.						
2=Change 3=Hold 4=End 5=Work with 6=Release 7=Display messag						
8=Work with spooled files 13=Disconnect ...						
Opt	Subsystem/Job	User	Type	CPU %	Function	Status
	QCTL	QSYS	SBS	.0		DEQW
	QPFRMON	QPGMR	BCH	.0		EVTW

Figure 199. Work with Active Jobs Panel

Figure 200 shows the joblog that was created by the RCVDTAQ application, including the QALSNDATA application to create and send the alert that RCVDTAQ processed of the PERFORM data queue.

```

2 > call qpfrmonchk
      1000 - RTVJOBA JOB(&JOBNAME) USER(&USERPRF) NBR(&NBR) OUTQ(&OUTQ)
      OUTQLIB(&OUTQLIB)
      1200 - HLDOUTQ OUTQ(GRAHAMA/GRAHAMA)
      1500 - WRKACTJOB OUTPUT(*PRINT) SBS(QCTL)
      1900 - CPYSPLF FILE(QPDSPAJB) TOFILE(QALSNDATA/CPYSPLF)
      JOB('042197'/GRAHAMA/GRAHAM2D) SPLNBR(*LAST)
Some data not copied to file CPYSPLF in QALSNDATA.
11 records copied to file CPYSPLF in QALSNDATA.
      2400 - RCVF DEV(*FILE) RCDfmt(*FILE) WAIT(*YES)          /* File name is
      QALSNDATA/LCPYSPL. */
End of file detected for file LCPYSPL in QALSNDATA.
      3000 - CALL PGM(QALSNDATA/QALSNDCLP)
      1400 - RTVMSG MSGID(CPFOA02) MSGF(QSYS/QCPFMSG) MSG(&MSGDTA)
      MSGLEN(&MSGDLN)
      1800 - CALL PGM(QALSNDATA/QALSNDATA)          /* The CALL command contains
      parameters */
      - RETURN          /* RETURN due to end of CL program */
      3900 - RLSOUTQ OUTQ(GRAHAMA/GRAHAMA)
      - RETURN          /* RETURN due to end of CL program */
2 > dspmsg qsysopr
2 > wrkalr
2 > call rcvdtAQ
      1700 - CALL PGM(QRCVDTAQ)          /* The CALL command contains
      2200 - STRPFRMON INTERVAL(5) HOUR(8) MINUTE(0)
Job 042214/QPGMR/QPFRMON submitted to job queue QCTL in library QSYS
Performance monitor 042214/QPGMR/QPFRMON submitted to job queue QCTL
QSYS.
      2400 - SNDUSRMSG MSG('Attention! The Performance Monitor was not
      started.') MSGTYPE(*INFO) TOMSGQ(*SYSOPR)
      2600 - CALL PGM(QCLRDTAQ)          /* The CALL command contains
      parameters */
      1700 - CALL PGM(QRCVDTAQ)          /* The CALL command contains
      parameters */
      - RETURN          /* RETURN due to end of CL program */
2 > dspmsg qsysopr
2 > WRKACTJOB SBS(QCTL)

```

Figure 200. Job Log for Alert Data Queue Application



---

## Appendix A. SNA Generic Alerts

A generic alert is a System Network Architecture (SNA) data flow which notifies a network operator of a problem that has occurred within a network resource. The generic alert contains key information about the problem, which includes identification of the machine on which the problem occurred, identification of the software that detected the problem, the cause of the problem, and the action required to recover from the problem.

The text that makes up an alert is represented by *code points*. A code point is a 1-byte (2 hexadecimal characters) or 2-byte (4 hexadecimal characters) that designates a particular piece of text to be displayed at the focal point. Code points are sent by an alert sender to convey alert data and are used to get the units of text for displaying alert data at a focal point.

An example of a code point is probable cause X'6314'. The text for this code point is tape drive. The code point X'6314' is sent in the alert. The text tape drive is displayed on the alerts displays at the receiving system.

A generic alert is most often generated by the resource that detected the problem and is transmitted to a problem management focal point on an SNA session to inform an operator of the problem. If the problem management focal point is a S/370 or S/390, then the NetView program can be used to receive the generic alert from the network and display it to the operator. In addition, the generic alert can be routed to any NetView in the network where it can then be processed.

Determining which NetView is to receive a generic alert is possible through the routing capabilities of NetView, but in this case, the generic alert can only be sent from one NetView to another and not to other systems that cannot run the NetView product.

---

### A.1 Generic Alert Code Points

Generic alerts are used in the following fields of the alert display:

**Alert type.** The alert type code point defines the severity of the problem.

**Alert Description.** The alert description code point describes the alert condition.

**Probable causes.** These codes define the most likely causes of the condition being described.

**User causes.** These codes describe the conditions caused by a user and are defined as conditions that can be resolved by the operator without contacting any service organization.

**Install causes.** These causes describe conditions resulting from the initial installation or setup of equipment.

**Failure causes.** These causes describe conditions caused by the failure of a resource.

**Recommended actions.** These codes describe actions that the focal point operator can take to correct the problem that caused the alert or to complete the process of problem analysis.

**Qualifiers.** Detail qualifiers can appear in user, install, or failure causes, and in the recommended actions. They can also appear in the Qualifiers section of the Display Alert Detail display. The code point used for detail qualifiers is a data ID that identifies the detail qualifier.

**Resource type.** These codes describe the type of resources that detected the error condition.

The AS/400 system uses the generic alert architecture. The code points are converted to a message ID, which is used to retrieve the text that is to be displayed on the alert displays from the alert message file. The name of the OS/400 alert message file is QALRMSG in library QSYS.

### A.1.1 Default Code Points

A code point is of the form xxxx where x is any hexadecimal digit (a 1-byte code is of the form xx).

A default code point is a code point of the form xx00. Default code points are special because if the AS/400 system cannot find a code point xxxx in the QALRMSG alert message file, the AS/400 system also tries the default code point xx00. A default code point is less specific than the original code point, but still provides useful information. For example, the text for probable cause code point X'6314' is Tape drive. Probable cause code point X'6300' is Input/output device.

---

## A.2 SNA Alert Format

The format for all SNA alerts is similar. The byte format of a generic alert request unit (RU) is defined in *Systems Network Architecture Formats Manual*, GA27-3136. Each alert is contained within the Network Management Vector Transport (NMVT) RU command. The NMVT RU command contains an Alert Major Vector and a series of subvectors and subfields. Please see Table 7 on page 203 for a description of the subvectors and subfields that make up each alert. The following format shows an SNA Alert:

----- Start of Alert Format -----

NMVT Generic Alert

Alert Major Vector

SNA Address List Common Subvector

Generic Alert Subvector

Probable Cause Subvector

Failure Cause Subvector

Failure Causes subfield

Recommended Actions subfield

Detailed Data subfield

Product Set ID Subvector



Product Identifier subfield  
Hardware Product Identifier subfield  
Code Engineering Change (EC) Level subfield

Date/Time Subvector

Local Date/Time subfield

----- End of Alert Format -----

### A.3 Detailed Formats of the RUs for SNA Alerts

The detailed formats of the request units (RUs) for SNA Alerts 1 through 15 are shown in Table 7. Variables aaaa through zz in the table are explained immediately after the table.

Table 7 (Page 1 of 3). Format of SNA Alerts		
Byte(s)	Value	Description
		<b>NMVT Header</b>
0-2	X'41038D'	NS header
3-4	X'0000'	Retired
5-6	X'0000'	PRID
7 <b>1</b>	B'00000000'	Flags
		<b>MS Major Vector</b>
0-1	X'aaaa'	Length
2-3	X'0000'	Key
		<b>SNA Address List Common Subvector <b>1</b></b>
0	X'0A'	Length
1	X'04'	Key
2	X'01'	Address Count
4-8	X'0000000000'	Reserved
4-8	X'@@@'	Local address
		<b>Generic Alert Subvector</b>
0	X'0B'	Length
1	X'92'	Key
2-3	X'0000'	Flags
4	X'01'	Alert type
5-6	X'bbbb'	Alert description code
7-10	X'ccccccc'	Alert ID number
		<b>Probable Cause Subvector</b>
0	X'dd'	Length
1	X'93'	Key
2-3	X'eeee'	Probable cause code points
4-5 <b>3</b>	X'ffff'	Probable cause code points
		<b>ggggggg Cause Subvector</b>

Table 7 (Page 2 of 3). Format of SNA Alerts		
Byte(s)	Value	Description
0	X'hh'	Length
1	X'96'	Key
		<b>ggggggg Causes Subfield</b>
0	X'ii'	Length
1	X'01'	Key
2-3	X'jjj'	ggggggg cause code points
4-5 <b>4</b>	X'kkkk'	ggggggg cause code points
6-7 <b>4</b>	X'llll'	ggggggg cause code points
		<b>Recommended Actions Subfield</b>
0	X'mm'	Length
1	X'81'	Key
2-3	X'nnnn'	Recommended actions code points
4-5	X'oooo'	Recommended actions code points
6-7	X'pppp'	Recommended actions code points
8-9 <b>5</b>	X'qqqq'	Recommended actions code points
		<b>Detailed Data Subfield</b>
0	X'rr'	Length
1	X'82'	Key
2	X'00'	Product ID code
3	X'ss'	Data ID
4	X'yy'	Data encoding
5 <b>6</b>	X'tt'	Detailed data
		<b>Detailed Data Subfield <b>7</b></b>
0	X'08'	Length
1	X'82'	Key
2	X'00'	Product ID code
3	X'07'	Data ID
4	X'00'	Data encoding
5 <b>6</b>	X'xx'	SRC byte 2
5	X'xx'	SRC byte 2
6	X'xx'	SRC byte 1
7	X'xx'	SRC byte 0
		<b>vvvvvvv Subfield <b>8</b></b>
0	X'ww'	Length
1	X'xx'	Key
2-7	X'yy'	MAC address
		<b>Product Set ID Subvector</b>
0	X'23'	Length
1	X'10'	Key
2	X'00'	Retired

Table 7 (Page 3 of 3). Format of SNA Alerts		
Byte(s)	Value	Description
		<b>Product Identifier Subvector</b>
0	X'20'	Length
1	X'11'	Key
2	B'00000001'	Product classification
		<b>Hardware Product Identifier Subfield</b>
0	X'13'	Length
1	X'00'	Key
2	X'12'	Format type
3-6	X'F5F4F9F4'	Machine type
7-9	X'xxxxxx'	Model number
10-11	X'xxxx	Plant of manufacture
12-18	X'xxxxxxxxxxxxxx'	Serial number
		<b>Code EC Subfield</b>
19	X'0A'	Length
20	X'0B'	Key
21-24	X'xxxxxxxx'	Code release
25-26	X'F0F0'	Unused
27-28	X'xxxx'	Correction level
		<b>Date/Time Subvector</b>
0	X'0A'	Length
20	X'01'	Key
		<b>Local Date/Time Subfield</b>
0	X'08'	Length
1	X'10'	Key
2	X'zz'	Year
3	X'01'-X'0C'	Month
4	X'01'-X'1F'	Day
5	X'00-X'17'	Hours
6	X'00'-X'3B'	Minutes
7	X'00'-X'3B'	Seconds

**Notes:**

- 1** The SNA Address List Common Subvector only exists for Alerts 1 through 5.
- 2** For alerts 1 through 5, this value is 00010000.
- 3** These bytes only exist for Alerts 4 and 11.
- 4** These bytes do not exist for Alerts 8, 9, 10, 14, and 15.
- 5** These bytes do not exist for Alerts 4, 6, and 9 through 15

**6** For Alerts 1 through 3 and 15, these are bytes 5-6; for Alert 4, these are bytes 5-12; for Alert 5 these are bytes 5-7; and for Alert 6, these are bytes 5-7 with byte 7 being 51 (bytes 5 and 6 are xx)

**7** The detailed Data Subfield does not exist for Alert 15.

**8** The LAN Link Connection Subsystem Data and the vvvvvvv subfield does not exist for Alerts 1 through 6.

The following table shows the values of the variables listed in Table 7 on page 203.

<i>Table 8 (Page 1 of 4). SNA Alert Variables</i>	
Variable	Description
	<b>MS Major Vector</b>
<i>aaaa=</i>	<b>0061</b> for Alerts 1 through 3
	<b>0078</b> for Alert 4
	<b>0062</b> for Alert 5
	<b>0054</b> for Alert 6
	<b>006C</b> for Alerts 7 and 11
	<b>0063</b> for Alert 8
	<b>0066</b> for Alerts 9,10, and 14
	<b>006A</b> for Alerts 12 and 13
	<b>005F</b> for Alert 15
	<b>Generic Alert Subvector</b>
<i>bbbb=</i>	<b>1002</b> for Alerts 1, 3, and 5
	<b>1202</b> for Alert 2
	<b>3118</b> for Alert 4
	<b>1602</b> for Alert 6
	<b>3211</b> for Alerts 7, 8, 9, 10, and 11
	<b>3212</b> for Alert 12
	<b>3213</b> for Alert 13
	<b>3214</b> for Alert 14
	<b>3215</b> for Alert 15
<i>cccccccc=</i>	<b>ED4AAAA3</b> for Alerts 1
	<b>030C2A29</b> for Alert 2
	<b>F2C96F67</b> for Alert 3
	<b>A89646AA</b> for Alert 4
	<b>4FDFDDDF</b> for Alerts 5
	<b>6F417AA1</b> for Alert 6
	<b>55BF3E1C</b> for Alert 7
	<b>CAF3C58A</b> for Alert 8
	<b>D615A61E</b> for Alert 9
	<b>44D1AD86</b> for Alert 10
	<b>016E5F4E</b> for Alert 11

<i>Table 8 (Page 2 of 4). SNA Alert Variables</i>	
<b>Variable</b>	<b>Description</b>
	<b>A676B230</b> for Alert 12
	<b>EB61E14F</b> for Alert 13
	<b>59F32622</b> for Alert 14
	<b>2102FCEB</b> for Alert 15
	<b>Probable Cause Subvector</b>
<i>dd=</i>	<b>04</b> for Alerts 1 through 3, 5 through 10, and 12 through 15
	<b>06</b> for Alerts 4 and 11
<i>eeee=</i>	<b>6302</b> for Alert 1
	<b>6210</b> for Alert 2
	<b>6301</b> for Alert 3
	<b>1023</b> for Alert 4
	<b>6313</b> for Alert 5
	<b>0422</b> for Alert 6
	<b>3702</b> for Alerts 7, 11, 12, and 13
	<b>3703</b> for Alerts 8 and 15
	<b>3704</b> for Alert 9
	<b>3705</b> for Alert 10
	<b>7013</b> for Alert 14
<i>ffff=</i>	<b>1022</b> for Alert 4
	<b>3701</b> for Alert 11
	<i>ggggggg</i> <b>Cause Subvector</b>
<i>ggggggg=</i>	<b>Failure</b> for Alerts 1 through 8, 11, 12, 13, and 15
	<b>Install</b> for Alert 9
	<b>User</b> for Alerts 10 and 14
<i>hh=</i>	<b>17</b> for Alerts 1 through 3
	<b>2C</b> for Alert 4
	<b>18</b> for Alert 5
	<b>14</b> for Alert 6
	<b>22</b> for Alert 7
	<b>1E</b> for Alert 8
	<b>1C</b> for Alerts 9, 10, and 14
	<b>20</b> for Alerts 11, 12, and 13
	<b>15</b> for Alert 15
	<i>ggggggg</i> <b>Causes Subfield</b>
<i>ii=</i>	<b>04</b> for Alerts 1 through 3, 5, 6, 8, 9, 10, 14, and 15
	<b>06</b> for Alert 4
	<b>08</b> for Alerts 7, 11, 12, and 13
<i>jjj=</i>	<b>6302</b> for Alert 1
	<b>6210</b> for Alert 2

<i>Table 8 (Page 3 of 4). SNA Alert Variables</i>	
<b>Variable</b>	<b>Description</b>
	<b>6301</b> for Alert 3
	<b>1023</b> for Alert 4
	<b>6313</b> for Alert 5
	<b>0422</b> for Alert 6
	<b>3320</b> for Alerts 7 and 13
	<b>3703</b> for Alerts 8 and 15
	<b>3704</b> for Alert 9
	<b>7101</b> for Alerts 10 and 14
	<b>3712</b> for Alert 11
	<b>3711</b> for Alert 12
<i>kkkk=</i>	<b>1022</b> for Alert 4
	<b>3711</b> for Alerts 7 and 13
	<b>3701</b> for Alert 11
	<b>3434</b> for Alert 12
	No corresponding byte for Alerts 8, 9, 10, 14, and 15
<i>llll=</i>	<b>3434</b> for Alert 1 and 13
	<b>2600</b> for Alert 11
	<b>3320</b> for Alert 12
	No corresponding byte for Alerts 8, 9, 10, 14, and 15
	<b>Recommended Actions Subfield</b>
<i>mm=</i>	<b>0A</b> for Alerts 1 through 3, 5, 7, and 8
	<b>08</b> for Alerts 4, 9 through 15
	<b>06</b> for Alert 6
<i>nnnn=</i>	<b>F0A0</b> for Alerts 1 through 3, 5, and 6
	<b>3110</b> for Alert 4
	<b>3301</b> for Alerts 7 and 8
	<b>2010</b> for Alerts 9 through 15
<i>oooo=</i>	<b>1000</b> for Alerts 1 through 3, 5, and 6
	<b>32D0</b> for Alert 4
	<b>2010</b> for Alerts 7 and 8
	<b>3101</b> for Alerts 9 through 15
<i>pppp=</i>	<b>3301</b> for Alerts 1 through 3, and 5
	<b>2012</b> for Alert 4
	<b>3101</b> for Alerts 7 and 8
	<b>32C0</b> for Alerts 9 through 14
	<b>32A0</b> for Alert 15
<i>qqqq=</i>	<b>3000</b> for Alerts 1 through 3, and 5
	<b>32C0</b> for Alerts 7 and 8
	No corresponding byte for Alerts 4, 6, and 9 through 15

<i>Table 8 (Page 4 of 4). SNA Alert Variables</i>	
Variable	Description
	<b>Detailed Data Subfield</b>
<i>rr</i> =	<b>07</b> for Alerts 1 through 3, and 15
	<b>0D</b> for Alert 4
	<b>08</b> for Alerts 5 and 6
	<b>06</b> for Alerts 7 through 14
<i>ss</i> =	<b>31</b> for Alerts 1 through 3, 5, and 6
	<b>A9</b> for Alert 4
	<b>61</b> for Alerts 7 through 14
	<b>17</b> for Alert 15
<i>tt</i> =	<b>xx</b> for Alerts 1 through 3, 5, and 6
	<b>(set by user)</b> for Alert 4
	<b>F0</b> for Alerts 7 through 14
	<b>xxxx</b> for Alert 15
	<b>LAN Link Connection Subsystem Data</b>
<i>uu</i> =	<b>0A</b> for Alerts 7, and 9 through 14
	<b>05</b> for Alerts 8 and 15
	<b>vvvvvvvv Subfield</b>
<i>vvvvvvvv</i> =	<b>Local Individual MAC Address</b> subfield for Alerts 7 and 9 through 14
	<b>Beaconing Data</b> subfield for Alerts 8 and 15
<i>ww</i> =	<b>08</b> for Alerts 7, and 9 through 14
	<b>03</b> for Alerts 8 and 15
<i>xx</i> =	<b>03</b> for Alerts 7, and 9 through 14
	<b>07</b> for Alerts 8 and 15
<i>yy</i> =	<b>xxxxxxxxxxxx</b> for Alert 7, and 9 through 14
	<b>xx</b> for Alerts 8 and 15
	<b>Local Date/Time Subfield</b>
<i>zz</i> =	<b>11</b> for Alerts 7 through 14
	<b>00</b> for Alert 15

## A.4 SNA Generic Alert Code Points

Please refer to Chapter 8 in the *SNA Network Product Formats*, LY43-0081-1 (available to IBM-licensed customers only) for details of the SNA generic alert types, description code points, and probable cause code points. The following sections summarize the basic categories of code points:

### A.4.1 Alert Type

This is a code point indicating the severity of the alert condition:

- X'01'  
Permanent loss of availability: a loss of availability to the end user that is not recovered from without intervention external to the reporting product.
- X'02'  
Temporary loss of availability: a momentary loss of availability that will probably be noticed by the end user, yet is recovered from without intervention external to the reporting product.
- X'03'  
Performance is below what is considered an acceptable level.
- X'04' - X'10'  
No longer used.
- X'11'  
Impending problem: a loss of availability to the user impending but that has not yet happened.
- X'12'  
Unknown: the severity of the alert condition cannot be assessed.
- X'13'  
No longer used.

---

### A.5 Alert Description Code

This is a code point that provides an index to predefined text describing the alert condition.

- X'1xxx' HARDWARE
  - X'1000'  
Equipment malfunction: an internal machine error has occurred.
  - X'1100'  
Input device error
  - X'1200'  
Output device error
  - X'1300'  
Input/output device error
  - X'1400'  
Loss of electrical power: a source of electrical power, internal or external, has been lost.
  - X'1500'  
Loss of equipment cooling or heating: a loss of equipment cooling or heating has occurred.
  - X'1600'



Subsystem failure: a failure in a set of components that jointly provide a specified function; typically a subsystem includes a controller, one or more interface adapters, physical connection media, and attached devices.

- X'2xxx' SOFTWARE

- X'2000'

Software program abnormally terminated: a software program has abnormally terminated due to some unrecoverable error condition.

- X'2100'

Software program error: an error has occurred within a software program that has caused incorrect results, but the program has not terminated.

- X'3xxx' COMMUNICATIONS

- X'3000'

Communication protocol error: an architecturally defined communication protocol has been violated.

- X'3100'

SNA protocol error: an SNA protocol has been violated.

- X'3200'

LAN error: an error has been detected on a local area network.

- X'3300'

Link error: an error has occurred on a network communication link.

- X'3400'

ISDN error: an error has occurred on an Integrated Services Digital Network (ISDN) connection.

- X'3500'

Local connection error: an error has occurred on a local channel connection.

- X'3600'

Link connection error: this includes the interface between the DTE and DCE, any protocol used to communicate between the DTE and the DCE, and DCE-provided information about the link.

- X'4xxx' PERFORMANCE

- X'4000'

Performance degraded: service or response time exceeds what is considered an acceptable level.

- X'5xxx' CONGESTION

- X'5000'

Congestion: a system or network component has either reached its capacity or is approaching it.

- X'6xxx' MICROCODE

- X'6000'

Microcode program abnormally terminated: a microcode program has abnormally terminated due to some unrecoverable error condition.

- X'6100'

Microcode program error: an error has occurred within a microcode program that has caused incorrect results, but the program was not terminated.

- X'7xxx' OPERATOR

- X'7000'

Operator procedural error: an operator has attempted to initiate an incorrect procedure or has initiated a procedure incorrectly.

- X'8xxx' SPECIFICATION

- X'8000'

Configuration or customization error: a system or device generation or customization parameter has been specified incorrectly, or is inconsistent with the actual configuration.

- X'9xxx' INTERVENTION REQUIRED

- X'9000'

Operator intervention required: a condition has occurred indicating that operator intervention is required, and an operator has not responded.

- X'Axxx' PROBLEM RESOLVED

- X'A000'

Problem resolved: a problem that may have been reported earlier by an alert has been resolved.

- X'Bxxx' NOTIFICATION

- X'B000'

Operator notification: problem-related information is being conveyed to a network operator.

- X'Cxxx' SECURITY

- X'C000'

Security event: an event indicative of a possible security exposure has been detected.

- X'Fxxx' UNDETERMINED

- X'FE00'

Undetermined error: an error condition has occurred that cannot be related to a more specific error category,

---

## A.6 Probable Cause Code Point

This is a code point denoting probable causes of the alert condition. The probable causes appear in order of decreasing probability. The probable causes code points are grouped under the following categories. Detailed information on probable cause code points can be found in *SNA Network Product Formats*, LY43-0081-1 (available to IBM-licensed customers only).

- X'0000'

- Processor
  - X'0100'
- Storage
  - X'0200'
- Power subsystem
  - X'0300'
- Cooling or heating subsystem
  - X'0400'
- Subsystem controller
  - X'0500'
- Subsystem
  - X'2000'
- Communications
  - X'2100'
- Communications/Remote Node
  - X'2200'
- Remote Node
  - X'2300'
- Connection not established
  - X'2600'
- Electrical interference
  - X'3000'
- Channel
  - X'3100'
- Controller
  - X'3200'
- Communications interface
  - X'3300'
- Adapter
  - X'3400'
- Cable
  - X'3500'
- Communication equipment
  - X'3600'
- Modem
  - X'3700'
- LAN component
  - X'4000'

Performance degraded

- X'5000'

Media

- X'6000'

Device

- X'6100'

Input device

- X'62100'

Output device

- X'6300'

Input/Output device

- X'6400'

Depository

- X'6500'

Dispenser

- X'6600'

Self-service terminal

- X'6700'

Security problem

- X'7000'

Personnel

- X'8000'

Configuration

- X'E000'-X'FFFF'

Reserved

- X'FE00'

Undetermined

- X'FFFF'

Reserved

---

## Appendix B. Management Services

---

### B.1 Introduction to Management Services

Network Management is the process of planning, organizing, monitoring, and controlling a communication-oriented data processing or information system. The architecture provided to assist in network management of SNA systems is called *management services* and is implemented as a set of functions and services designed to capture and use the information needed for effective management.

There are four major sections to network management. We are dealing with *problem management* in this book, so this section will deal with problem management.

#### B.1.1 Problem Management

Problem management is the process of managing a problem from its detection to its final resolution.

Problem is used to describe an error condition resulting in a loss of availability of a system resource to an end user. Problems may originate in hardware, software, media, or microcode, or because of external causes such as user procedures or environmental abnormalities.

SNA management services are provided to assist in performing problem determination and diagnosis.

For more information on SNA Management Services, refer to *Systems Network Architecture Management Services*, SC30-3346.

---

### B.2 Management Services Transport Introduction

The Management Services Transport function provides for the sending and receiving of management services data between systems in an APPN network as described in the SNA/Reference. The data may be:

- Request without a reply (for example an alert)
- Request with reply (for example, send current configuration)
- Single or multiple replies

Communication from a focal point to an end node is normally performed via the network node server(s). The network node performs an intermediate routing function in Management Services Transport. This is separate from the intermediate routing provided by APPN network nodes. By default a CPSVCMG session is used between a network node and an end node. This session will not be used between the AS/400 focal point and a NetView focal point; instead this connection will use a direct session SNASVCMG or user-defined mode.

The transport architecture was developed because of the need to concentrate network management sessions. In large networks the number of sessions needed to support the various network management applications could become burdensome to focal points without session concentration. Management Services

Transport multiplexes all of the network management data from all applications in a network node domain (network node and attached end nodes) onto a single session to a focal point. This means that an end node has data to send to a network node focal point, it would send the data to a network node server which would locate the focal point and send the data to it.

Management Services Transport performs all routing based on network ID, control point name, and application name. In case of a session AS/400 and NetView, the control point name must be the name of the destination LU (NetView). Applications must register themselves with Management Services Transport to be able to receive unsolicited data. Multiple Domain Support is the MDS function set defined in the Management Services architecture.

### **B.2.1 MS Transport Implementations**

The MS Transport using the LU 6.2 protocol allows for data exchange between two SNA systems. In this context, an SNA system is one which supports the LU 6.2 protocol.

Currently the following SNA systems implement an MS Transport API:

- NetView V2R2 or later
- OS/400 V2R2 or later
- OS/2 EE 1.2, 1.3, OS/2 V2 with SAA Networking Services/2 installed, ES/1.0 or Communications Manager/2 or later.
- RS/6000 with SNA/Server or NetView Service Point
- 3174 Release 5 or later

This does not mean that only the above systems can utilize the MS Transport. It is just easier to write applications on these systems for exchanging management data. The main goal of the MS Transport is to provide an open and easy to use API that enables customers to manage IBM and non-IBM systems from a focal point.

---

## **B.3 Data Flow over the MS Transport**

A user application must make itself known to the MS Transport by means of a process called registration.

The MS Transport does not have to initiate the LU 6.2 session. This is taken care of by a function called the MDS-ROUTER. This function is responsible for all data distributions among MS applications within a particular system.

Receiving the data is a responsibility shared between two components of the MS Transport: the MDS-ROUTER and the MDS-RECEIVE function. MDS-RECEIVE is a transaction program responsible for issuing the correct sequence of LU 6.2 verbs for receiving the incoming data. The MDS-RECEIVE program passes the data to the MDS-ROUTER program, which will handle it based on the destination application name and the existing information about currently registered applications. If there is an application registered with that specific name, the MDS-ROUTER will place the data in the appropriate queue.

MDS-SEND is another component of the MS Transport. It is used when an MS application wants to send data to a partner application.

## B.4 Management Service Formats

A management services unit (MSU) is formatted according to a major vector, subvector, or subfield scheme. The MSU that flows on an SSCP-PU session is termed a network management vector transport (NMVT).

The MSUs that flow on CP-CP or LU-LU sessions are general data stream (GDS) variables, which adhere to the coding rules of GDS variables. GDS variables may contain other GDS variables, control vectors, or MS major vectors.

The CP-MSU is a general data stream (GDS) variable that is transported on CP-CP and LU-LU sessions within a Multiple Domain Support Message Unit (MDS-MU). See *SNA Formats*, GA27-3136, for more detailed information about MDS-MU.

The CP-MSU is also transported within a SNA/DS MU on a SNA/DS conversation over an LU-LU session. The SNA Condition Report (SNACR), FS Action Summary, and the Agent-unit-of-work are SNA/DS encoding. See *SNA Formats*, GA27-3136, for more detailed information about SNA/DS.

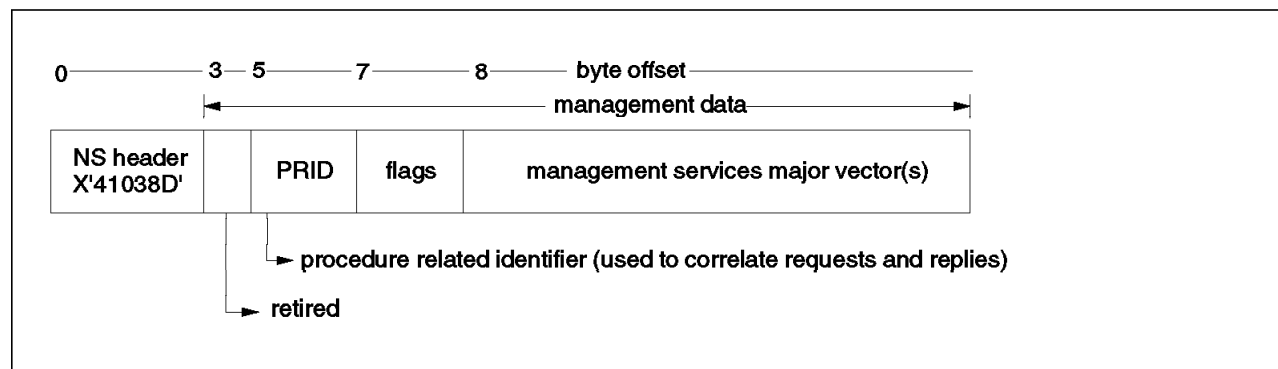


Figure 201. Format of the NMVT Management Services RU

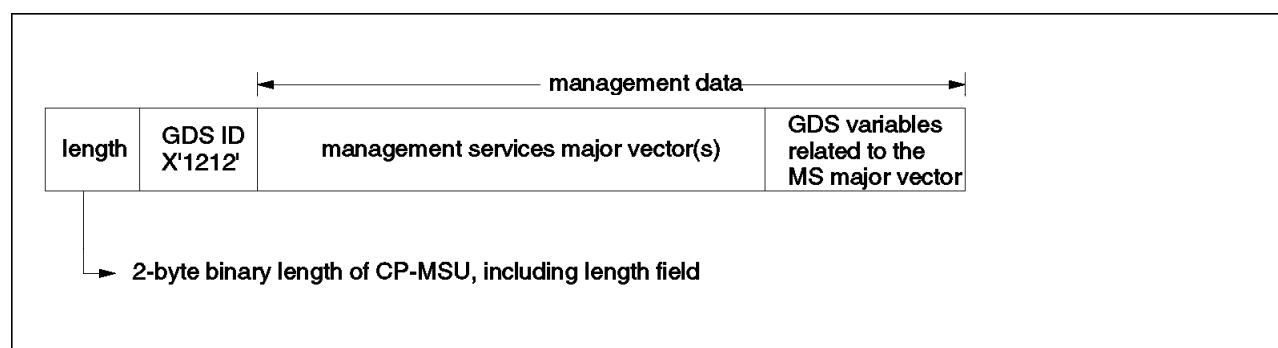


Figure 202. Format of the CP-MSU Management Services GDS Variable

The 2-byte length field of a GDS variable actually consists of a 1-bit flag followed by a 15-bit integer, so that the maximum length is 32767 bytes. Note, however, that the length is restricted by multiple domain support to 31743 bytes.

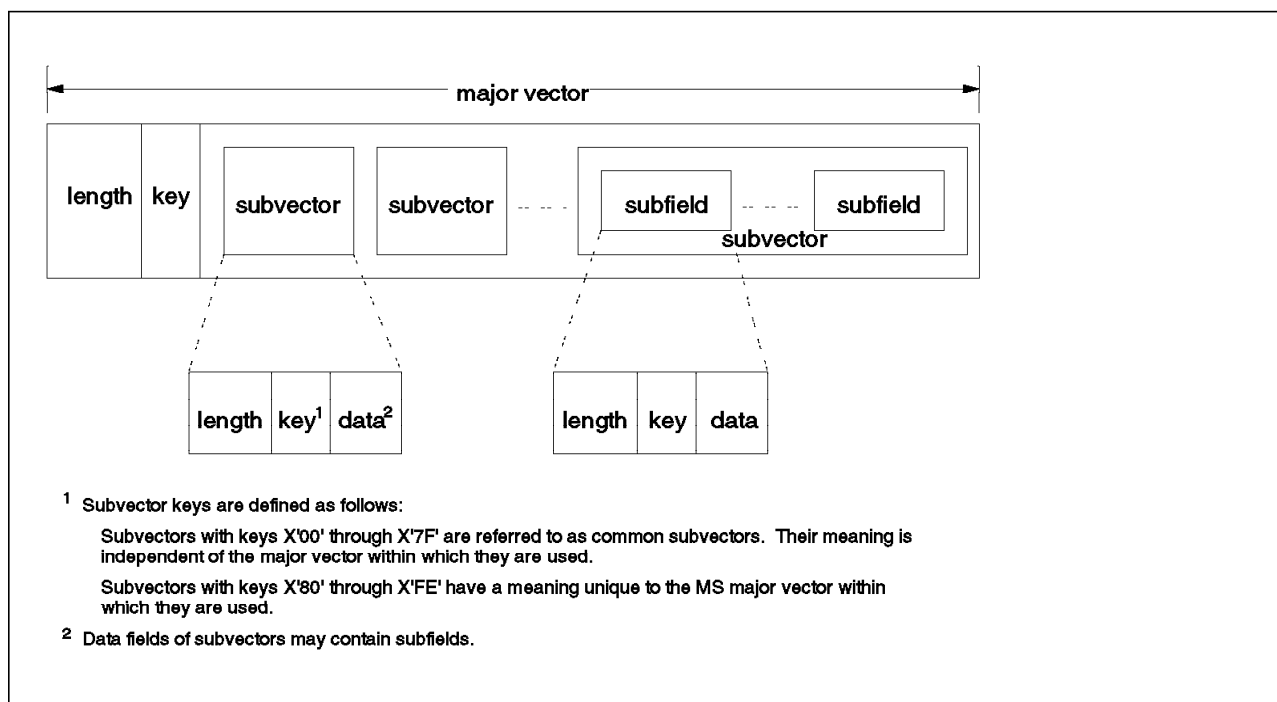


Figure 203. Overview of a Management Services Major Vector

Figure 203 provides an overview of the major vector, subvector, or subfield encoding scheme of a MSU. The key of the major vector identifies the management function provided. This generally correlates to an element of a major category of network management. For example, the alert major vector, identified by a key of X'0000', provides the problem determination, and optionally the problem diagnosis, element of problem management. The major vector indicates the function to be provided and includes the subvectors that carry management services data.

The general encoding scheme for MSUs is extended in the case of common operations services. Ordinarily an MSU transports a single major vector for common operations services, however, one or more parameter major vectors are also included, after certain MS major vectors. A parameter major vector is one that carries information associated with the MS major vector. Thus the entire structure shown in Figure 203 is repeated multiple times within a single MSU. For more detailed information about MSU formats see *SNA Formats*, GA27-3136.



---

## Appendix C. IBM AUTOMATION CENTER/400

---

### C.1 IBM AUTOMATION CENTER/400 as a SystemView Product

SystemView is IBM's strategic offering for all areas of AS/400 System's Management. All the products in the SystemView range have three basic requirements:

- Common presentation (end-user interface)
- Common systems management data (data need only be defined once)
- Common Application structure consistent with Systems Application Architecture (SAA) standards

SystemView provides you with a powerful set of advanced AS/400 products and functions. Together these can help you increase your system availability, contain costs, automate your operations, ensure a high level of data access, maintain security and data integrity and improve operations productivity.

IBM AUTOMATION CENTER/400 is a SystemView product that is designed to cover parts of the operational areas of SystemView. It covers the automation of operator tasks and the centralized management of multiple AS/400 systems.

---

### C.2 IBM AUTOMATION CENTER/400 in a Stand-Alone Environment

It would be possible in a single system environment for you to use IBM OMEGAMON/400 only. This would simply monitor your system for events and would not take automated actions against these events. If you require fully automated operations, you would need IBM AUTOMATED FACILITIES/400 as well as IBM OMEGAMON/400.

With only IBM OMEGAMON/400 and IBM AUTOMATED FACILITIES/400, you have to create all your IBM AUTOMATION CENTER/400 objects on a non-programmable terminal.

As well as IBM OMEGAMON/400 and IBM AUTOMATED FACILITIES/400 you could use IBM OMEGAVIEW/400. This would give you a graphical user interface and would simplify the creation of your IBM AUTOMATION CENTER/400 objects.

---

### C.3 IBM AUTOMATION CENTER/400 in a Network

In a networked environment we would recommend that you use IBM OMEGAVIEW/400 in addition to IBM OMEGAMON/400 and IBM AUTOMATED FACILITIES/400. Using IBM OMEGAVIEW/400 is the only way to distribute IBM AUTOMATION CENTER/400 objects around a network. Without IBM OMEGAVIEW/400, you would have to re-create each object, on every system in the network. IBM OMEGAVIEW/400 therefore avoids duplication of effort.

The graphical user interface of IBM OMEGAVIEW/400 provides you with an easy to use, intuitive environment for creating and editing all the objects required in IBM AUTOMATION CENTER/400. The graphical interface also gives you a pictorial overview of the status of all the systems in your network.

The more complex policies and situations are extremely difficult to create without IBM OMEGAVIEW/400

In a networking environment IBM OMEGAVIEW/400 is essential.

Using IBM OMEGAMON/400 in a network, allows AS/400 systems to send alerts to other systems (both IBM and non-IBM) which handle alerts. For example, IBM OMEGAMON/400 could be used to send an alert to IBM NetView on an MVS system.

## C.4 How You Could Use IBM AUTOMATION CENTER/400

The best way to consider how you could use IBM AUTOMATION CENTER/400 is by looking at an example. IBM OMEGAMON/400 detects that the percentage of central processing unit (CPU) utilization is too high in the system. IBM AUTOMATED FACILITIES/400 is used to automatically lower the job priority of several jobs. IBM OMEGAVIEW/400 visually monitors the change in CPU utilization. IBM OMEGAVIEW/400 could also have previously been used to set up the conditions you wish to monitor for, using IBM OMEGAMON/400 and the automation routines you want to run using IBM AUTOMATED FACILITIES/400

The following table shows you which products you would need to perform which tasks.

<i>Table 9 (Page 1 of 2). AUTOMATION CENTER/400 Functions Matrix</i>			
<b>Task</b>	<b>IBM OMEGAMON/400</b>	<b>IBM AUTOMATED FACILITIES/400</b>	<b>IBM OMEGAVIEW/400</b>
Detect library growth	X		
Detect auxiliary storage pool growth	X		
Detect security violations	X		
Send status alerts to NetView when specified system conditions detected	X		
Prioritize local jobs	X	X	
Limits local use to authorized users	X	X	
Control local job flow	X	X	
Provide real-time graphical display resource utilization problems	X		X
Distribution of situations and policies	X		X
Graphical viewing and editing of a situation	X		X
Graphical viewing and editing of a policy	X		X
Running a situation in OMEGAVIEW	X		X
Running a policy in OMEGAVIEW	X	X	X
Manage remote jobs	X	X	X
Transfer or prioritize work	X	X	
Automate distributed applications	X	X	X
Automate remote configuration changes	X	X	X
Verify remote fix levels	X		X
Clean up remote files	X	X	X

Table 9 (Page 2 of 2). AUTOMATION CENTER/400 Functions Matrix			
Task	IBM OMEGAMON/400	IBM AUTOMATED FACILITIES/400	IBM OMEGAVIEW/400
Centralize monitoring of network performance data	X		X

The tasks shown in Table 9 on page 220 are based on Base Products uation is the as well as optional features. A *situation* is a condition for which you are monitoring using IBM OMEGAMON/400, while a *policy* is the IBM AUTOMATED FACILITIES/400 automation routine.

## C.5 Configuration Requirements

### C.5.1 Hardware

#### C.5.1.1 For IBM OMEGAMON/400 and IBM AUTOMATED FACILITIES/400

They will both run on any model of AS/400. Any model of non-programmable terminal or PC running 5250 emulation can be used.

#### C.5.1.2 For IBM OMEGAVIEW/400

IBM OMEGAVIEW/400 requires any PC capable of running OS/2 Version 2.0. You also need 8MB of memory and 5MB of disk space on the PC.

### C.5.2 Software

IBM OMEGAMON/400, IBM AUTOMATION CENTER/400 and IBM OMEGAVIEW/400 all require the AS/400 to have OS/400 Version 2 Release 3 (V2R3).

IBM OMEGAMON/400 is the base product for IBM AUTOMATION CENTER/400. IBM AUTOMATED FACILITIES/400 and IBM OMEGAVIEW/400 are features of IBM OMEGAMON/400. You cannot run IBM AUTOMATED FACILITIES/400 or IBM OMEGAVIEW/400 without it. It can however, be purchased and run by itself, the function you get in this case is only the monitoring part of IBM AUTOMATION CENTER/400 and is fairly limited. IBM OMEGAMON/400 is packaged in the same way as other AS/400 licensed programs. It is installed using the GO LICPGM menu.

IBM AUTOMATED FACILITIES/400 is used in conjunction with IBM OMEGAMON/400. IBM AUTOMATED FACILITIES/400 obtains the information about system conditions from IBM OMEGAMON/400

IBM OMEGAVIEW/400 requires both IBM OMEGAMON/400 and IBM AUTOMATED FACILITIES/400 to be installed on the AS/400 before it can be used. IBM OMEGAVIEW/400 is shipped on 3 PC diskettes.

In a networking environment, IBM OMEGAVIEW/400 is installed at the central site. The central AS/400 requires both IBM OMEGAMON/400 and IBM AUTOMATED FACILITIES/400 to be installed. Each remote system requires IBM OMEGAMON/400. If automated responses are required, IBM AUTOMATED FACILITIES/400 will need to be installed on them as well.

The following table summarizes the configuration for the product IBM OMEGAMON/400 and the features IBM AUTOMATED FACILITIES/400 and IBM OMEGAVIEW/400.

The following table shows you which products you would need to perform what tasks.

<i>Table 10. AUTOMATION CENTER/400 Hardware and Software Requirements</i>		
<b>Product</b>	<b>Hardware</b>	<b>Software</b>
IBM OMEGAMON/400	5250 non-programmable workstation or workstation running 5250 emulation connected to any AS/400 model	OS/400 V2R3
IBM Automated Facilities/400	5250 non-programmable workstation or workstation running 5250 emulation connected to any AS/400 model.	OS/400 V2R3 IBM OMEGAMON/400
IBM OMEGAVIEW/400	486/50 MHz programmable workstation with capability to run OS/2 2.0 or higher, connected to any AS/400 model	OS/400 V2R3
	16MB total memory on the PC	IBM OMEGAMON/400 on systems used for situation monitoring
	25MB total memory on the PC for IBM OMEGAVIEW/400	IBM Automated Facilities/400 on systems using automation function
	16/4MB Token-Ring Local Area Network	OS/2 2.0 and higher, Communications Manager/2, PC Support/400, Communications Manager/400 option or IBM TCP/IP for OS/2 Version 1.2.1 If a TCP/IP connection is used, IBM TCP/IP Connectivity Utilities/400 must be installed on the AS/400 system
	100MB of DASD on the AS/400 system	PC Support/400, OS/2 Programs option for installation and program temporary fixes

---

## Appendix D. NetView Remote Operations for AS/400

NetView Remote Operations for the AS/400 will be shipped as two separate licensed products.

- NetView Remote Operations Manager MVS/ESA runs on a system where NetView is installed and enables you to send AS/400 commands to a remote AS/400 system from the NetView system.
- NetView Remote Operations Agent/400 runs on an AS/400 system, executes these commands, and sends the response data back to NetView Remote Operations Manager MVS/ESA.

Using these programs, NetView operators can issue AS/400 commands from their NetView Graphic Monitor Facility (NGMF) workstations, Command Tree/2 workstations, or NetView consoles. The AS/400 responses are forwarded to the originating consoles.

For automation purposes, NetView system programmers can use these programs to issue AS/400 commands by using the automation tables or by using Resource Object Data Manager (RODM).

---

### D.1 Features of NetView Remote Operations Manager MVS/ESA

The Remote Operations Manager provides the following features:

- Can be invoked through various interfaces.

The Remote Operations Manager can be invoked through the NetView command line, the Command Tree/2 program (either by itself or from GMF), the automation table, RODM methods, and other user programs. All command responses from the remote system are sent to the operator console.

- Provides a command tree containing a list of AS/400 commands. You can invoke the AS/400 command tree by using the Command Tree/2 program. In NGMF, you can also select a destination and then invoke the AS/400 command tree to send an AS/400 command to the selected destination.
- Enables you to display or suppress remote command responses.

You can choose to display or suppress the messages for acceptance or rejection reports, success or failure reports, and data output of remote commands.

- Enables you to set up default destinations or destination lists.

You can set up default destinations and even destination lists for your remote commands either at startup time or at run time. The destination or the destination list, which contains a list of destinations, for a specific command is referenced by a name. A default destination and a default destination list is used when the name is not specified. For the destinations that have not been set up, you can explicitly specify them by invoking the Remote Operations Manager commands.

- Provides a message flow debugging facility.

You can turn on the debug facility to verify the content of the incoming and outgoing MS message units.

- Provides message correlation of remote commands with responses.  
This helps you correlate the remote commands and their responses.
- Enables you to issue scheduled remote commands.  
You can issue a scheduled command that will be executed in the specified execution-time window.
- Enables you to cancel previously issued commands.  
You can send cancel request commands to a remote system to cancel previously issued commands. Only those commands that have not yet been executed (and are not busy executing) on the remote system can be cancelled.
- Enables the system programmer to prevent operators from issuing unauthorized commands.  
The system programmer can define scope-checking for all Remote Operations Manager command Keywords.

---

## D.2 Features of NetView Remote Operations Agent/400

The Remote Operations Agent provides the following features:

- Enables remote commands to be executed simultaneously.  
The Remote Operations Agent creates one batch job for each remote command. The jobs for the commands are executed simultaneously.
- Enables remote commands to be executed immediately or in a specific time window.  
It schedules the command to be executed in the specified execution-time window or to be executed immediately if no execution-time window is specified.
- Enables the Remote Operations Manager to cancel commands that have not yet been executed.  
The Remote Operations Agent allows cancellation of commands that have not yet been executed.
- Enables the Remote Operations Manager to decide which level of output is returned.  
The Remote Operations Agent sends status and data output of remote commands to the manager as requested.
- Enables the system administrator to set up application level security checking of remote commands.  
The Remote Operations Agent provides a security user exit sample that allows you to prevent unauthorized remote commands from being executed on your system. You can modify the sample or supply your own security exit.

---

## D.3 Planning for NetView Remote Operations Manager MVS/ESA

This section describes the system requirements (hardware, software and storage) for installing and running NetView Remote Operations Manager on a system with NetView installed.

### D.3.1 Hardware and Software Requirements

The Remote Operations Manager runs under NetView V2R3 on MVS/ESA. No other hardware is required other than the MVS/ESA requirements and no other software other than NetView V2R3.

### D.3.2 Storage Requirements

The Remote Operations Manager requires 2MB of disk space on the host and 0.5MB of disk space at the workstation. This is in addition to the space required by NetView V2R3, NGMF, Command Tree/2, and any other application being used.

---

## D.4 Installation of NetView Remote Operations Manager MVS/ESA

This section describes the steps necessary to install the Remote Operations Manager MVS/ESA. The Remote Operations Manager MVS/ESA is loaded from tape using SMP/E once the product has been installed at the NetView host.

### D.4.1 Installing the AS/400 Command Tree at the Workstation

The GraphicsView/2 installation administrator is used to install the AS/400 command tree at the workstation. The installation administrator is invoked by typing in EXQINST at the command prompt. The installation files for the AS/400 Command Tree are stored in data set SYS1.SFNAPS2U. The files are:

- FNA001OD            Option file
- FNA001CA            Catalog file
- FNA001PA            Package file

For information about installing the above, consult the chapter "Installing the NetView Graphic Monitor Facility on the Workstation" in the NetView Installation and Administration Guide (MVS), SC31-6127. It will guide you through the following steps:

1. Download the installation administrator files if you have not done so already.
2. Customize the installation options file, FNA001OD.
3. Customize the installation catalog, FNA001CA.
4. Invoke the installation administrator, EXQINST.
5. Define your installation environment.
6. Specify the MVS options file. The TSO data set name is SYS1.SFNAPS2U and the TSO member is FNA001OD.

7. Get the installation options file.
8. Use the installation administrator main window.
9. View and change your current installation options.
10. Get the selected items.
11. Install selected items.
12. Exit the installation administrator.

---

## D.5 Customizing the Command Tree/2 Interface

After having downloaded the code for CT/2 (Command Tree/2) from the host to the workstation, you can customize this environment. All commands are sent from the CT/2 interface to a designated terminal emulator. A variable set of commands is supplied with NetView Remote Operations Manager which is downloaded and accessible from CT/2. To be able to make any required changes to the variable set, click on the CT/2 icon on the desktop and select the administrator version of CT/2. (See Figure 204.) Click on **File** and then on **Open...** as in Figure 205 on page 227 and then select the variable set and click on the **Open** push button as in Figure 206 on page 227 to open the variable set of commands.

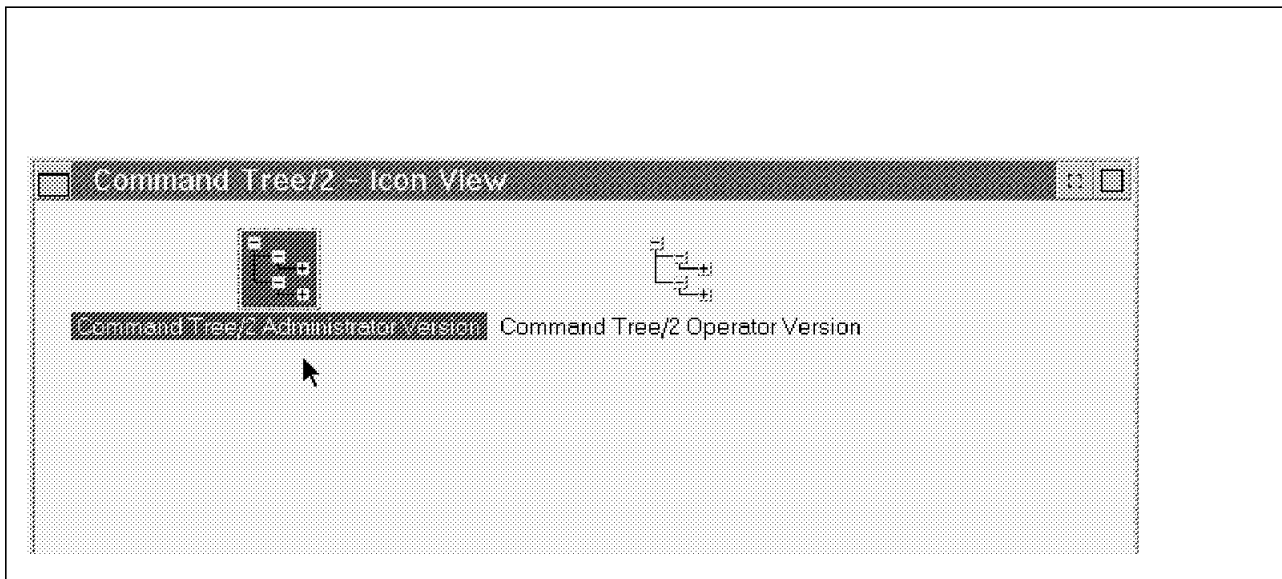


Figure 204. CT/2 Panel to Select Administrator Version



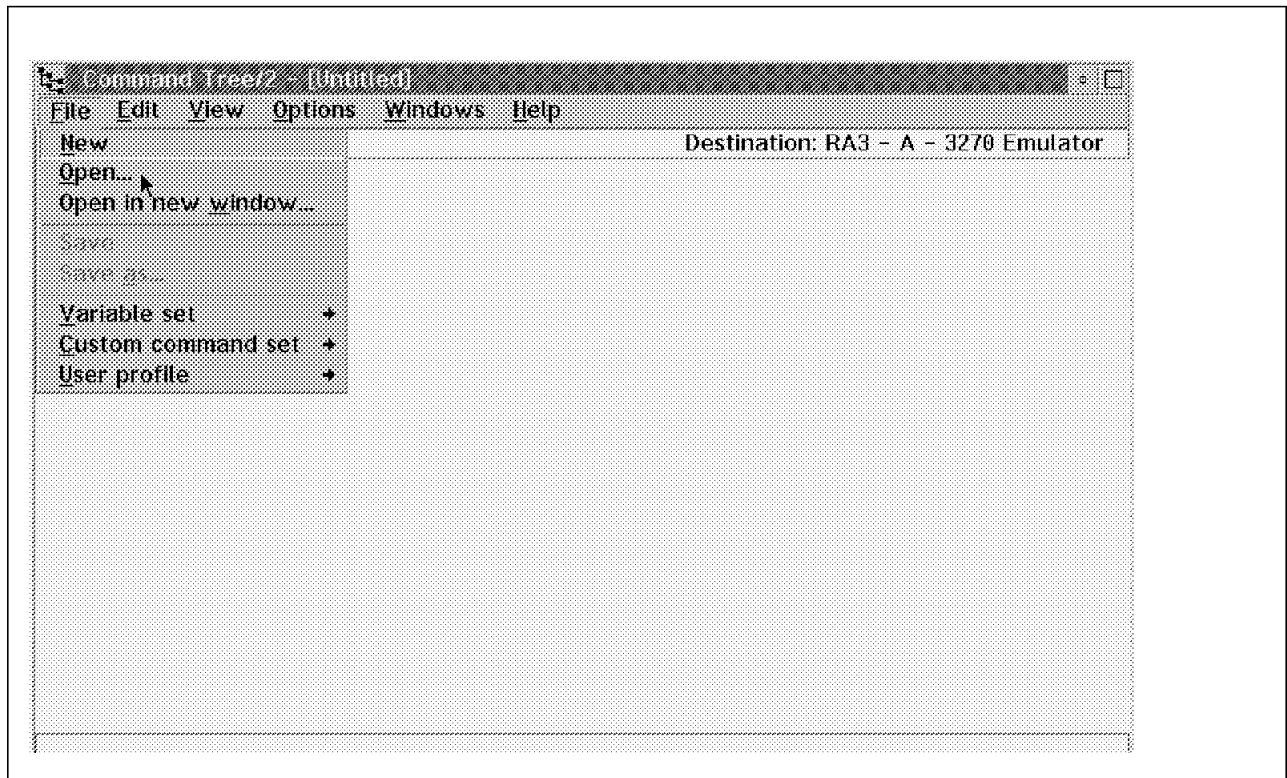


Figure 205. CT/2 Open Variable Set (Panel 1 of 2)

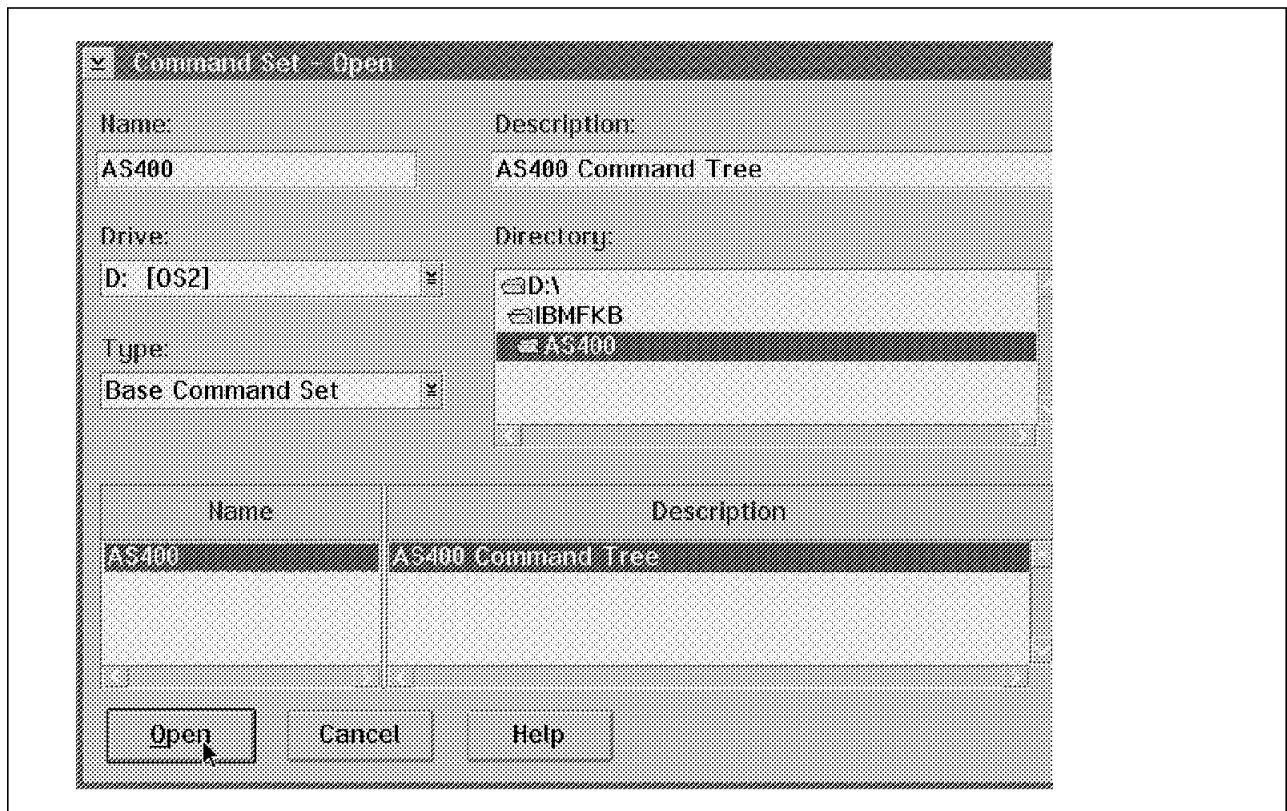


Figure 206. CT/2 Open Variable Set (Panel 2 of 2)

As soon as the variable set is opened, the following panel appears (see Figure 207 on page 228). Clicking on the plus sign expands the variable set.

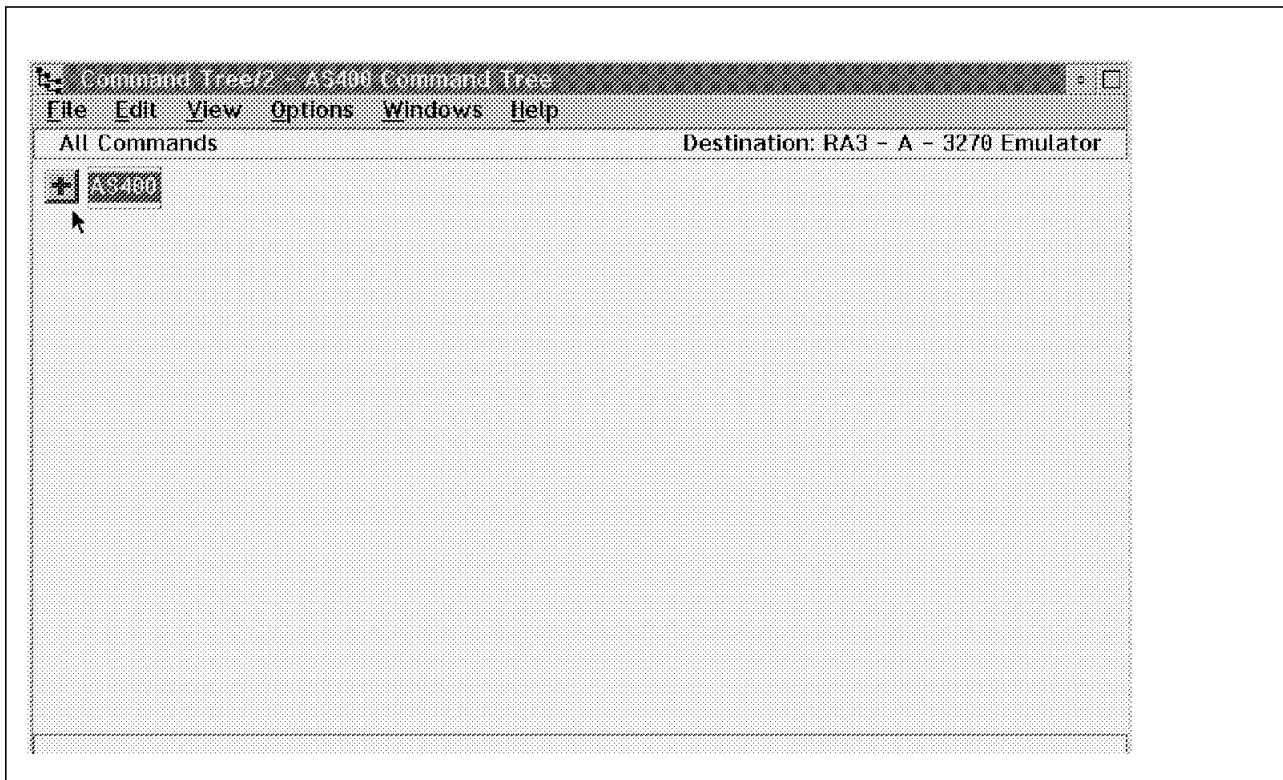


Figure 207. CT/2 Panel With Variable Set Opened

To add a command to the variable set select **Edit** and then **Add base command node...** (see Figure 208 on page 229).

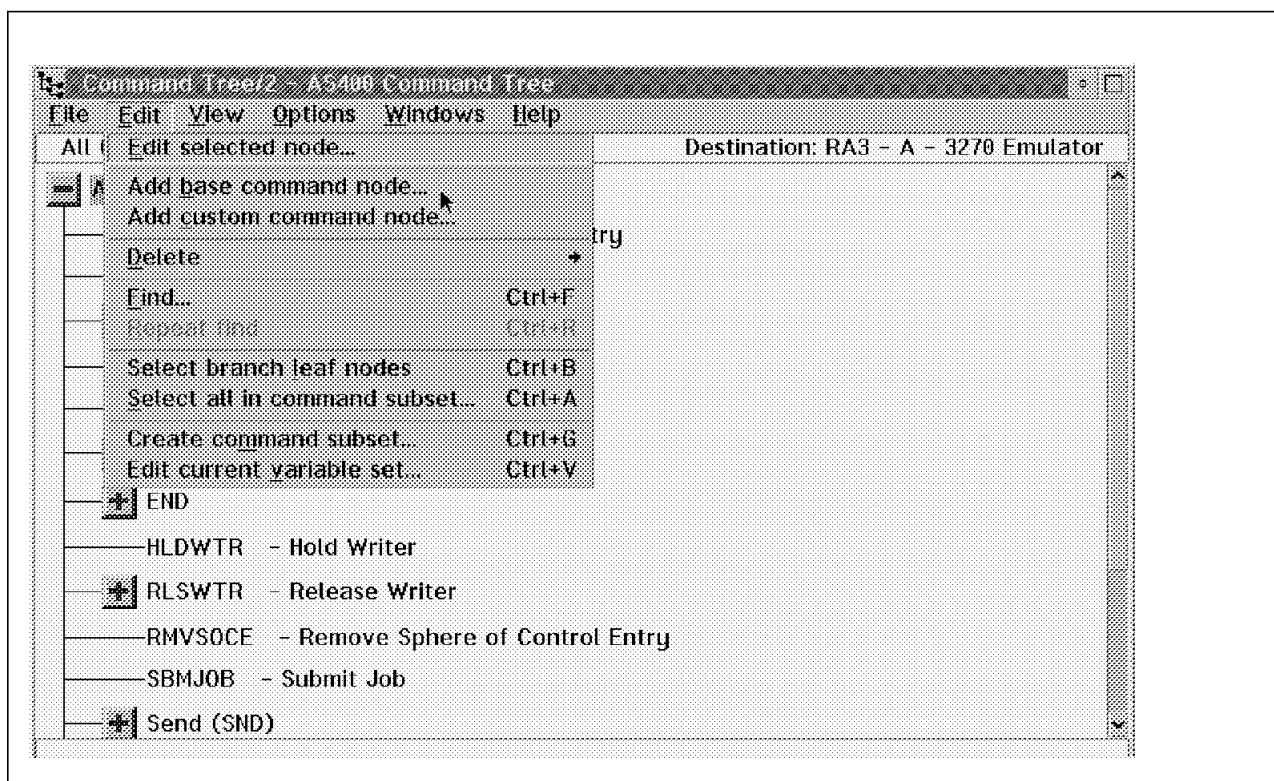


Figure 208. Add Command to CT/2 Variable Set (Panel 1 of 2)

The result is the panel in Figure 209 on page 230. We have added the command DSPSBSD and checked the Force command preview checkbox. This will allow you to add parameters to the command before sending.

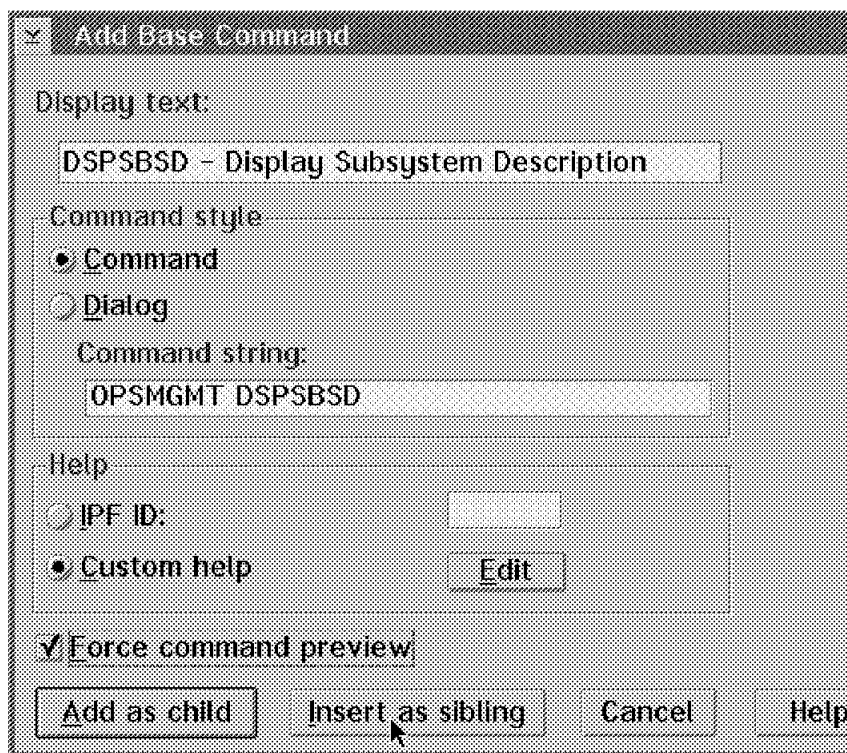


Figure 209. Add Command to CT/2 Variable Set (Panel 2 of 2)

The result of having done the above and inserting the command as a sibling to the tree will be that the command is placed in alphabetical order with other siblings in the tree (see Figure 210 on page 231).

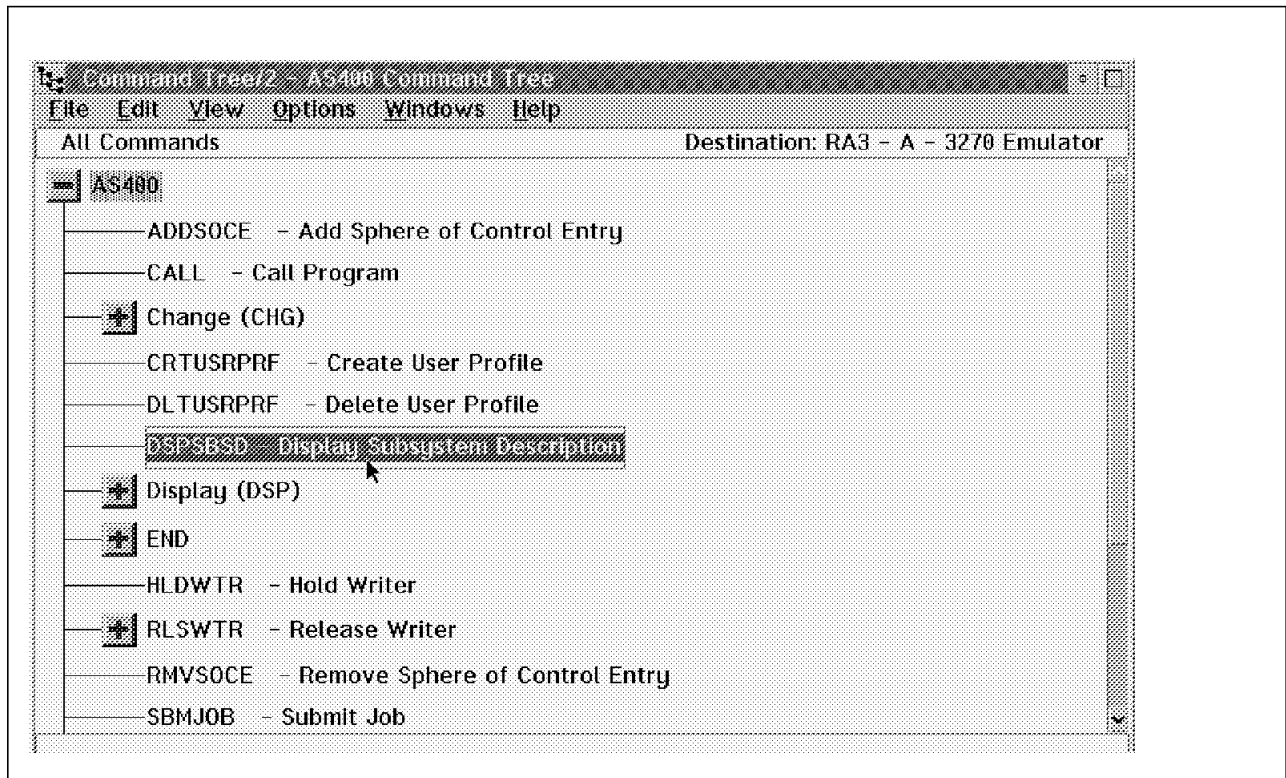


Figure 210. Command Added to CT/2 Variable Set

By selecting **Display Subsystem Description**, as shown in Figure 210, we get the following panel (see Figure 211). This gives us the description and status of subsystem QSNADS.

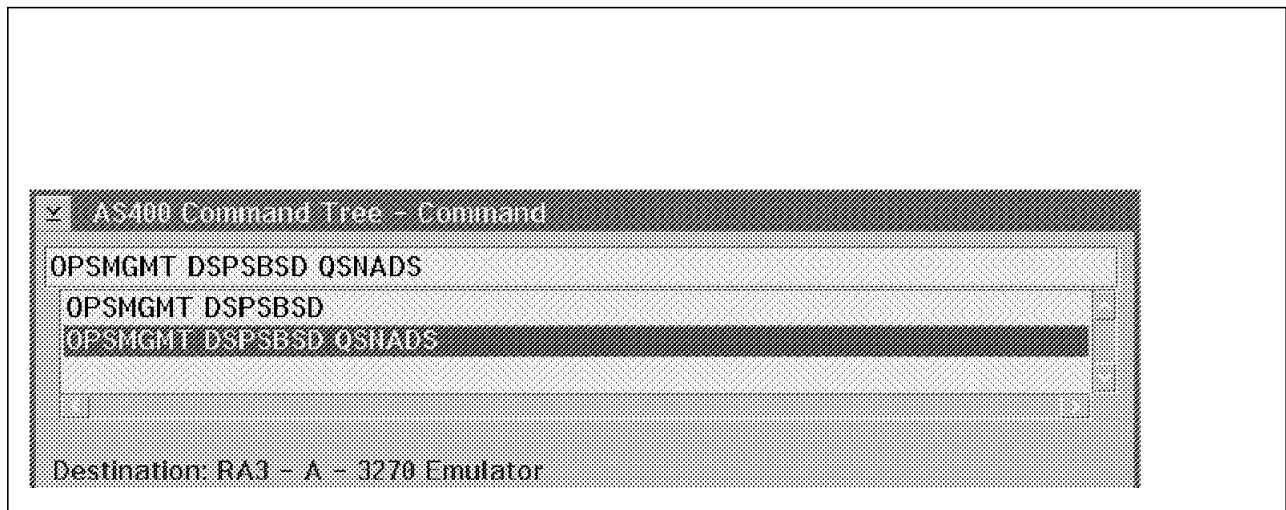


Figure 211. Command Ready to Send to NetView

The result is that the command is sent to the destination terminal emulator, which is our NetView session, and then executed with the OPSMGMT command supplied by NetView Remote Operations Manager.

```

NCCF                                N E T V I E W    RA3AN FORTUIN  09/23/93 08:4
* RA3AN    OPSMGMT DSPSBSD QSNADS
- RA3AN    CNM570I STARTING AUTOMATION TASK FNAAUTO
- RA3AN    FNA567I OPSMGMT COMMAND ENVIRONMENT INITIALIZATION HAS COMPLETED
              SUCCESSFULLY
- RA3AN    FNA550I 1, OPSMGMT COMMAND ACCEPTED, REPLY=ALL, NETID=USIBMRA,
              LU=RALYAS4A, APPL=EP_OPS, BEGTIME=*, ENDTIME=*, CMD='DSPSBSD
- RA3AN    FNA558I 1, OPSMGMT COMMAND ACCEPTED BY THE REMOTE SYSTEM,
              CMD='DSPSBSD QSNADS'
- RA3AN    FNA556I 1, 5738SS1 V2R3M0  931217              Display Sub
              Description                      9/23/93  8:47:15
              Page 1
- RA3AN    FNA556I 1, Subsystem description . . . . . : QS
              Status . . . . . : Active
- RA3AN    FNA556I 1, Operational Attribute
- RA3AN    FNA556I 1, Subsystem description . . . . .
              SBSO      QSNADS
- RA3AN    FNA556I 1, Library . . . . .

```

It is also possible to change the destination terminal emulator in the following way. Select **Options** and then **Command destination** (see Figure 212).

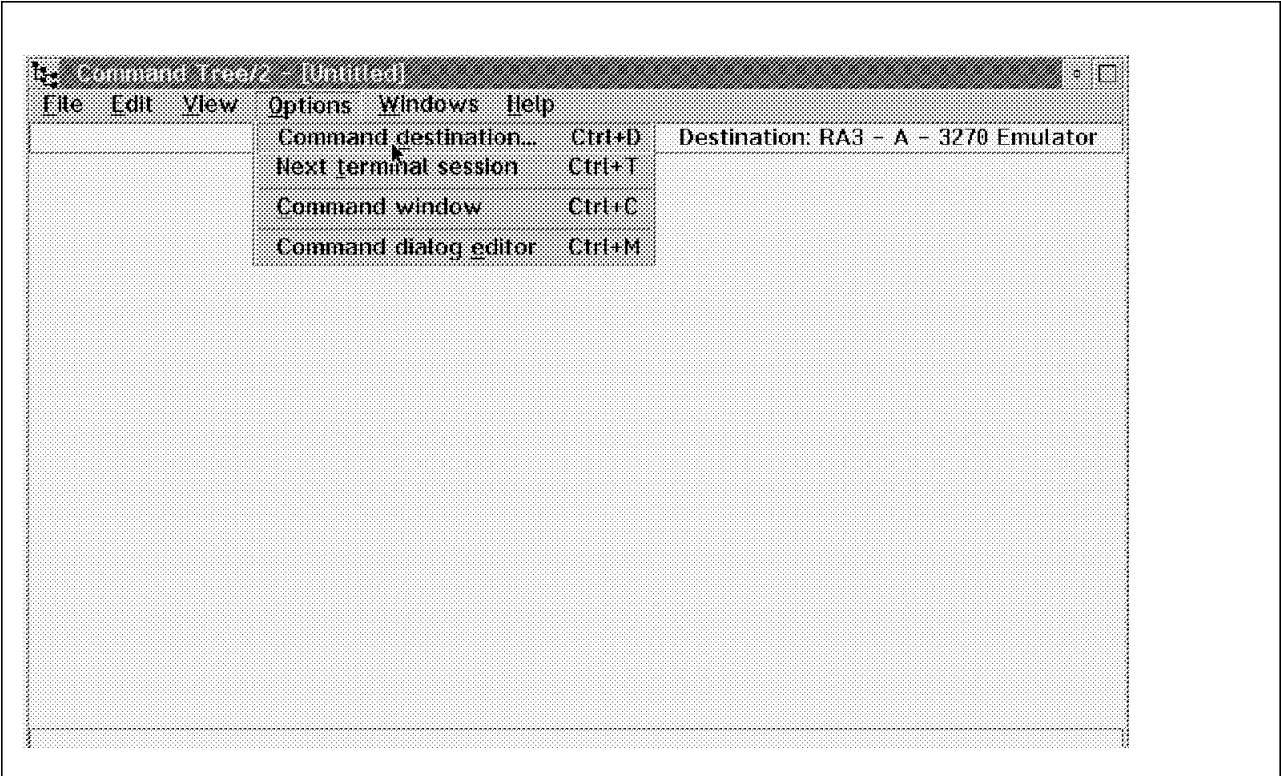


Figure 212. Changing Command Destination in CT/2 (Panel 1 of 4)

By selecting the **Terminal session settings...** in the resulting display (see Figure 213 on page 233) we get the option to select a new destination emulator (see Figure 214 on page 233). We have chosen the D emulator as our new destination emulator. This is shown in Figure 215 on page 234.

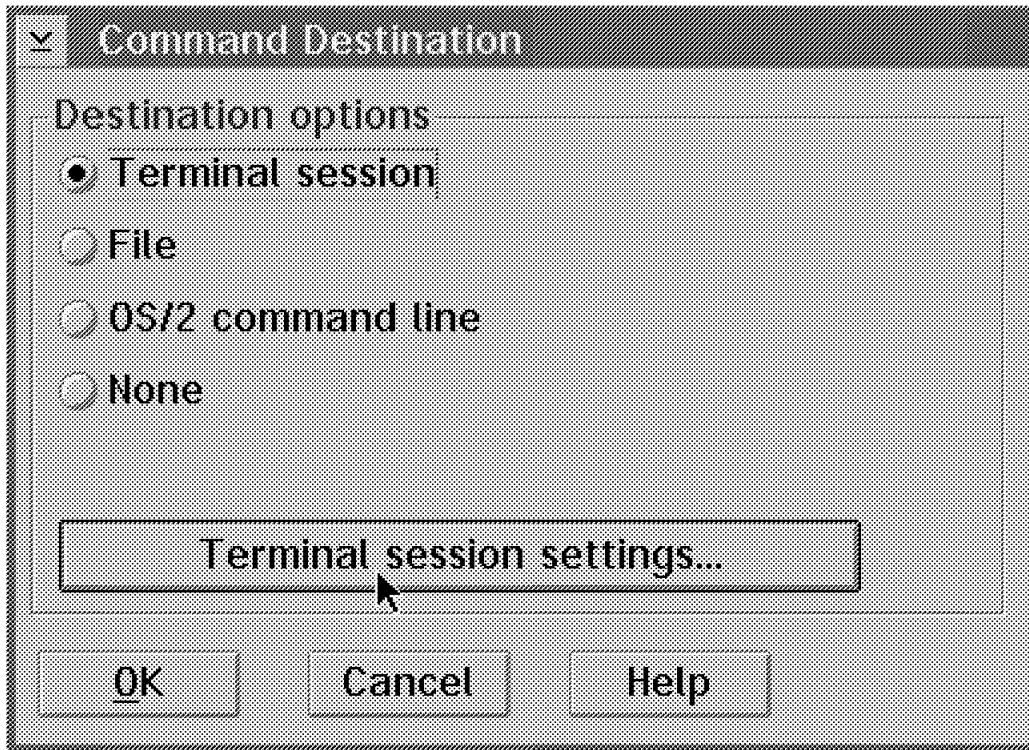


Figure 213. Changing Command Destination in CT/2 (Panel 2 of 4)

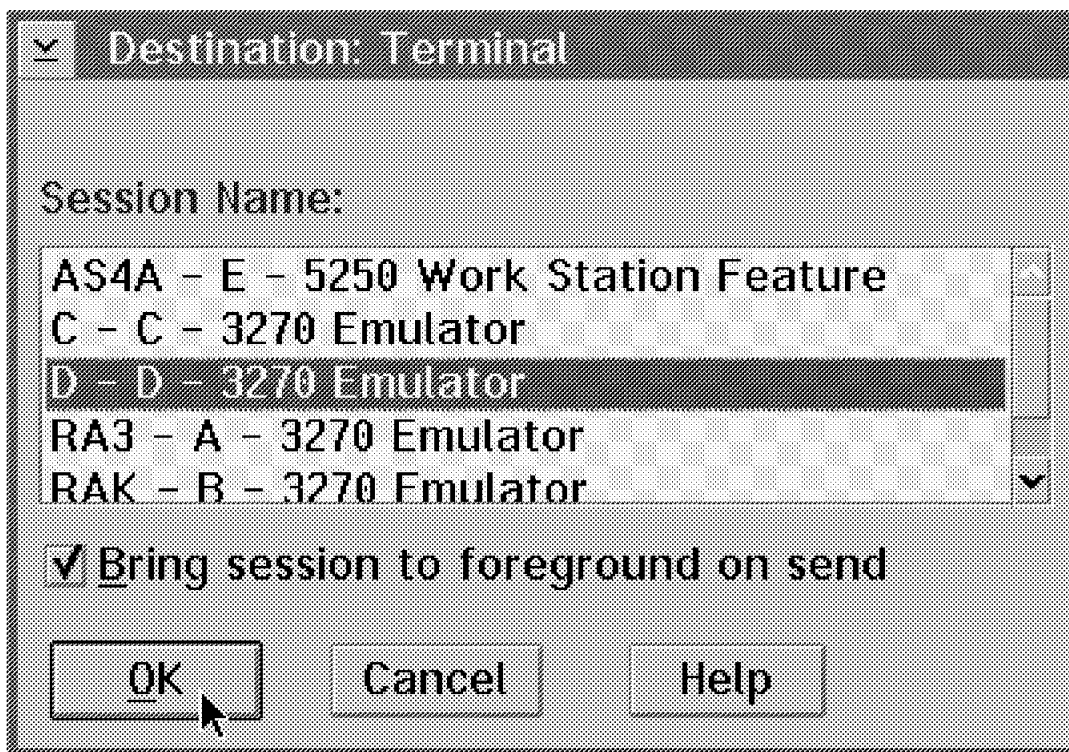


Figure 214. Changing Command Destination in CT/2 (Panel 3 of 4)



Figure 215. Changing Command Destination in CT/2 (Panel 4 of 4)

## D.6 Customizing NetView Remote Operations Manager

FNAGVARS is a sample command list that is provided with the NetView Remote Operations Manager code. This command list sets the values of the task global variables defined for the OPSMGMT command environment. You can customize this command list for a set of default values for all variables. The command list, which resides in data set SYS1.SFNACLST, is invoked by the command list FNAINIT, another sample command list. FNAGVARS invokes the FNASETV command list, which is used to initialize the task global variables.

## D.7 Using NetView Remote Operations Manager

The NetView Remote Operations Manager provides five command lists a user can run in the NetView environment. We will discuss all of them. The following steps are described in detail in *NetView Remote Operations Manager MVS/ESA NetView Remote Operations Agent/400 User's Guide*, SC31-7177.

### D.7.1 OPSMGMT Command List

The OPSMGMT command processor forwards commands via an LU6.2 session to a remote AS/400. All responses are returned to the sender of the OPSMGMT command, and if the sender is not available, all responses are forwarded to the registered task FNAAUTO. FNAAUTO then forwards the responses to automation, the connected console, and the NetView log.



## D.7.2 FNAINIT Command List

The FNAINIT command processor specifies that the OPSMGMT command environment is to be initialized for the operator session. FNAINIT provides the following services:

- If FNAAUTO is not already running, it is started. This autotask is required for the correct operation of the OPSMGMT command.
- The FNAGVARS command list is invoked to set all task global variables for the OPSMGMT command environment.
- The OPSMGMT command initialization module is called to initialize OPSMGMT command environment.

## D.7.3 FNAGVARS Command List

The FNAGVARS command list is used to initialize the task global variables for the OPSMGMT environment. FNAGVARS is automatically invoked by FNAINIT. FNAGVARS can also be manually invoked. It, in turn, calls the FNASETV command list.

## D.7.4 FNASETV Command List

The FNASETV command list is used to change the values of the task global variables used by OPSMGMT. This command list can also be manually invoked from the NetView command line.

## D.7.5 FNADSPV Command List

The FNADSPV command list is used to display all task global variables set for OPSMGMT.

---

## D.8 Planning for NetView Remote Operations Agent/400

This section describes the system requirements (hardware, software and storage) for installing and running NetView Remote Operations Agent on the AS/400 system.

### D.8.1 Hardware and Software Requirements

The Remote Operations Agent runs under OS/400 (Operating System/400) V2R2 or later. No extra hardware or software is required other than an AS/400 running OS/400 V2R2.

### D.8.2 Storage Requirements

The Remote Operations Agent requires 1MB of disk space, this is in addition to the disk space used by the OS/400.

---

## D.9 Installing NetView Remote Operations Agent/400

To install the Remote Operations Agent/400, restore the Remote Operations Agent library, QJRO, from tape. Follow these steps:

1. Sign on as the security officer (QSECOFR) on your AS/400.
2. Enter the following CL (control language) command to restore the product library QJRO:

```
RSTLICPGM LICPGM(5733165) DEV(dev_name)
```

where dev\_name is the tape device name according to your configuration.

3. After restoration, an installation exit is called automatically to complete the installation work.

### D.9.1 Customizing NetView Remote Operations Agent/400

This section describes the necessary steps to administer and customize the NetView Remote Operations Agent/400.

### D.9.2 Starting or Ending the Request File Journal

After installing the Remote Operations Agent/400 on the AS/400, the journal (QJROJRN) and the journal receiver (QJROJRN0001) are created in the QUSRSYS library for journaling the Request Table File (QJRORQF). The journal is turned off initially. All remote requests records are placed in the Request Table File for processing and are removed after completion. The journal must be started before the STRROAGT command if journaling is to be used. When the journal is started all remote requests are logged for tracking and maintenance purposes.

To start the journal enter the following control language command:

```
STRJRNPF FILE(QUSRSYS/QJRORQF) JRN(QJROJRN) IMAGES(*BOTH)  
OMTJRNE(*OPNCLO)
```

To end the journal, enter the following control language command:

```
ENDJRNPF FILE(QUSRSYS/QJRORQF)
```

### D.9.3 Modifying the Job Descriptions

There are three job descriptions for the Remote Operations Agent/400. The QJRORCV job description is for the main job that receives remote requests and schedules the requests for processing. The QJROEXC job description is for processing AS/400 commands. The QJROCAN job description is for executing cancel requests. The following definitions are the default attributes of these job descriptions:

```
QJRORCV JOBQ(QSYSNOMAX) RTGDTA(RUNPTY15)
```

```
QJROEXC JOBQ(QSYSNOMAX) RTGDTA(RUNPTY35)
```

```
QJROCAN JOBQ(QSYSNOMAX) RTGDTA(RUNPTY20)
```

You can change the run priority of any job using the CHGJOB command.

### D.9.4 Security Provided

Security is provided by means of a security exit QJROSUXT. This security exit is called by Remote Operations Agent to check every remote request received. QJROSUXT returns an acceptance indicator to indicate whether the request is authorized or not. If a request is not authorized it is rejected by the Remote Operations Agent.

QJROSUXT goes through the security table (QJROSECF) to find out if a request is authorized or not. QJROSECF is a physical file with only one member in it. The member name is the same as the file name.

For more detail on the security provided see *NetView Remote Operations Manager MVS/ESA NetView Remote Operations Agent/400 User's Guide*, SC31-7177.

---

## D.10 Samples

The following subtopic has the sample command lists (CLISTs) discussed in this chapter.

### D.10.1 FNAINIT Sample

```
/* FNAINIT REXX EXEC */

Trace ERR

/*****
/* Initialize OPSMGMT command environment */
/* This EXEC is called automatically the first time the OPSMGMT */
/* command is issued by an operator since logon. This EXEC */
/* can be called at any time prior to or subsequent to an OPSMGMT */
/* command invocation and will cause the task global variables */
/* to be initialized or re-initialized. If called before the */
/* first OPSMGMT command invocation, then this EXEC will not be */
/* called again (which would re-initialize the task global */
/* variables) unless explicitly called by the operator. */
*****/

/*****
/* Try and start the FNAAUT autotask if not already running */
*****/

final_rc = 0 /* Init return code */
auto_task = 'FNAAUTO' /* OPSMGMT auto task */
If opid() <> auto_task then do /* This operator task is not the
                                OPSMGMT auto task */
    'AUTOTASK OPID=' auto_task /* Start the FNAAUTO autotask */
    knt = 0
    'globalv getc FNAAUTOSTAT'
    Do while FNAAUTOSTAT = null
        If TASK() <> 'PPT' then /* Only if not PPT task */
            'WAIT 1' /* Wait to kill time */
            knt = knt + 1 /* Loop variable to kill time */
        If knt > 500000 then do
            final_rc = 1
            leave
        End
        'globalv getc FNAAUTOSTAT'
    End
End

/*****
/* Initialize OPSMGMT environment */
*****/

'globalv gett FNANOINITV'
If FNANOINITV <> 'YES' & FNANOINITV <> 'Y' then
    'FNAGVARS' /* Init task global variables */
```

```

If (final_rc = 0) then
    'FNAINTP'                                /* Initialize OPSMGMT env    */
Else
    say 'Failed to start autotask' auto_task

return final_rc                                /* Return rc                */

```

## D.10.2 FNADSPV Sample

```

/*****
/* FNADSPV                                */
/* Used by an operator to display        */
/* global variables for the OPSMGMT command environment.    */
/*                                     */
/* FNADSPV ? to display the usage        */
*****/
Trace ERR

arg parms
parms=strip(parms)

if left(parms,1)='?' | parms='' then do
    'help fnadspv'
    exit 0
end

var_names = 'TIMEOUT    REPLY    NETID    LU    '
            'DESTLIST    APPL    PRI    DEBUG    CANCEL'
act_names = 'FNATIMEOUT  FNAREPLY  FNANETID  FNALU    '
            'FNADESTLIST FNAAPPL  FNAPRI   FNADEBUG  FNACANCEL'
var_group = '1          1          1          1          '
            '1          1          1          0          0          '

group_name=''
ix_destlist=find(var_names,'DESTLIST')
first_grp=1
/*****
/* Get groups from all group list variables    */
*****/
fnagrplist=''
'globalv gett fnaglist.0'
if fnaglist.0 ~= '' & datatype(fnaglist.0,'N') & fnaglist.0 > 0 then
    do grp_ix=1 to fnaglist.0
        fnagrplist=fnagrplist getval(fnaglist.grp_ix)
    end

do while words(parms) > 0
    parse var parms x_grp '=' .
    if x_grp='GROUP' then
        parse var parms '=' group_name parms
    else
        parse var parms group_name parms
        group_name=strip(group_name)

    if first_grp then
        call display_group '.'
        first_grp=0

```

```

if group_name='*' then do
  do i_grp=1 to words(fnagrplist)
    call display_group word(fnagrplist,i_grp)
  end
end; else if group_name<>'.' then
  call display_group group_name
  first_grp = 0
end
call exits 0

display_group:
grp=arg(1)
if grp='.' then do
  say 'Default group:'
  grp=''
end; else do
  first_char=left(grp,1)
  temp_grp=translate(grp,'AB','_','$')
  if datatype(first_char,'M') | datatype(temp_grp,'A') |
    (length(temp_grp) > 8) then do
    say 'Invalid group name:' grp
    return -1
  end
  say 'Group' grp ':'
end

do i=1 to words(var_names)
  act_name=word(act_names,i)
  var_name=word(var_names,i)
  x$=''
  if word(var_group,i) then
    x$='.'||grp
  if x$<>' ' | grp='' then do
    if i = ix_destlist then do
      'globalv gett ' act_name||x$
      say ' 'left(act_name||x$, 20) '=' value(act_name||x$)
    end
    else do
      cur_val=''
      if grp='' then
        act_name=act_name'.'grp
        last_ix=getval(act_name'.0')
        if datatype(last_ix,'N') then
          do ii=1 to last_ix
            tem_act_name=act_name'.'ii
            cur_val= cur_val getval(tem_act_name)
          end
        cur_val=strip(cur_val)
        if grp='' then
          act_name=act_name'.'
          say ' 'left(act_name, 20) '=' cur_val
        end
      end
    end
  end
  return 0

exits:
exit arg(1)

```

```

getval:
    'globalv gett ' arg(1)
    return space(value(arg(1)))

```

### D.10.3 FNASETV Sample

```

/*****
/* 5696-583 (C) COPYRIGHT IBM CORPORATION 1993
/* ALL RIGHTS RESERVED.
/* NAME(FNASETV) SAMPLE(FNASETV)
/* DESCRIPTION: SET TASK GLOBAL VARIABLES FOR THE OPSMGMT
/* ENVIRONMENT.
*****/
/* Function:
/* Used by an operator to set task
/* global variables for the OPSMGMT command environment.
/*
/* FNASETV ? to display the usage
/*
/* Parameters:
/* See HELP for FNASETV.
/*
/* Return codes:
/* 0 : Normal exit
*****/
Trace ERR

parse arg parms '(' options ')'
parms=strip(parms)

if left(parms,1)='?' | parms='' then do
    'help fnasetv'
    exit 0
end

var_names = 'TIMEOUT REPLY NETID LU '
            'DESTLIST APPL PRI DEBUG CANCEL ',
            'NOINITV'
act_names = 'FNATIMEOUT FNAREPLY FNANETID FNALU '
            'FNADESTLIST FNAAPPL FNAPRI FNADEBUG FNACANCEL ',
            'FNANOINITV'
var_list = '0 0 0 0 '
           '1 0 0 0 '
var_group = '1 1 1 1 '
            '1 1 1 0 0 0 '
valid_val1 = 'YES Y NO N'
valid_val2 = 'ACCEPT SUCCESS STATUS ALL LASTDATA FAILDATA NONE'
valid_val3 = 'H M L'

call parse_options options
group_list='.'

/*****
/* Get groups from all group list variables
*****/
fnagrplist=''

```

```

'globalv gett fnaglist.0'
if fnaglist.0 == " & datatype(fnaglist.0,'N') & fnaglist.0 >0 then
  do grp_ix=1 to fnaglist.0
    fnagrplist=fnagrplist getval(fnaglist.grp_ix)
  end

ix_debug=find(var_names,'DEBUG')
ix_cancel=find(var_names,'CANCEL')
ix_reply=find(var_names,'REPLY')
ix_pri=find(var_names,'PRI')
ix_timeout=find(var_names,'TIMEOUT')
ix_lu=find(var_names,'LU')
ix_netid=find(var_names,'NETID')
ix_appl=find(var_names,'APPL')
ix_destlist=find(var_names,'DESTLIST')
ix_noinitv=find(var_names,'NOINITV')

do while words(parms) > 0
  parse var parms var_name '=' parms
  var_name=translate(space(var_name))
  if words(var_name)>1 then do
    say 'Variable name can only be one word:' var_name
    leave
  end

  parms=strip(parms)
  if var_name=' GROUP' then do
    if left(parms,1)='<' then
      parse var parms '<' group_list '>' parms
    else
      parse var parms group_list parms
    parms=strip(parms)
    group_list=translate(space(group_list))

    if group_list='' then
      group_list='.'
    _xgrp = group_list

    $update_grp=0
    do forever
      parse var _xgrp group_name _xgrp
      if group_name='' then leave
      if group_name<>'.' & group_name<>'*' then do
        first_char=left(group_name,1)
        temp_name=translate(group_name,'AB','_','$')
        if -datatype(first_char,'M') | -datatype(temp_name,'A') |,
          (length(temp_name) > 8) then do
          say 'Group name is not a valid name:' group_name
          say "The allowable group name is up to 8 characters where"
          say " each character is A-Z, 0-9, '_' or '$', and the first"
          say " character is A-Z only. The default group is used for"
          say " global variables."
          group_list=,
            delword(group_list, wordpos(group_name, group_list), 1)
        end; else do
          if find(fnagrplist,group_name)=0 then do
            $update_grp=1
            found=0
            do il=1 to words(fnagrplist)

```

```

        if group_name<word(fnagrplist,il) then do
            fnagrplist=subword(fnagrplist,1,il-1) group_name,
                subword(fnagrplist,il)
            found=1
            leave
        end
    end
    if -found then
        fnagrplist=fnagrplist group_name
        call set_defaults group_name
    end
end
end
end
if $update_grp then
    call set_grplist
iterate
end

if var_name=' DELGROUP' then do
    if left(parms,1)='<' then
        parse var parms '<' grp_list '>' parms
    else
        parse var parms grp_list parms
        parms=strip(parms)
        grp_list=translate(space(grp_list))

        _xgrp=grp_list
        $update_grp=0
        do forever
            parse var _xgrp grp _xgrp
            if grp='' then leave
            if grp='*' then do
                do il=1 to words(fnagrplist)
                    call drop_group word(fnagrplist,il)
                end
                fnagrplist=''
                call set_grplist
                call drop_group ''
            end; else do
                if grp='.' then
                    call drop_group ''
                else do
                    ix=find(fnagrplist,grp)
                    if ix<>0 then do
                        call drop_group word(fnagrplist,ix)
                        fnagrplist=delword(fnagrplist,ix,1)
                        $update_grp=1
                    end
                end
            end
        end
    end
    if $update_grp then
        call set_grplist
    iterate
end

ix=find(act_names,var_name)
if ix=0 then do

```



```

ix=find(var_names,var_name)
if ix=0 then do
    say 'Name specified is not a valid variable name:' var_name
    iterate
end
end

parms=strip(parms)
append=0
subtract=0
if left(parms,1)='+' & ix=ix_destlist then do
    append=1
    parms=strip(substr(parms,2))
end;
else if left(parms,1)='-' & ix=ix_destlist then do
    subtract=1
    parms=strip(substr(parms,2))
end

if left(parms,1)='<' & ix=ix_destlist then do
    if pos('>',parms)=0 then do
        say "Cannot match '>' sign in the value list of FNADESTLIST"
        parse var parms . parms
        iterate
    end
    else
        parse var parms '<' var_val '>' parms
    end
else
    parse var parms var_val parms
parms=strip(parms)
var_val=space(var_val)
if -opt.opt_mixed then
    upper var_val
if var_val<>"" & var_val<>"'" then /* Non-null value */
/*
select /* Check invalid value */
when ix=ix_debug | ix=ix_cancel then do
    if find(valid_val1,var_val) = 0 then do
        say 'Value specified is not a valid value of',
            'FNADEBUG/FNACANCEL:' var_val
        say "The allowable values for FNADEBUG/FNACANCEL are 'YES','Y',"
        say " 'NO' or 'N'."
        iterate
    end
end
when ix=ix_noinitv then do
    if find(valid_val1,var_val) = 0 then do
        say 'Value specified is not a valid value of',
            'FNANOINITV:' var_val
        say "The allowable values for FNANOINITV are 'YES','Y',"
        say " 'NO' or 'N'."
        iterate
    end
end
when ix=ix_reply then do
    if find(valid_val2,var_val) = 0 then do
        say 'Value specified is not a valid value of FNAREPLY:' var_val
        say "The allowable values for FNAREPLY are 'ACCEPT','SUCCESS',"

```

```

        say " 'STATUS','ALL','LASTDATA','FAILDATA' or 'NONE'."
        iterate
    end
end
when ix=ix_pri then do
    if find(valid_val3,var_val) = 0 then do
        say 'Value specified is not a valid value of FNAPRI:' var_val
        say "The allowable values for FNAPRI are 'H','M' or 'L'."
        iterate
    end
end
when ix=ix_timeout then do
    if var_val = 0 then
        var_val='0'
    else
        var_val=strip(var_val,L,0)
        if (datatype(var_val,'W') | var_val<-1 |,
            var_val>31622400) then do
            say 'Value specified is not a valid value of FNATIMEOUT:',
                var_val
            say "The allowable values for FNATIMEOUT are -1, 0 or",
                "1-31622400."
            iterate
        end
    end
end
when ix=ix_lu then do
    if (datatype(var_val,'A') = 0) | (length(var_val) > 8) then do
        say 'Value specified is not a valid value of FNALU:' var_val
        say "The allowable value for FNALU is up to 8 characters"
        say " where each character is 'A'-'Z' or '0'-'9'."
        iterate
    end
end
when ix=ix_netid then do
    if ((datatype(var_val,'A') = 0) | (length(var_val) > 8)) &,
        (var_val~='*') then do
        say 'Value specified is not a valid value of FNANETID:' var_val
        say "The allowable value for FNANETID is up to 8 characters"
        say " where each character is 'A'-'Z' or '0'-'9'."
        iterate
    end
end
when ix=ix_appl then do
    tem_val=translate(var_val,'A','_')
    if (datatype(tem_val,'A') = 0) | (length(var_val) > 8) then do
        say 'Value specified is not a valid value of FNAAPPL:' var_val
        say "The allowable value for FNAAPPL is up to 8 characters"
        say " where each character is 'A'-'Z','0'-'9' or '_'."
        iterate
    end
end
when ix=ix_destlist then do
    err_flag='N'
    tem_val=var_val
    d_cnt=0
    do while tem_val~=""
        d_cnt=d_cnt+1
        parse var tem_val tem_val1 tem_val
        parse var tem_val1 tem_netid '.' tem_lu
    end
end

```

```

        if tem_lu='' then tem_lu=tem_netid
        else if tem_netid='' then tem_netid='TEMP'
        if tem_val1="" | tem_val1="" then /* Null value */
            var_val = delword(var_val, wordpos(tem_val1, var_val), 1)
        else if (datatype(tem_netid,'A') = 0) |,
            (length(tem_netid) > 8) |,
            (datatype(tem_lu,'A') = 0) |,
            (length(tem_lu) > 8) then do
                say 'Value specified is an invalid value:' var_val
                say "The allowable value for FNADESTLIST is unlimited number"
                say " NETID and LU name pairs of the form: inetid.lu where"
                say " netid and lu are defined for FNANETID and FNALU."
                err_flag='Y'
                leave
            end
        end
        if err_flag='Y' then iterate
    end
    otherwise nop
end /* End of value checking */

_xgrp=group_list
do forever
    parse var _xgrp group_name _xgrp
    if group_name='' then leave
    if group_name='' | group_name='.' then do
        call setgroup_var ''
        do i0=1 to words(fnagrplist)
            call setgroup_var word(fnagrplist,i0)
        end
    end; else
        call setgroup_var group_name
    end
end
call exit 0

setgroup_var:
grp=arg(1)
new_val=var_val
var_name=word(var_names,ix)
act_name=word(act_names,ix)

/*****
/* Reset new value if input value is '' or ""
*****/
if group_name<>'.' & group_name<>'*' then do /* Named group */
    if new_val="" | new_val="" then do /* New value is null */
        if ix=ix_destlist then
            new_val=space(getval(act_name'.')) /* Set new val to default */
        else do
            new_val=''
            last_ix=getval(act_name'.0')
            if datatype(last_ix,'N') then
                do i=1 to last_ix /* Collect all default values */
                    tem_act_name=act_name'.i'
                    new_val= new_val getval(tem_act_name)
                end
            end
        end /* End of DESTLIST type */
    end /* End of null value */

```

```

end                                     /* End of named group */
else if new_val="" | new_val="" then /* Group name is . or * */
    new_val=""                         /* Set to actual null */
/*****

/***** Get current variable value to check if it's null*****/
if ix=ix_destlist then do
    if grp="" then
        act_name=act_name'.'grp
        cur_val=space(getval(act_name'.0')) /* Get number of DESTLIST */
    end
else do
    if word(var_group,ix) then
        act_name=act_name'.'grp
        cur_val=space(getval(act_name))
    end
/*****
/* Only set value if cur value is null or current group is default */
/* group, or group is named group */
/*****
if cur_val="" | group_name='.' & grp="" | group_name<>'.' then do
    if ix=ix_destlist then
        call set_destlist
    else
        call setval act_name,new_val
    end
return 0

getval:
'globalv gett' arg(1)
return space(value(arg(1)))

setval: trace o
interpret arg(1)"=""double_quote(arg(2))""
'globalv putt' arg(1)
return 0

drop_group: trace o
do j0=1 to words(act_names)
    xname=word(act_names,j0)'.'arg(1)
    if word(var_group,j0) then do
        if j0=ix_destlist then do
            interpret xname=""
            'globalv putt' xname
            'globalv purget' xname
            interpret drop xname
        end
    else do
        if arg(1)="" then
            xname=xname'.'
        last_ix=getval(xname'.0')
        if datatype(last_ix,'N') then
            do i=0 to last_ix
                tem_xname=xname||i
                interpret tem_xname=""
                'globalv putt' tem_xname
                'globalv purget' tem_xname
                interpret drop tem_xname
            end
        end
    end
end

```

```

        end
    end
end
return 0

set_defaults: trace o
do j0=1 to words(var_names)
    xname=word(act_names,j0)
    if word(var_group,j0) then do
        xname=xname'.'
        if j0=ix_destlist then do
            xval=getval(xname)
            xname=xname||arg(1)
            interpret xname=""double_quote(xval)""
            'globalv putt ' xname
        end
    else do
        last_ix=getval(xname'0')
        if datatype(last_ix,'N') then
            do i=0 to last_ix
                tem_xname=xname||i
                xval=getval(tem_xname)
                tem_xname=xname||arg(1)'.'i
                interpret tem_xname=""double_quote(xval)""
                'globalv putt ' tem_xname
            end
        end
    end
end
return 0

double_quote: procedure
    trace o
    x=arg(1)
    x1=''
    do forever
        n=index(x,"")
        if n=0 then do
            x1=x1||x
            leave
        end
        x1=x1||left(x,n)||""
        x=substr(x,n+1)
    end
    return x1
exit:
    exit arg(1)

parse_options: trace o
opt.=0
parse arg options
do while options<>' '
    parse var options kwd .
    paren=0
    if index(kwd,'(')<>0 then do
        parse var options kwd ')' options /*
        parse var kwd kwd1 '(' val ')' /* parse paren values
        kwd=kwd1
        paren=1
    end
end

```

```

end; else if left(word(options,2),1)='(' then do /* paren aft bl */
  parse var options kwd '(' val ')' options /* extract kwd, opt */
  paren=1 /* */
end; else do /* no paren keyword */
  parse var options kwd options /* extract keyword */
  val='' /* */
end

options=strip(options) /* */
kwd=translate(strip(kwd)) /* */

select /* determine keyword type */
  when abbrev('MIXED',kwd,3) then opt.opt_mixed=1 /* */
  otherwise do /* */
    say 'Invalid keyword:' kwd /* */
    call exit 1 /* */
  end /* */
end /* */
end /* */
return 0 /* */

set_destlist: trace o
  group_cnt=act_name'.0'
  last_ix=getval(group_cnt) /* Get index of last subgroup */
  if last_ix='' then
    last_ix=1
  if append then do
    last_subgroup=act_name'.'last_ix
    cur_val=space(getval(last_subgroup))
    cur_val=cur_val new_val
  end /* end of APPEND operation */
  else if subtract then do /* SUBTRACT is specified */
    cur_val=''
    do i=1 to last_ix /*Get values from all subgroup*/
      tem_act_name=act_name'.'i
      cur_val=cur_val getval(tem_act_name)
    end
    do forever /* Find out the specified val */
      parse var new_val x new_val
      if x='' then leave
      n=find(cur_val,x)
      if n<>0 then
        cur_val=delword(cur_val,n,1) /* Delete the specified value */
      end /* End of DO FOREVER */
    end /* End of SUBTRACT operation */
  else /* Replace current DESTLIST */
    cur_val=new_val

  if append then
    start_ix=last_ix
  else
    if new_val='' & ¬subtract then
      start_ix=0
    else
      start_ix=1
    n_ix=start_ix
    tem_grp.n_ix=word(cur_val,1) /* Initialize temporary group */
    do i=2 to words(cur_val) /* Go through all values */
      if length(tem_grp.n_ix) + length(word(cur_val,i)) + 1 < 250 then

```

```

        tem_grp.n_ix=tem_grp.n_ix word(cur_val,i) /*Concatenate value*/
                                                /* to the same subgroup */
    else do                                     /* Current subgroup is full */
        n_ix = n_ix + 1                       /* Skip to next subgroup */
        tem_grp.n_ix=word(cur_val,i)
    end
end
call setval group_cnt,n_ix                    /* Update group counter */
do i=start_ix to n_ix                        /* Reset global variables */
    tem_act_name=act_name'.'i
    call setval tem_act_name,tem_grp.i
end
if last_ix > n_ix then                       /* Free unused subgroup */
    do i=n_ix+1 to last_ix
        tem_act_name=act_name'.'i
        interpret tem_act_name=""
        'globalv putt' tem_act_name
        'globalv purget' tem_act_name
        interpret drop tem_act_name
    end
return 0                                     /* End of set_destlist */

set_grplist: trace 0
    $ix=1
    fnaglist.1=word(fnagrplist,1)
    do $i=2 to words(fnagrplist)             /* Go through all group list */
        if length(fnaglist.$ix)+length(word(fnagrplist,$i))+1 < 250 then
            fnaglist.$ix=fnaglist.$ix word(fnagrplist,$i) /* Concatenate */
                                                                /* value to the same grouplist*/
        else do                               /* Current grouplist is full */
            $ix = $ix + 1                     /* Skip to next grouplist */
            fnaglist.$ix=word(fnagrplist,$i)
        end
    end
end

if fnagrplist="" then do
    fnaglist.0=""
    $ix=0
end
else
    fnaglist.0=$ix

do $i=0 to $ix
    'globalv putt fnaglist.'$i
end
return 0                                     /* End of set_grplist */

```

#### D.10.4 FNAGVARS Sample

Here is the FNAGVARS EXEC that has been customized to our test environment.

```

/* FNAGVARS REXX EXEC */

Trace OFF

/*****
/* Task global variables */
/* Used for default values for the OPSMGMT command for each */

```

```

/* operator environment. Each time this EXEC is executed by an */
/* operator, the default values for that operator environment are */
/* changed. */
/* */
/* This EXEC is called by FNAINIT to establish the task global */
/* variables for the operator's environment. */
/* */
/* This EXEC can be invoked at any time and will reset all task */
/* global variable values. */
/* */
/* The following task global variables are supported by the */
/* OPSMGMT command: */
/* */
/* FNADEBUG      - Display MDS_MU trace information */
/*                'YES', 'NO' */
/* */
/*                'YES' specifies to display debug information */
/*                showing all input and output MDS_MUs */
/* */
/* FNACANCEL      - Cancel outstanding requests at logoff: */
/*                'YES', 'NO' */
/* */
/*                'YES' specifies to send a cancel request to */
/*                for each outstanding OPSMGMT request for the */
/*                NetView operator at logoff time. */
/*                'NO' specifies not to cancel any outstanding */
/*                requests at logoff. */
/* */
/* FNAREPLY.      - Stem variable specifying the reply level */
/*                expected if REPLY is not specified in the */
/*                OPSMGMT command: */
/* */
/*                'NONE', 'ACCEPT', 'SUCCESS', 'STATUS', */
/*                'ALL', 'FAILDATA', 'LASTDATA' */
/* */
/*                'NONE' - specifies that no replies are */
/*                expected */
/* */
/*                'ACCEPT' - specifies that only acceptance or */
/*                rejection replies are expected */
/* */
/*                'SUCCESS' - specifies that only success or */
/*                failure replies are expected */
/* */
/*                'STATUS' - specifies that only acceptance, */
/*                rejection, success, or failure */
/*                replies are expected */
/* */
/*                'ALL' - specifies that all replies and */
/*                data are expected */
/* */
/*                'FAILDATA' -specifies that only acceptance, */
/*                rejection, success, or failure */
/*                replies are expected. In addition, */
/*                if the request fails, then job */
/*                log data (ie failed-request data) */
/*                will be expected. */
/* */
/*                'LASTDATA' -specifies that all replies are */

```



```

/*                                expected but only the last (ie */
/*                                most recent) data output from the */
/*                                OPSMGMT request is expected */
/*                                */
/* FNETID.      - Stem variable specifying the destination net */
/*               ID name if NETID is not specified in the */
/*               OPSMGMT command */
/*               */
/* FNALU.       - Stem variable specifying the destination LU */
/*               name if LU is not specified in the OPSMGMT */
/*               command */
/*               */
/* FNAAPPL.     - Stem variable specifying the destination */
/*               application name if APPL is not specified in */
/*               the OPSMGMT command */
/*               */
/* FNADESTLIST. - Stem variable specifying a list of destination */
/*               net IDs and LU names to which the OPSMGMT */
/*               command will be forwarded if DESTLIST is */
/*               specified in the OPSMGMT command */
/*               */
/* The task global variables FNACANCEL and FNADEBUG are not */
/* stem variables and are not members any group. */
/* */
/* The stem variables described above represent either the */
/* default (ie unnamed) group or a named group. The unnamed */
/* group is simply the set of stem variables each with a dot and */
/* serves to define defaults for both the unnamed group and */
/* for all other groups. A named group is a set of stem */
/* variables each with a dot followed by the group name and */
/* serves to define a named group which can be reference by the */
/* GROUP keyword in the OPSMGMT command. The absence of the */
/* GROUP keyword in the OPSMGMT command references the unnamed */
/* group. */
/* */
/* Global variables in the group specified by the OPSMGMT command */
/* are only referenced when the corresponding keywords in the */
/* OPSMGMT command are not specified. Following is the list of */
/* OPSMGMT command keywords and their corresponding task global */
/* variables: */
/* */
/* LU          - FNALU. */
/* NETID       - FNETID. */
/* APPL        - FNAAPPL. */
/* DESTLIST    - FNADESTLIST. */
/* REPLY       - FNAREPLY. */
/* */
/* GROUP       - defines a named group used with the corresponding */
/*               stem variables */
/*               */
/*****

'FNASETV DEBUG=NO'                                /* Output debug information
                                                    This variable cannot be
                                                    preceded by a nickname. */
'FNASETV CANCEL=NO'                                /* Cancel all task-specific
                                                    at operator logoff */
'FNASETV NOINITV=YES'                              /* Initialization flag */
/*****

```

```

/* Default values for all groups */
/*****

'FNASETV TIMEOUT=120'                /* # seconds to wait for reply */
'FNASETV REPLY=ALL'                  /* Default request with reply */
'FNASETV NETID=USIBMRA'              /* Default NETID */
'FNASETV LU=RALYAS4A'               /* Default LU */
'FNASETV DESTLIST=<>'                /* Default netid.lu list */
'FNASETV APPL=EP_OPS'               /* Default dest appl ID */
'FNASETV PRI=M'                     /* Default priority */

/*****
/* Default for AS4001 nickname */
/*****

/*' FNASETV GROUP=AS4001 FNADESTLIST=<III400 IISI4001>' */

/*****
/* Default for AS4002 nickname */
/*****

/*' FNASETV GROUP=AS4002 FNADESTLIST=<IISINET.III400 IISINET.IISI4001>' */
/*' FNASETV GROUP=AS4002 FNADESTLIST=+<IISINET.IISI4003>' */

/*****
/* Set up group called K1 */
/*****

'fnasetv group=k1 fnadestlist=<usibmra.ralyas4a usibmra.ralyas4b>||',
'timeout=30 pri=h pri=l'

/*****
/* End of global variable definitions. */
/*****

```

## Appendix E. Systems Management Automation Offering (SMAO)

SMAO/400 is a feature of IBM SystemView Systems Management Automation Offerings (SystemView SMAO). It enables the management of a network of distributed AS/400s from a focal point on ES/9000 running MVS/ESA or MVS/XA.

This appendix is included as a product introduction and does not include full technical details.

SMAO/400 offers the following functions:

- Centralized monitoring of an AS/400 network
- Problem notification
- Enterprise reporting
- Central accounting of distributed resources
- Automated enterprise job scheduling and tracking
- Operations automation

These functions are provided by using a number of IBM SystemView products. See Table 11 on page 274.

SMAO/400 is delivered on tape or cartridge and includes software for the MVS host and the distributed AS/400s. See *SMAO Installation and Operations Guide*.

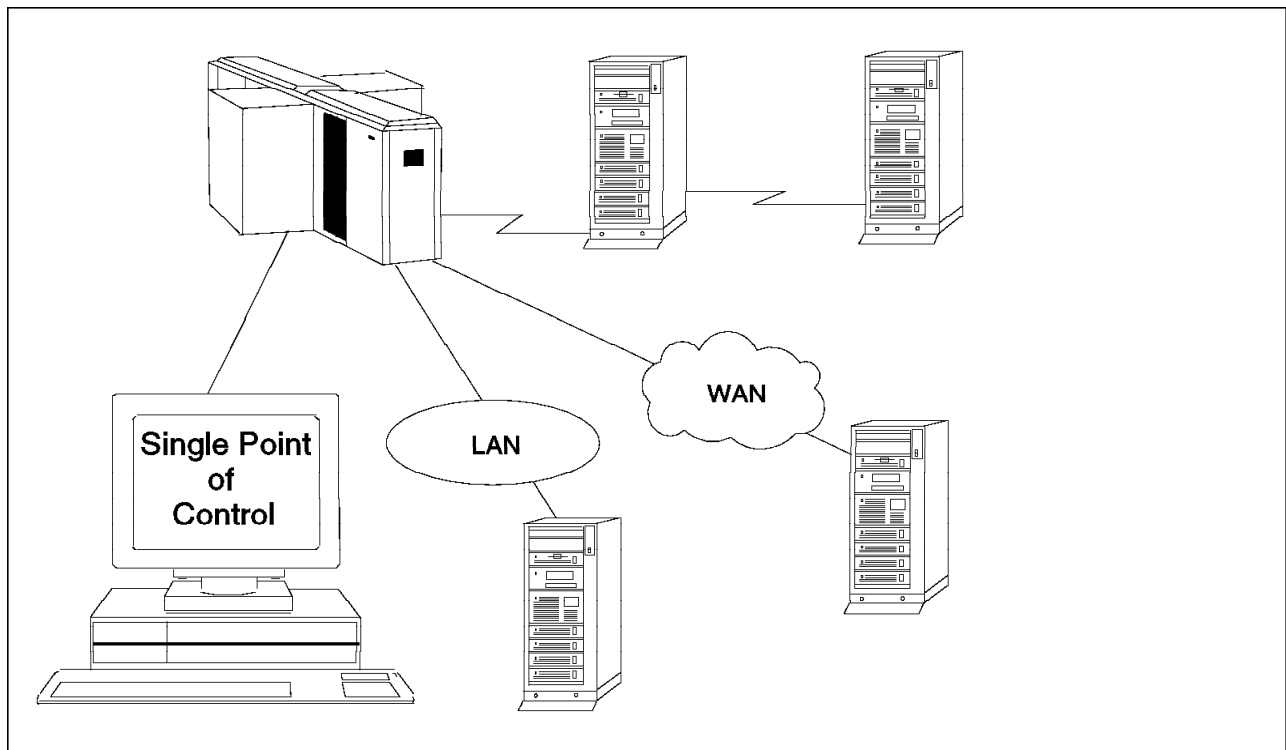


Figure 216. Typical SMAO/400 Environment

## E.1 Functional Description

The SMAO/400 code is divided into two parts, one that is running at the MVS host and one that is running at the AS/400s. The data transport between NetView and OS/400 is handled by alerts, for information flowing from OS/400 to NetView, and Remote Job Entry(RJE) and SNADS for downstream data transfer. The AS/400 can communicate with the MVS host as a stand-alone system or via a intermediate AS/400 focal point. The connection types can be a SDLC link or a Token-ring connection.

### E.1.1 Centralized Monitoring of an AS/400 Network

The basic objective for SMAO/400 is to provide a single point of control for a number of activities. The MVS focal point delivers this by using the SDF screen of AOC/MVS. See 3.3.4, "SMAO/400 Remote Operations" on page 155 for details.

### E.1.2 Problem Notification

Using the IBM Information/Management program, alerts sent from an AS/400 network can be handled from a central site. A subset of the alert IDs for the AS/400 alertable messages is set up in DSIPARM member AMONDFLT. In this member you also make the selection of which alerts that should be creating a problem record in Information/Management. To do this the Information/Management parameter is set to "Y". See Figure 217.

```
NETVIEW.BRWS ----- BROWSE AMONDFLT (DSIPARM ) --- LINE 00152 TO 00170 0
                                                                SCROLL ==
ALID=8C2F73D8          /* LAN PROTOCOL ERROR                */
ALID=A9998C16          /* EXCESSIVE ERRORS          */
ALID=D314B2A8          /* AUTO REMOVAL              */
ALID=EB61E14F          /* AUTO REMOVAL              */
/*                      */
/* DISKETTE PROBLEMS    */
ALID=15DA4086          /* INT REQ                   */
ALID=7D4FF0A3          /* INT REQ                   */
ALID=83FB394C          /* OPERATION ERROR          */
/*                      */
/* MICRO CODE PROBLEMS */
ALID=042064AC,Y 1 /* MICRO CODE PROGRAM ERROR */
ALID=265F8CF6,Y        /* MICRO CODE PROGRAM ERROR */
ALID=7B8370BD,Y        /* MICRO CODE PROGRAM ERROR */
/*                      */
/* MEDIA PROBLEMS      */
ALID=11239AAE          /* INT REQ                   */
/*                      */
/* CONTROL PROGRAM PROBLEMS */

CMD==>
1=HELP 2=END 3=RET 4=TOP 5=BOT 6=ROLL 7=BACK 8=FWD 9=RPTFND 12=
```

Figure 217. SMAO NetView Filter

**Note:**

**1** Y - this alert ID will create a problem record in Information/Management.

### **E.1.3 Enterprise Reporting**

Using the IBM Service Level Reporter (SLR) program, configuration and performance reports can be produced for both MVS and connecting AS/400s. The SLR support is based on transferring standard log files from OS/400 to an MVS system. Multiple OS/400 systems can be handled in the same SLR database. More than 40 report layouts are provided by SMAO. These cover the areas below. For samples see E.2.4, “SLR/400 Sample Reports” on page 271.

Supported AS/400 logs are:

- History log
- Configuration log
- Accounting log
- Performance logs

The following report categories are available:

- Message reports. See Figure 235 on page 271.
- Job reports.
- Accounting reports. See Figure 236 on page 272.
- Configuration reports. See Figure 237 on page 273.
- Performance reports. See Figure 238 on page 274.

### **E.1.4 Central Accounting of Distributed Resources**

Central accounting of an AS/400 computer network is done using IBM SAA Accounting Manager/MVS (AM/MVS). Data is collected from the standard AS/400 accounting logs. The dpAM/MVS function permits different charging schemes based on PERIOD (when a job was run), JOBTYP (type of job), SYSID (which AS/400 was used), and PRTFORM (which printer/form was used).

### **E.1.5 Automated Enterprise Job Scheduling and Tracking**

Using the IBM Operations Planning and Control/ESA (OPC/ESA) program, batch jobs can be scheduled on the MVS and OS/400 platforms. The OPC/ESA program provides a coordinated batch, which means a job application can consist of a mixture of OS/400 and MVS jobs with complex dependencies.

Through SDF screens, the OPC/ESA scheduled jobs on AS/400 computers are easily tracked, showing when a job is received, when it is executed, and when or if it ends in error. The OPC/ESA job tracker also receives the job completion code from SMAO/400 connected AS/400s. See 3.3.4, “SMAO/400 Remote Operations” on page 155.

With the OPC/ESA V1R2.1 program, the job tracking and scheduling can be implemented without requiring NetView, AOC/MVS or ANO/MVS as prerequisites.

## **E.1.6 Operations Automation**

Real time AS/400 operations monitoring is provided as well as control through policy, automation, and Status Display Facility. The system operator is replaced with a message automation table in the same way as NetView has implemented automation. The setup of this function is covered by 4.2, "SMAO/400 Remote Subsystem Monitoring" on page 168.

A simple command interface is included which makes it possible to send commands from a NetView screen to a distributed AS/400 network and receive response back. See 3.3.4, "SMAO/400 Remote Operations" on page 155.

## E.2 Operational Environment

### E.2.1 AS/400

```
Work with Active Jobs S44AA647
08/14/93 17:27:58
CPU %: .0 Elapsed time: 00:00:00 Active jobs: 50

Type options, press Enter.
 2=Change 3=Hold 4=End 5=Work with 6=Release 7=Display message
 8=Work with spooled files 13=Disconnect ...

Opt Subsystem/Job User Type CPU % Function Status
AMO ALRSRV SMA0400 BCH .0 PGM-AM0999I DEQW
AMOSRV SMA0400 BCH .0 PGM-AM0731C EOFW
CMDSRV SMA0400 BCH .0 PGM-AM0723I DEQW
HBTSRV SMA0400 BCH .0 PGM-AM0502I DEQW
JOBSSRV SMA0400 BCH .0 PGM-AM0722I DEQW
PFRSRV SMA0400 BCH .0 PGM-AM0807I DEQW
SLRSRV SMA0400 BCH .0 PGM-SLR802I TIMW
QBATCH QSYS SBS .0 DEQW

Parameters or command
===>
F3=Exit F5=Refresh F10=Restart statistics F11=Display elapsed data
F12=Cancel F23=More options F24=More keys
```

Figure 218. Jobs in SMAO/400 Subsystem AMO

ALRSRV generates and sends alerts. It services the other SMAO jobs that send data to NetView.

AMOSRV is the catcher job. At the intermediate focal point it resolves and routes jobs and commands locally and to remote systems. At a distributed system it catches data sent from the AS/400 focal point and resolves it.

HBTSRV retrieves subsystem information. This job is time-interval driven. The default time is set to 30 minutes. It can also be activated dynamically by using the Send Heartbeat(SNDHBT) command or the Change Heartbeat(CHGHBT) command. See 4.2, “SMAO/400 Remote Subsystem Monitoring” on page 168.

CMDSRV executes remote commands from NetView. See 4.2, “SMAO/400 Remote Subsystem Monitoring” on page 168.

JOBSRV executes job streams from an OPC application. It returns job arrival, start of execution and completion code to OPC. Jobs are also monitored by SDF. Jobs that has arrived to their destination node are colored yellow. When the job has started to execute the color changes to green. If the job finishes in an error the entry will turn red. Figure 219 displays job information for two OPC jobs.

```
AMQJOB                      S M A 0 / 4 0 0

AS/400 JOBS
SEIBMM06 17:31 : ADNAME=AS400A2 WSNAME=AG06 OPNUM=21 TYPE=S
SEIBMM05 17:32 : ADNAME=AS400A3 WSNAME=AG05 OPNUM=31 TYPE=E,ERRCODE=CPD004

08/16/93 18:59:20
====>
1=HELP 2=DETAIL 3=RET 4=DELETE 5= 6=ROLL 7=UP 8=DN 9=TAPE 10=LF 11=RT 12=TOP
```

Figure 219. Second Level Job Information in SDF

The application name, the work station name and the operation number are the OPC identifiers.

The job scheduled for AS/400 system SEIBMM06 is colored green and has started to execute (TYPE=S). The job scheduled for SEIBMM05 has ended abnormally (TYPE=E) and is colored red. In this case, the message that the job received as a result of the ABEND, is also displayed. Press PF2 to get the complete message text.



PFRSRV retrieves and sends performance data to SDF. This job calculates average values for CPU utilization, I/O and paging for a time interval provided by the SNDPFRDTA command. See Figure 220.

```
----- DETAIL STATUS DISPLAY -----
                                     1 OF 1

COMPONENT: SEIBMM06                SYSTEM : MCC
COLOR : GREEN                      PRIORITY : 550
DATE : 08/15/93                    TIME : 18:30:40
REPORTER : AUTOAMO                 NODE : DSKAO

REFERENCE VALUE: SEIBMM06

18:30 : TIME: 300S CPU: 2% PAG: 1/S I/O: 0/S FREE AUX: 494 MB TOT
AUX: 1221 MB

====>
1=HELP 3=RETURN 6=ROLL 7=UP 8=DOWN 9=ASSIST 10=DELETE 11=BOTTOM 12=TOP
```

Figure 220. Performance Data Supplied by the SNDPFRDTA Command to SDF

SLRSRV is the SLR performance monitoring job. It is started by the STRSLRSRV command and is retrieving performance data and sending it to the QHST log. The data is contained in the message data of the AMO8001 message. The retrieval time is scheduled by the time interval parameter of STRSLRSRV. When QHST data is processed by SLR, reports for this message will show the fluctuations of resource utilization over a time period. This to the resolution of the measurement time interval. See Figure 222 on page 260.

## E.2.2 SMAO/400 Commands and Menus

From the SMAO/400 Main Menu you are able to manage and control the AS/400 part of SMAO. See Figure 221.

```
SMAOMAIN                      SMAO/400 Main Menu                      System:  S44AA647

Select one of the following:

    1. Work with message table
    2. Work with SLR/400
    3. Select SMAO/400 command
    4. Work with SMAO/400 installation

    90. Signoff

Selection or command
====> _____

F3=Exit  F4=Prompt  F9=Retrieve  F12=Cancel
(C) COPYRIGHT IBM CORP. 1993.
```

Figure 221. SMAO/400 Main Menu

The Work with Message Table (WRKMSGTBL) command enables maintenance of the automation table. See 4.2, “SMAO/400 Remote Subsystem Monitoring” on page 168.

```
Work with Message Automation Table

Position to . . . . . Message-ID
Type options, press Enter.
2=Change 4=Remove 5=Display Message Description

Opt Message ID Action
- CAE0002 STRSBS QBATCH
- CPF0927 SNDHBT
- CPF1103 SNDHBT

F3=Exit F12=Cancel F9=System Command F6=Add Entry
```

Figure 222. Work with Message Automation Table Panel

SLR/400 is a feature of SMAO/400. The AS/400 part of this feature has a data capturing capability. The actual generation of reports will be made in the MVS host. Two libraries are supplied with this feature.

```
SLRMAIN                      SLR/400 Main Menu                      System:  S4

Select one of the following:

    1. Start SLR/400 monitor
    2. Start SLR/400 data capturing
    3. Initialize tape
    4. Save SLR/400 data

    90. Signoff

Selection or command
====> _____

F3=Exit  F4=Prompt  F9=Retrieve  F12=Cancel
(C) COPYRIGHT IBM CORP. 1992.
```

Figure 223. SLR/400 Main Menu

Figure 223 shows the SLR/400 main menu. From this you can start a SLR/400 server job see Figure 224 on page 262 and also the data capturing for SLR. See Figure 226 on page 263. The data can be transferred to the MVS host in different ways depending on connection type and amount of data. Option 4 on the SLR menu will save the captured data to an appropriate media. Supported, besides tape, in the SLRSV400 command are Network Job Entry (NJE) and NetView File Transfer Program (NFTP).

The Start SLR/400 Server Job (STRSLRSRV) command submits a job that will retrieve performance data and send it to the QHST log. The retrieval is not a OS/400 performance monitor function.

```

                                Start SLR/400 Server job (STRSLRSRV)

Type choices, press Enter.

Time interval . . . . . 5_____ Number of minutes


F3=Exit  F4=Prompt  F5=Refresh  F12=Cancel  F13=How to use this display
F24=More keys

```

Figure 224. Start SLR Server Job

```

                                Additional Message Information

Message ID . . . . . : AMO8001      Severity . . . . . : 00
Message type . . . . . : Information
Job . . . : SLRSRV      User . . . : SMA0400      Number . . . : 0224
Date sent . . . . . : 08/15/93      Time sent . . . . . : 12:0

Message . . . . . : Elapsed time(s): 300.04122 CPU used(s): 1.81453 Tot
                    stg(MB): 1221 Avail AUX stg(MB) 495 Pages: 6 I/O reqs: 6 Jobs: 78 Nbr
                    ASPs: 1

Press Enter to continue.

F3=Exit  F6=Print  F12=Cancel  F21=Select assistance level

```

Figure 225. Message AMO8001 is Sent to the QHST Log

The Start SLR/400 Data Capturing (STRSLR400) command captures data from the QHST log, the accounting log and from the hardware configuration file. You can also start the OS/400 performance monitor to create a database for SLR. The \*AVAIL value of the Beginning time parameter means that you will continue to capture data from the point you left off at the previous occasion. The \*BEGIN value for Beginning date acts in the same way.

```

Start SLR/400 data capturing (STRSLR400)

Type choices, press Enter.

Outfile . . . . . OS4QHST__ OS4QHST, OS4QACG, OS4QHDW...
Library . . . . . SLRDTA__ Name, *LIBL
Time period for log output:
Start time and date:
Beginning time . . . . . *AVAIL__ Time, *AVAIL
Beginning date . . . . . *BEGIN__ Date, *BEGIN, *CURRENT
End time and date:
Ending time . . . . . *AVAIL__ Time, *AVAIL
Ending date . . . . . *CURRENT__ Date, *CURRENT

F3=Exit F4=Prompt F5=Refresh F12=Cancel F13=How to use this display
F24=More keys

```

Figure 226. Start SLR/400 Data Capturing (STRSLR400)

```

Select Command

Type options, press Enter.
1=Select

Opt Command Library Text
ADDNODEE AMOLIB Add SMAO/400 node entry
CHGHBT AMOLIB Change heartbeat interval
ENDHBT AMOLIB End Heartbeat Function
RMVNODEE AMOLIB Remove SMAO/400 node entry
SNDHBT AMOLIB Send heartbeat
SNDHOSTMSG AMOLIB Send host message
SNDPFRDTA AMOLIB Send performance data
SNDRMTCMD AMOLIB Send remote command
STRMSGSRV AMOLIB Start message automation server
STROPC AMOLIB Start OPC interface
STRSLRSRV AMOLIB Start SLR/400 server job
WRKMSGTBL AMOLIB Work with Message Automation Table
WRKSMAO AMOLIB Work with SMAO/400

Parameters or command
===>
F3=Exit F4=Prompt F5=Refresh F9=Retrieve F11=Display names only
F12=Cancel F16=Repeat position to F17=Position to

```

Figure 227. SMAO Supplied Commands

From the Work with SMAO/400 (WRKSMAO) panel you are able to monitor SMAO at the AS/400 level. You can install/remove SMAO code from a node, start display station pass-through, issue commands on remote AS/400 systems, and work with alerts for the different nodes.

Work with SMAO/400

SMAO/400 user profile: SMA0400

Type options, press Enter.

1=Install 4=Remove 6=Start Pass-Through 9=Remote command 10=Alerts

Opt	Control Point	Network ID	Node Type	Current Status
9	SEIBMM04	SEIBM000	*NETNODE	Installed
9	SEIBMM05	SEIBM000	*NETNODE	Installed
—	SEIBMM06	SEIBM700	*NETNODE	Installed

Parameters or command

==> pwrwnsys \*immed restart(\*yes)

F3=Exit F4=Prompt F5=Refresh F9=Retrieve F12=Cancel

Figure 228. Work with SMAO Installation Panel

Option 9, Remote command, invokes the SDRMTCMD command. Used from this screen it supplies a way of decreasing retyping of commands to different nodes. By selecting option 9 for a number of AS/400s and entering a command on the command line, you can execute a command on multiple AS/400s easily. Response from the remote systems will be displayed as messages in row 24. Applicable commands to send are the ones that don't produce output. See Figure 226 on page 263.

```

Add SMA0/400 Node Entry (ADDNODEE)

Type choices, press Enter.

SMA0/400 user profile . . . . . USRPRF
Control point name . . . . . CPNAME
Network ID . . . . . NETID
Node type . . . . . NODETYPE
Network node server . . . . . NETSERVER
    Network ID . . . . .
Alert status . . . . . ALRSTS
Alert logging status . . . . . ALRLOGSTS
Alert primary focal point . . . . . ALRPRIFP
Alert default focal point . . . . . ALRDFTFP
Alert focal point to request . . . . . ALRRQSFP
    Network ID . . . . .
Alert controller description . . . . . ALRCLTD
Start of OPC interface . . . . . STROPC
OPC interface . . . . . INTERFACE
Emulation device . . . . . EMLDEV

F3=Exit    F4=Prompt    F5=Refresh    F12=Cancel    F13=How to use this display
F24=More keys

```

```

Add SMA0/400 Node Entry (ADDNODEE)

Type choices, press Enter.

RJE session description . . . . RJESSND      _____ 6
Library . . . . .                _____ QRJE
Subsystem library . . . . . SYSLIBLE          *NONE _____ 7

F3=Exit  F4=Prompt  F5=Refresh  F12=Cancel  F13=How to use this display
F24=More keys
Bottom

```

Appendix E. Systems Management Automation Offering (SMAO) 265

**Note:**

- 1** USRPRF the user profile that runs SMAO/400 at all nodes. It will be created, if necessary, during the installation.
- 2** The remote system net attributes will be updated with the corresponding parameter values. The NODETYPE parameter will not be changed.
- 3** STROPC valid for the AS/400 intermediate focal point.
- 4** INTERFACE valid if STROPC equals \*YES. Possible values are:
  - \*RJE
  - \*JES328X
- 5** EMLDEV valid if INTERFACE is \*JES328X
- 6** RJESSND valid if INTERFACE is \*RJE
- 7** SYSLIBLE specifies a library that is entered ahead of other libraries in the system library list. This parameter allows you to use a secondary language library causing messages and displays to appear in that language.

### **E.2.3 NetView Commands and Panels**

In order to perform enterprise-wide monitoring of system activity, SMAO/400 utilizes the Status Display Facility (SDF) feature of AOC/MVS. This provides information on systems that are running in different environments, compiled into one single screen.

The color coding used for SMAO/400 is green for status meeting objectives, yellow for a potential problem and red for a problem.

The worst condition is propagated through the SDF hierarchy and Figure 231 on page 267 displays the highest level. To look at details, you position the cursor on an entry and press PF8.



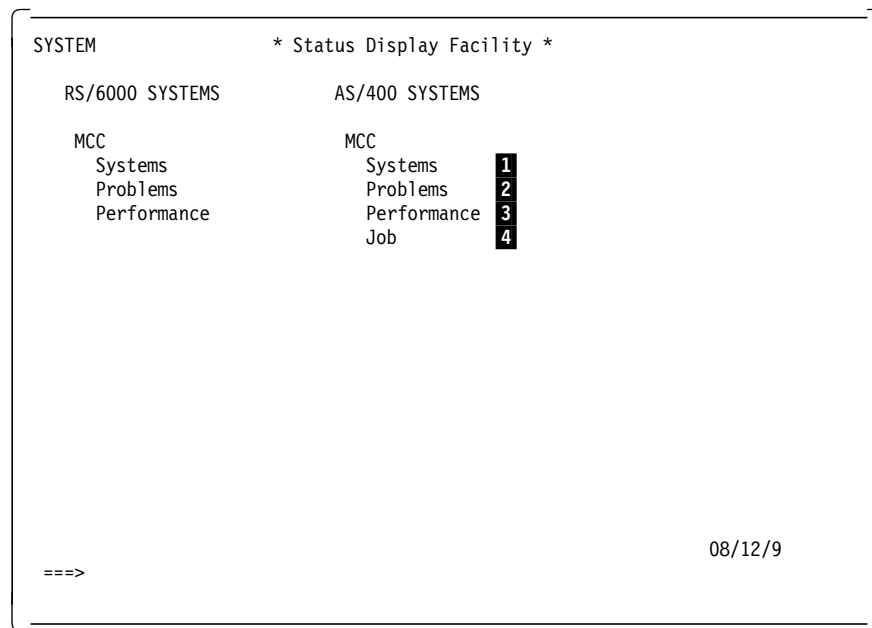


Figure 231. The Single Point of Control SDF Screen

**Note:**

- 1** AS/400 system/subsystem status
- 2** Alertable AS/400 messages and messages from local automation
- 3** Data sent using the SNDPFRDTA command
- 4** OPC scheduled AS/400 jobs

The AMONESTR command is run as the AMO Initial Command. AMONEFST and AMONEINI are called and a timer is set to execute AMONECHB every 10 minutes. If you want another value, you have to change the statement in AMONESTR.

**Warning**

If you execute this command, it must be done under the AMOOPER operator.

Type:

EXCMD AMOOPER AMONESTR

The AMONEINI command is run by AMONESTR, but can also be entered to re-initialize all AMO variables. When this command is executed all current status information of the AS/400s is lost, but will be set again as soon as the next heart beats are received.

**Warning**

If you execute this command, it must be done under the AMOOPER operator.

Type:

EXCMD AMOOPER AMONEINI

The AMONEINF command will give you the necessary help information needed to be able to manage the NetView part of SMAO/400. See Figure 232.

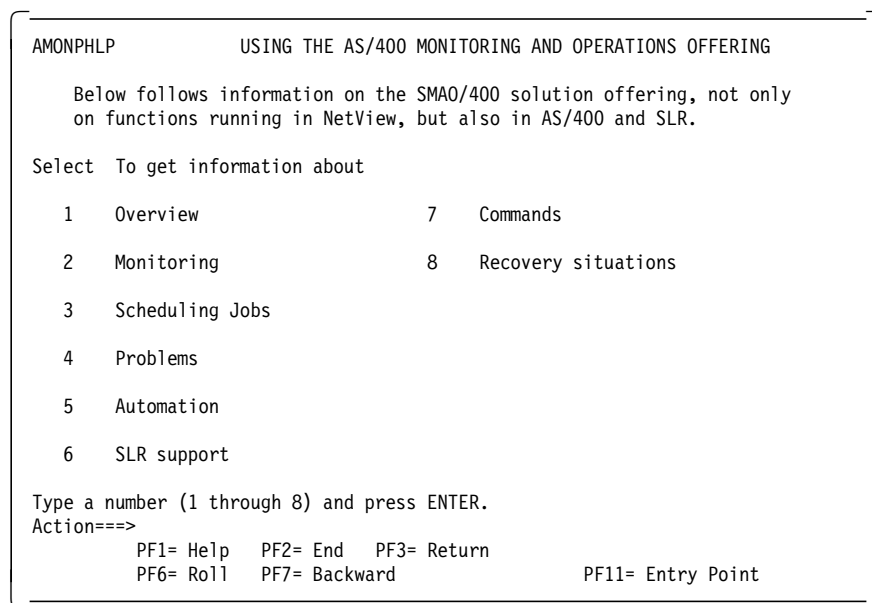


Figure 232. SMAO Help Function in NetView

The AMONESTA command will display a full screen summary of the AS/400 status. Some of the main variables are also shown, like if the focal point is connected or not, when AMONEINI was last run etc.

This screen will be updated every minute with the latest status.

PF4 will browse the NetView log, which is very useful if you want to see the detailed text of the AMO messages.

On this screen you can modify the HBT value for each AS/400, but you need to understand how the heart beat mechanism works:

1. At AMONEINI time the HBT values from AMONDSYS will be used. These values are in effect until overridden by either operator or heart beat.
2. All AS/400s sending heart beats with a HBT period other than 000 will update the HBT field on the AMONESTA panel.
3. If you as operator specify a new HBT value that value will be used until next heart beat with a HBT value other than 000 is received. Using 000 in the AS/400 alert means 'Use host specifications'.

Apart from specifying another numeric value you can specify OFF, which means do not calculate a new status for this AS/400; for example, AMONECHB means do not calculate a new status for this AS/400. AMONECHB will not bother about this AS/400 until a new numeric value is set, either by operator or by an alert.

4. It is also possible to look at a node's specific schedule and change it online. The change will be active until you restart AMO or NetView. AMONDSCH will not be updated.

To look at a schedule specify an "S" in the Schedule column in front of the node you are interested in.

To change a schedule you just overwrite the start and stop time and press Enter. The next time AMONECHB is executed it will use the new schedule information.

AMONPM01			S M A O / 4 0 0			11:14:07	
			Info/Man update: YES				
Focal Point Operator : AUT02			AOC Conn def : YES				
Focal Point Node : DSSA0			Filters set : YES				
Initialized Date : 93/04/15			AOC status : UNCONNECTED				
Time : 08:50			Use schedules : YES				
S-info	System	Info	Status	Schedule	HBT	Last Report	
-	SEIBMM04	N	U	Y	030	10:46	93/04/19
-	SEIBMM05	N	U	Y	030	11:03	93/04/19
S	SEIBMM06	N	U	Y	020	11:07	93/04/19
-	S44A0033	N	U	N	030	07:33	93/04/19
-	S44C0034	Y	D	Y	030	08:50	93/04/15
-	S44A1680	Y	D	Y	030	08:50	93/04/15
-	S44A1317	N	U	N	030	07:26	93/04/19
Action====>							
PF1= Help		PF2= End		PF3= Return		PF4= Browse	
PF6= Roll		PF7= Backward		PF8= Forward			

Figure 233. AMONESTA Command Displays the Status Screen

Figure 234 is the AMONPSCH panel, which will be displayed when you select a system on the AMONPSTA panel.

```
AMONPSCH                      S M A O / 4 0 0

System :  SEIBMM06
-----

Current weekday : Thursday
Current date    : 1 Jul 1993
Current time    : 11:14:08

Current Schedule

Weekday  Starttime  Stoptime
MO       0700      2300
TU       0700      1900
WE       0700      1900
TH       0700      1900
FR       0700      1900
SA       0800      1200
SU       0800      1200

Action===>
          PF1= Help  PF2= End  PF3= Return
```

Figure 234. Scheduling Information - SMAO/400

The AMONEFST command will set all the necessary AMO filters, can be re-run at any time. On the AMONESTA panel there is an indicator showing if the filters are set or not.

The AMO filters should not be confused with NPDA filters. AMO uses its filters to decide if a problem should create a problem record in Information/Management or not. AMO uses MSUs instead of alerts to drive its functions, and thereby not depending on NPDA filter settings.

The AMONEGTR command should not be used manually, but can be issued if your focal point has been down and you want to inform about the current AS/400 status. Normally this command will be driven when the gateway connection comes up.

#### Warning

If you execute this command, it must be done under the AMOOPER operator.

Type:

EXCMD AMOOPER AMONEGTR

## E.2.4 SLR/400 Sample Reports

MOST FREQUENT MESSAGES - SYSTEM OS44 - 92 MAR 29				
MESSAGES IN OS400 QHST				
MSG_ID	MSGALL COUNT	PCT_ID %	TBYTES_PER MESSAGE	DBYTES_PER MESSAGE
*****	*****	*****	*****	*****
CPF1164	28366	22.69	132.00	251.00
CPF1124	27773	22.21	132.00	266.00
CPI9803	12101	9.68	96.95	61.29
CPF1187	5553	4.44	55.44	20.00
CPF5140	4185	3.35	45.54	318.00
CPF2677	3579	2.86	40.62	10.00
CPF590A	3557	2.85	40.43	10.00
CPF5143	3113	2.49	46.45	318.00
CPD2640	3028	2.42	47.02	12.00
CPC2605	3017	2.41	36.27	12.00
CPI8072	2813	2.25	54.16	334.00
CPI5906	2717	2.17	83.16	42.00
	2143	1.71	24.08	0.00
CPC2606	2011	1.61	39.15	12.00
CPF2758	1684	1.35	48.12	10.00
CPF1273	1418	1.13	64.43	36.00
CPF5908	1200	0.96	43.07	25.00
CPI1127	1090	0.87	45.19	10.00
CPF2240	972	0.78	78.29	53.00
CPI1E81	799	0.64	69.03	37.03
CPF2753	791	0.63	40.28	10.00
CPI5908	670	0.54	83.03	94.00
CPC2609	516	0.41	40.12	12.00
CPF1241	478	0.38	71.58	42.00
CPI1133	452	0.36	49.43	10.00

Figure 235. Most Frequent Messages in the QHST Log

JOB COST SYSTEM OS44 YEAR 92 MONTH APR 13

JOB ACCOUNTING FROM OS400 QHST

ACCT_CODE	USER_NAME	TYPE	JOB COUNT	JOB_PRICE ECU	CPU_TIME SEC	CPU_PRICE ECU	JOB_IO COUNT	IO_PRICE ECU	PRICE ECU	DISCOUNT ECU	NET_PRICE ECU
*****											
1000-AAA-000000	TN001	I	1	0.0000	5	0.1000	1449	0.1449	0.24	0.01	0.24
	TSV02	I	2	0.0000	5	0.1000	1060	0.1060	0.21	0.01	0.20
	UAN01	I	2	0.0000	17	0.3400	2965	0.2965	0.64	0.02	0.62
	UGR01	I	5	0.0000	28	0.5600	2745	0.2745	0.83	0.03	0.81
	UHA01	I	1	0.0000	7	0.1400	719	0.0719	0.21	0.01	0.21
	ULA02	I	11	0.0000	32	0.6400	7219	0.7219	1.36	0.04	1.32
	UME01	I	2	0.0000	6	0.1200	1094	0.1094	0.23	0.01	0.22
	UNIO4	I	2	0.0000	7	0.1400	1952	0.1952	0.34	0.01	0.33
	UPE01	I	3	0.0000	11	0.2200	2409	0.2409	0.46	0.01	0.45
	VPE01	I	16	0.0000	117	2.3400	17858	1.7858	4.13	0.12	4.00
	WSECADM	I	3	0.0000	115	2.3000	10446	1.0446	3.34	0.10	3.24
	WSECOFR	I	1	0.0000	27	0.5400	10481	1.0481	1.59	0.05	1.54
	YAN02	I	2	0.0000	48	0.9600	9552	0.9552	1.92	0.06	1.86
	YMA01	I	1	0.0000	5	0.1000	402	0.0402	0.14	0.00	0.14
	.										
	.										
	.										
SUBTOT		SUB	---	---	---	---	---	---	---	---	307.95
1000-AAA-000001	MOL07	B	1	1.0000	1	0.0100	179	0.0179	1.03	0.01	1.02
		I	1	1.0000	5	0.0500	487	0.0487	1.10	0.01	1.09
SUBTOT		SUB	---	---	---	---	---	---	---	---	2.11
2000-AAA-000001	ULI01	B	4	---	4	0.0400	543	0.0543	0.09	0.00	0.09
		I	6	---	47	0.4700	8285	0.8285	1.30	0.05	1.25
SUBTOT		SUB	---	---	---	---	---	---	---	---	1.34
2000-AAA-000010	MB001	B	2	2.0000	2	0.0200	422	0.0422	2.06	0.10	1.96
		I	2	2.0000	8	0.0800	1030	0.1030	2.18	0.11	2.07
SUBTOT		SUB	---	---	---	---	---	---	---	---	4.03
2000-AAA-000012	GAS01	B	3	3.0000	3	0.0300	563	0.0563	3.09	0.19	2.90
		I	3	3.0000	15	0.1500	2477	0.2477	3.40	0.20	3.19
SUBTOT		SUB	---	---	---	---	---	---	---	---	6.09
.											
.											
.											
SUBTOT		SUBTOT SUB	---	---	---	---	---	---	---	---	1695.77

Figure 236. SLR/400 Accounting Report Sample

ALL HARDWARE RESOURCES FOR SYSTEM S44A0061 - REPORT DATE: 92 APR 16

OS400 CONFIGURATION LOG

HDRSCN NAME	ATTACH DATE	RECONFIG DATE	HDRSNT TYPE	HDSRNM NUMBER	HD4BUA	HDELID	HDBUSA	HDHWST STATUS
*****								
CC01	890410	890906	6130	53-8940236	FFFFFFFF	009	05	8000
CC02	890410	890906	6130	53-8019350	FFFFFFFF	012	0A	8000
CC03	890410	901015	6130	53-0330059	FFFFFFFF	018	07	8000
CC04	890410	890410	6130	53-8017080	FFFFFFFF	020	08	8000
CEC01	890410	890410	9406	44-A0061	00000000	003	00	0000
CTL01	890410	890906	6040	53-8834010	00FFFFFF	011	06	8000
CTL010000	890410	920108	3476	00-08072	000000FF	---	06	8000
CTL010001	890410	890906	4214	00-0000000	000001FF	---	06	8000
CTL010002	890411	891102	3196	00-0000000	000002FF	---	06	8000
CTL010003	901018	901018	5291	00-0000000	000003FF	---	06	8000
CTL010005	890907	890911	4214	00-0000000	000005FF	---	06	8000
CTL010006	890912	890912	5150	00-0000000	000006FF	---	06	8000
CTL010100	891010	901018	3196	00-0000000	000100FF	---	06	8000
CTL010101	890410	890906	3197	00-0000000	000101FF	---	06	8000
CTL010102	890907	890907	5292	00-0000000	000102FF	---	06	8000
CTL010104	910307	920217	5150	00-0000000	000104FF	---	06	8000
CTL010105	890411	891207	4214	00-0000000	000105FF	---	06	8000
CTL010106	910304	910307	5150	00-0000000	000106FF	---	06	8000
CTL010200	891212	891212	3476	00-0000000	000200FF	---	06	8000
CTL010201	890922	901010	4224	00-0000000	000201FF	---	06	8000
...								
TAP01	890410	891228	9347	00-0000000	0700FFFF	029	04	8000
TAP02	890906	891228	9346	00-0000000	0700FFFF	043	0B	8000
TAP03	891228	891228	3430	00-0000000	0700FFFF	---	01	8000
TAP05	911129	911129	3422	00-0000000	0800FFFF	---	01	8000
WC01	890410	890906	6040	53-8834010	FFFFFFFF	---	06	8000
WC02	890503	890523	6040	53-8967125	FFFFFFFF	---	09	8000
WC03	901015	901015	6041	53-0307204	FFFFFFFF	---	0C	8000

Figure 237. SLR/400 Configuration Report Sample

PERFORMANCE MEASUREMENTS FOR ALL SYSTEMS - 92 DEC 29

AM08001 STATISTICS

SYSTEMID	CPU_A %	CPU_M %	IO_A PER SEC	IO_M PER SEC	PAGE_A PER SEC	PAGE_M PER SEC	JOB_A COUNT	AUX_T MB	AUX_UP %
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
S44A0061	48.6	93.3	4.3	21.2	5.4	42.6	147	5186	90.0
S44A0062	49.1	80.5	5.1	11.0	7.2	32.4	98	10244	72.5
S44A0063	31.8	71.0	3.9	17.9	8.7	49.8	121	10244	79.8
S44A0064	52.2	95.3	8.3	27.6	4.1	33.2	171	8144	83.0

Figure 238. SLR/400 Performance Report Sample

Table 11. Prerequisites for the Different Functions of SMAO

Product Description	Product Number	Level	Monitoring	Probl Mgmt	Job Sched	Auto-mat'n	Enterprise Reporting	Centralized Accounting
MVS/SP JES3	5665-291	V2R2	Y	Y		Y	Y	Y
MVS/SP JES2	5740-XC6	V2R2						
MVS/SP JES2	5685-001	V3R1						
MVS/SP JES3	5685-002	V3R1	Y	Y	Y	Y	Y	Y
MVS/ESA SP JES2	5695-047	V4R1						
MVS/ESA SP JES3	5695-048	V4R1						
NetView/XA	5685-138	V2R3						
NetView/ESA	5685-111	V2R3	Y	Y	Y			
ANO/MVS	5756-265	V1R1	Y1	Y1	O			
AOC/MVS	5785-151	V1R1	Y1	Y1	Y			
OPC/ESA	5695-007	V1R1			Y			
OPCAO	5695-062	R1			Y			
Information/Mgmt	5685-060	V4R2		O				
Information/Mgmt	5695-065	V5R1		O				
SLR	5665-397	V3R3					Y	Y
NetView FTP	5685-108	V2R1					O	O
TSO/E(REXX)	5685-025	V2R1	Y	Y	Y		Y	Y
NetView FTP/400	5730-082	V1R1					O	O
JES/328X	5785-BAC	V2			Y2			
JES/328X	5785-BAZ	V3			Y2			
OS/400	5738-SS1	V2R2	Y	Y	Y	Y	Y	Y
dpAM/MVS	5688-168	V1R1						Y
PL/1 runtime	5668-910	V1R1			Y			
OS/400 RJE	5738-CM1	R2			Y2			
SMP/E	5668-949	R5	Y	Y	Y	Y	Y	Y
<b>Note:</b> Y Required O Recommended, but Optional Y1 Either ANO/MVS or AOC/MVS must run on the focal point Y2 Either JES/328X or RJE								



---

## Appendix F. NetView to AS/400 Bridge PRPQ

The NetView to AS/400 Bridge is a PRPQ that allows a copy of a generic alert to be forwarded to an AS/400 system for processing. The alert is still processed normally by NetView as the PRPQ does not interfere with this process. The NetView to AS/400 Bridge will be referred to as the PRPQ in this document.

The PRPQ consists of the following two load modules:

- A NetView user exit which utilizes the NetView XITCI interface. The user exit receives control every time a Network Management data flow is received by NetView. The user exit determines if the data is a generic alert; if so, the alert is passed to the PRPQ user task.
- PRPQ User Task. The second module runs as a task under NetView. The user task receives the alert from the user exit and parses it to see if the alert is to be forwarded to the AS/400.

When it has been determined that an alert should be forwarded to the AS/400, the user task does so via an LU 6.2 session. If the session is not active at the time, the alert is placed in a data set until the session does become active. It is then forwarded to the AS/400.

---

### F.1 Installation

The PRPQ is installed in a MVS/ESA or MVS/XA host. The minimum software requirements to run the PRPQ are:

- MVS/ESA or MVS/XA
- VTAM V3R2 or later
- NetView V1R3 or later
- NCP V4R2 or later
- Installation tool (SMP/E Release 5 or higher for MVS) and user's guide.

#### F.1.1 Installation Procedures

These are the steps required to install the PRPQ:

1. Ensure adequate resources; that is that data sets and storage are available.
2. Mount the installation tape.
3. Receive file 4 from this tape. This file contains the installation jobs.
4. Review each job (EPV120P1 through EPV120P6) and make the changes required for your environment.

See the *Program Directory for NetView to AS/400 Bridge* for more complete installation instructions.

The following is a list of the installation jobs:

- EPV120P1 - Allocate and initialize SMP/E libraries (required)
- EPV120P2 - Receive NetView to AS/400 Bridge PRPQ (required)
- EPV120P3 - Apply check NetView to AS/400 Bridge PRPQ (optional)
- EPV120P4 - Apply NetView to AS/400 Bridge PRPQ (required)

- EPV120P5 - Accept check NetView to AS/400 Bridge PRPQ (optional)
- EPV120P6 - Accept NetView to AS/400 Bridge PRPQ (required)

## F.1.2 Other Considerations

There are some system considerations at the host. An LU 6.2 session must be defined within VTAM (Virtual Telecommunications Access Method) and NCP (Network Control Program). The NetView product has to be configured to handle generic alerts. Some APARs have to be applied at the host. Please see the following section for implementation details.

## F.1.3 PRPQ Implementation Scenario

This section describes the implementation of the PRPQ to forward an alert sent by one AS/400 to another AS/400. There is no direct session running between the two AS/400 systems, RALYAS4A and RALYAS4B, connected to a subarea network via Token-Ring and an MVS host running NetView Version 2 Release 3 were used. The objectives were to generate an alert on RALYAS4B, forward it to NetView and send the alert to RALYAS4A using the PRPQ. Following are the configurations for our implementation.

### F.1.3.1 NetView Customization.

In NetView we customized member BNJMBDST by adding the statement DSTINIT XITCI=EPVNPEXT at the end of the member. See Figure 239.

```
*****
* (C) COPYRIGHT IBM CORP. 1986, 1987 *
* LAST CHANGE: 04/03/87 22:28:10 SSI=62462023 *
* IEBCOPY SELECT MEMBER=((CNMS3001,BNJMBDST,R)) *
* DESCRIPTION: SAMPLE -- THIS MEMBER DEFINES THE INITIALIZATION *
* VALUES FOR THE TASK BNJDSERV. *
* CNMS3001 CHANGED ACTIVITY: *
* CHANGE CODE DATE DESCRIPTION *
* ----- *
*****
DSTINIT PDDNM=BNJLGPR
*DSTINIT PPASS=USERPASS
DSTINIT SDDNM=BNJLGSE
*DSTINIT SPASS=USERPASS
DSTINIT DSRBU=5
DSTINIT DSRBO=5
DSTINIT UNSOL=BNJUNSOL
DSTINIT FUNCT=BOTH
* THE NEXT STATEMENT IS ADDED FOR THE NETVIEW AS/400 PRPQ
DSTINIT XITCI=EPVNPEXT
```

Figure 239. NetView Member BNJMBDST

We then created member EPVALPRM in the DSIPARM data set of NetView. This member defines the LU (Logical Unit) that NetView will use to forward the alert to the AS/400 and which alerts are to be sent to the AS/400, we selected all, see Figure 240 on page 277. The LU name matches the LU name defined in VTAM.

```
LUNAME=TR1340A1
ALL
```

Figure 240. NetView Member EPVALPRM

We then created a task in the NetView member by adding the following statement in member DSIDMN in the DSIPARM data set (see Figure 241).

```
*****
*      NETVIEW TO AS/400 BRIDGE TASK      *
*****
TASK      MOD=EPVNPTSK,TSKID=EPVNPTSK,MEM=EPVALPRM,PRI=6,INIT=Y
END
```

Figure 241. NetView Task Definition

The final steps for the NetView customization was to copy the load modules EPVNPEXT and EPVNPTSK to a load library specified on the STEPLIB DD statement of the NetView startup procedure and then add the following DD statement to the NetView startup procedure:

```
//AS4ALRTQ DD DSN=xxxxxx,DISP=SHR
```

where xxxxxx is the name of a data set that is created to store the alerts. The data set must be created using the following attributes:

- LRECL        - 512
- BLKSIZE     - 512
- RECFM       - F
- DSORG       - PS

### F.1.3.2 Configuring VTAM

In VTAM we had to define both an Application LU (see Figure 242) and a VTAM Logical Unit definition for the session to the AS/400 (see Figure 243), which was added to switched major node definition for the AS/400.

```
PRPQAPPL VBUILD TYPE=APPL
EPVNPTSK APPL APPC=YES,DSESLIM=1,DMINWNL=1,DMINWNR=0,EAS=5
```

Figure 242. VTAM Application LU Definition

```
*-----NETVIEW TO AS400 BRIDGE PRPQ DEVICE-----
TR1340A1 LU    LOCADDR=1
```

Figure 243. VTAM LU Definition

### F.1.3.3 Configuring the AS/400

In order for the AS/400 we used to receive the alert, we had to create a device and mode description and change the network attributes. We did not need to create a line or control unit description as our installation already had the AS/400 defined to VTAM via token-ring. Figure 244 shows the command we entered to create our device description.

```
CRTDEVAPPC DEVD(PRPQALERT) RMTLOCNAME(TR1340A1) ONLINE(*YES) +  
  LCLLOCNAME(*NETATR) RMTNETID(USIBMRA) +  
  CTL(RA3HOST) MODE(INTERACT) APPN(*YES) +  
  SNGSSN(*YES) LCLCTLSSN(*NO) LOCADR(01) +  
  MSGQ(QSYSOPR) + TEXT('PRPQ DEVICE')
```

Figure 244. Create PRPQ Device Description

Figure 245 shows the command we entered to create our mode description.

```
CRTMODD MODD(INTERACT) MAXSSN(2) MAXCNV(2) LCLCTLSSN(0) +  
  PREESTSSN(0) INPCING(7) OUTPACING(7) MAXLENRU(4096) +  
  TEXT('MODE DESCRIPTION INTERACT')
```

Figure 245. Create PRPQ Mode Description

Figure 246 shows the command we entered to change our network attributes.

```
CHGNETA LCLNETID(USIBMRA) +  
  DFTMODE(BLANK) NODETYPE(*NETNODE) ALRSTS(*OFF) +  
  ALRPRIFP(*NO) ALRDFTFP(*NO) ALRLOGSTS(*RCV) +  
  ALRCTLD(RA3HOST)
```

Figure 246. Change Network Attributes for PRPQ

## F.1.4 Scenario Showing Alert Flow

RALYAS4A is the AS/400 to which the PRPQ will route alerts, based on the parameters set in the EPVALPRM member. In the test case the parm was set to ALL.

### Member EPVALPRM in DSIPARM

```
LUNAME=TR1340A1 ALL
```

Figure 247 on page 279 shows the relevant network attributes of the RALYAS4B to enable it to forward alerts to NetView. RA3HOST is the host controller description for the NetView system.

Display Network Attributes	
System: RALYAS4B	
Alert status . . . . .	*UNATTEND
Alert logging status . . . . .	*ALL
Alert primary focal point . . . . .	*YES
Alert default focal point . . . . .	*YES
Alert backup focal point . . . . .	
Network ID . . . . .	*NONE
Alert focal point to request . . . . .	RA3AN
Network ID . . . . .	USIBMRA
Alert controller description . . . . .	RA3HOST
Alert hold count . . . . .	0
Alert filter . . . . .	*NONE
Library . . . . .	
Message queue . . . . .	QSYSOPR
Library . . . . .	QSYS
Output queue . . . . .	QPRINT
Library . . . . .	QGPL
Job action . . . . .	*FILE
Press Enter to continue.	
F3=Exit F12=Cancel	

Figure 247. Network Attribute Display for RALYAS4B

Figure 248 is a display of the relevant network attributes of RALYAS4A to enable it to receive alerts from the PRPQ.

Display Network Attributes	
System: RALYAS4A	
Alert status . . . . .	*OFF
Alert logging status . . . . .	*RCV
Alert primary focal point . . . . .	*NO
Alert default focal point . . . . .	*OFF
Alert backup focal point . . . . .	
Network ID . . . . .	*NONE
Alert focal point to request . . . . .	RA3AN
Network ID . . . . .	USIBMRA
Alert controller description . . . . .	*NONE
Alert hold count . . . . .	0
Alert filter . . . . .	*NONE
Library . . . . .	
Message queue . . . . .	QSYSOPR
Library . . . . .	QSYS
Output queue . . . . .	QPRINT
Library . . . . .	QGPL
Job action . . . . .	*FILE
Press Enter to continue.	
F3=Exit F12=Cancel	

Figure 248. Network Attribute Display for RALYAS4A

In order to generate an alert, one of the local displays on AS/400 RALYAS4B was powered off. This creates messages CPF2677 and CPF5140. Alerts were generated by making these messages alertable. Figure 249 on page 280 is the work with alerts display panel on RALYAS4B where the alerts are generated and sent to NetView. **1** is the alert generated by message CPF5140 and **2** the alert generated by message CPF2677.



In Figure 251 on page 281 **1** and **2** show the alerts as they are displayed on NPDA.

```

N E T V I E W          SESSION DOMAIN: RA3AN   MERWE   09/23/93 07:3
NPDA-30A              * ALERTS-DYNAMIC *

DOMAIN RESNAME TYPE TIME ALERT DESCRIPTION : PROBABLE CAUSE
RA3AN RALYAS4B*TERM 07:17 DEVICE ERROR: DISPLAY 1
RA3AN RALYAS4B CP 07:17 UNDETERMINED ERROR:UNDETERMINED 2
RA3AN RALYAS4B*TERM 07:12 DEVICE ERROR: DISPLAY
RA3AN RALYAS4B CP 07:12 UNDETERMINED ERROR:UNDETERMINED
RA3AN REPTGEN PROG 07:11 SW PROGRAM ABNORM TERM:APPLICATION PROGR
RA3AN RALYAS4B*TERM 07:08 DEVICE ERROR: DISPLAY
RA3AN RALYAS4B CP 07:08 UNDETERMINED ERROR:UNDETERMINED
RA3AN RALYAS4B*TERM 07:06 DEVICE ERROR: DISPLAY
RA3AN RALYAS4B CP 07:06 UNDETERMINED ERROR:UNDETERMINED
RA3AN RALYAS4B*TERM 07:04 DEVICE ERROR: DISPLAY
RA3AN RALYAS4B*TERM 07:04 DEVICE ERROR: DISPLAY
RA3AN RALYAS4B CP 07:04 UNDETERMINED ERROR:UNDETERMINED
RA3AN RALYAS4B CP 07:04 UNDETERMINED ERROR:UNDETERMINED
RA3AN RALYAS4B*TERM 06:53 DEVICE ERROR: DISPLAY
RA3AN RALYAS4B CP 06:53 UNDETERMINED ERROR:UNDETERMINED

DEPRESS ENTER KEY TO VIEW ALERTS-STATIC

???
CMD==>

```

Figure 251. Alerts Dynamic NPDA Display Panel

The PRPQ uses MS Transport to send the alerts to RALYAS4A. The trace in Figure 252 on page 282 records 31 and 40 shows the CP-MSUs (X'1212') and the alert major vectors (X'0000') it is transporting on the LU 6.2 session between the PRPQ application and the AS/400.

COMMUNICATIONS TRACE				Title: BRIDGE RALYAS4A	09/23/93 07:19:02	Page: 3
Record Number	S/R	Controller Name	Data Type	SNA Data: TH, RH, RU		
27	R	RA3HOST	EBCDIC	TH : FID=2, MPF=Only ODAI=0, DAF'=01, OAF'=01, SNF'=0390, EFI RH : ('6B8000'X) REQ SC, FI, BCI, ECI, DR1 RU Command . . . . : BIND RU Data . . . . : 31001307B0B050B100078585880006020000000000000082C000008C5D7 *.....&...EEH.....EP* E505D7E3E2D227000902C9D5E3C5D9C1C3E3090300FF41644B479BE21104 *VNPTSK....INTERACT.....S.* E4E2C9C2D4D9C14BC5D7E5D5D7E3E2D20008E3D9F1F3F4F0C1F1 *USIBMRA.EPVNPTSK..TR1340A1 *		
29	S	RA3HOST	EBCDIC	TH : FID=2, MPF=Only ODAI=0, DAF'=01, OAF'=01, SNF'=0390, EFI RH : ('EB8000'X) RSP SC, FI, DR1 RU Command . . . . : BIND RU Data . . . . : 31001307B0B050B10007858587000602000000000000090240000002700 *.....&...EEG.....* 0902C9D5E3C5D9C1C3E3090300FF41644B479BE21105E4E2C9C2D4D9C14B *..INTERACT.....S..USIBMRA.* D9C1D3E8C1E2F4C10000 *RALYAS4A.. *		
31	R	RA3HOST	EBCDIC	TH : FID=2, MPF=Only ODAI=0, DAF'=01, OAF'=01, SNF'=0001 RH : ('0A9100'X) REQ FMD, FI, BCI, DR1, ERI, PI RU Command . . . . : FMH- 5=110502FF0003D000400423F0F0F0000000 *.....}. ..000... * RU Data . . . . : 00F8121200F400000B92000012FE00331AA4A13D10001E1101130011F9F4 *.8...4...K.....U.....94* F0F4C5F2F0F1F0F1F5F5F3F34040080EC1E261F4F0F01C11040804F0F2F0 *04E201015533 ..AS/400.....020* F3F0F00806D6E261F4F0F00908F5F7F3F8E2E2F10E0108105D091707122E *300..OS/400..5738SS1.....)* 04200000254A230101E4E2C9C2D4D9C140D9C1D3E8C1E2F4C2C5D76DC1D3 *.....¢...USIBMRA RALYAS4BEP_AL* C5D9E374BFF12B9F8000AB0493FE0006970481200015980C82212011C3D7 *ERT..1.....L...P.A...Q.B...CP* C6F2F6F7F7078221230100281E050E100009D9C1D3E8C1E2F4C220F40E20 *F2677.B.....RALYAS4B.4..* 0009D9C1D3E8C1E2F4C200EF3831060202B9002506120000000003211227 *..RALYAS4B.....* 30C485A589838540C4E2D7F0F1409596409396958785994083969494A4 *.DEVICE DSP01 NO LONGER COMMU *		
33	R	RA3HOST	EBCDIC	TH : FID=2, MPF=Only ODAI=0, DAF'=01, OAF'=01, SNF'=0002 RH : ('01A001'X) REQ FMD, ECI, DR1, DR2, CEBI RU Data . . . . : 95898381A38995874B *NICATING. *		
34	S	RA3HOST	EBCDIC	TH : FID=2, MPF=Only ODAI=0, DAF'=01, OAF'=01, SNF'=0000 RH : ('830100'X) RSP FMD, PI No RU data		
37	S	RA3HOST	EBCDIC	TH : FID=2, MPF=Only ODAI=0, DAF'=01, OAF'=01, SNF'=8000 RH : ('83A000'X) RSP FMD, DR1, DR2 No RU data		
40	R	RA3HOST	EBCDIC	TH : FID=2, MPF=Only ODAI=0, DAF'=01, OAF'=01, SNF'=0003 RH : ('0A9080'X) REQ FMD, FI, BCI, DR1, ERI, BBI RU Command . . . . : FMH- 5=110502FF0003D000400423F0F0F0000000 *.....}. ..000... * RU Data . . . . : 016B1212016700000B920000011002ED4AAA33D10001E1101130011F9F4 *.8.....K.....¢.T.....94* F0F4C5F2F0F1F0F1F5F5F3F34040080EC1E261F4F0F01C11040804F0F2F0 *04E201015533 ..AS/400.....020* F3F0F00806D6E261F4F0F00908F5F7F3F8E2E2F1191000161103130011F3 *300..OS/400..5738SS1.....3* F1F8F0F0F0F2F0F0F0F0F0F0F0F0E0108105D091707122E0420000025 *1800020000000000.....)* 4A230101E4E2C9C2D4D9C140D9C1D3E8C1E2F4C2C5D76DC1D3C5D9E374BF *¢...USIBMRA RALYAS4BEP_ALERT..* F12BD24000E6049363024096040163020C8122C0F0A01000330100B21582 *1.K .W.L.. 0.....A.{0.....B* 00A511C4E2D7D3D6C740D3D6C74DD8C8E2E35D02820C82002211C3D7C6F5 *.V.DSPLOG LOG(QHST).B.B...CPF5* F1F4F00B8200A511C1D5E9D7D9C215980C82212011C3D7C6F5F1F4F007 *140.B.V.ANZPRB.Q.B...CPF5140. *		
41	R	RA3HOST	EBCDIC	TH : FID=2, MPF=Only ODAI=0, DAF'=01, OAF'=01, SNF'=0004 RH : ('01A001'X) REQ FMD, ECI, DR1, DR2, CEBI RU Data . . . . : 822123010046340524100009D9C1D3E8C1E2F4C220F409C3E3D3F0F14040 *B.....RALYAS4B.4.CTL01 * 40603809C3E3D3F0F1F0F0F060170E200009D9C1D3E8C1E2F4C200EF4231 * -.CTL01000-.....RALYAS4B....* 060202B90025061200000000321123130E285A2A289969540A2A3969797 *.....SESSION STOPP* 85844082A808140998598A485A2A34086999694408485A589838540C4E2 *ED BY A REQUEST FROM DEVICE DS* D7F0F14B *P01. *		
44	S	RA3HOST	EBCDIC	TH : FID=2, MPF=Only ODAI=0, DAF'=01, OAF'=01, SNF'=8003 RH : ('83A000'X) RSP FMD, DR1, DR2 No RU data		

Figure 252. Alert Flow from PRPQ to AS/400 RALYAS4A

Figure 253 on page 283 is the work with alerts display panel on RALYAS4A where the alerts that were sent by the PRPQ are displayed.



Work with Alerts					R
					09/23/93 1
Type options, press Enter.					
2=Change		4=Delete		5=Display recommended actions	6=Print deta
8=Display alert detail		9=Work with problem			
Resource					
Opt	Name	Type	Date	Time	Alert Description: Probable Cause
	CP31743	CP	09/23	08:25	SNA protocol error: Application pro
	CP31743	CP	09/23	08:25	SNA protocol error: Application pro
	CP31743	CP	09/23	07:24	SNA protocol error: Application pro
	RALYAS4B*	DSP	09/23	07:17	Device error: Display
	RALYAS4B	CP	09/23	07:17	Undetermined error: Undetermined
	REPTGEN	UNK	09/23	07:11	Software program abnormally termina
	RALYAS4B*	DSP	09/23	07:06	Device error: Display
	RALYAS4B	CP	09/23	07:06	Undetermined error: Undetermined
	RALYAS4B*	DSP	09/23	07:04	Device error: Display
	RALYAS4B	CP	09/23	07:04	Undetermined error: Undetermined
	REPTGEN	UNK	09/23	06:48	Software program abnormally termina
	REPTGEN	UNK	09/23	06:46	Software program abnormally termina
	RALYAS4B*	DSP	09/23	07:04	Device error: Display
	RALYAS4B	CP	09/23	07:04	Undetermined error: Undetermined
	REPTGEN	UNK	09/23	06:48	Software program abnormally termina
	REPTGEN	UNK	09/23	06:46	Software program abnormally termina
F3=Exit		F10=Show new alerts		F11=Display user/group	F12=Cancel
F13=Change attributes		F20=Right		F21=Automatic refresh	F24=More k

Figure 253. Alerts Received by RALYAS4A from PRPQ



## Appendix G. Alert Automation Applications

The source code for two user-written alert automation applications is included in this section. The applications have been kept deliberately simple in order to demonstrate the principles of how certain Application Programming Interfaces, supplied with OS/400, could be used to automate alert processing on the AS/400 system.

### G.1 Automating The Generating and Sending of an Alert

This section contains the source code of the files and programs used in 5.4, "Sending an Alert Using OS/400 APIs" on page 189 to generate and send an alert.

```
PGM:      PGM
          DCL      VAR(&JOBNAME) TYPE(*CHAR) LEN(10)
          DCL      VAR(&USERPRF) TYPE(*CHAR) LEN(10)
          DCL      VAR(&NBR) TYPE(*CHAR) LEN(6)
          DCL      VAR(&OUTQ) TYPE(*CHAR) LEN(10)
          DCL      VAR(&OUTQLIB) TYPE(*CHAR) LEN(10)
          DCLF     FILE(QALSND/LCPYSPL) /* Logical file over +
          CPYSPLF. Keyed by JOBNAM='QPFRMON'. +
          Select=COMP(EQ 'QPFRMON ') Omit=ALL */
          RTVJOBA  JOB(&JOBNAME) USER(&USERPRF) NBR(&NBR) +
          OUTQ(&OUTQ) OUTQLIB(&OUTQLIB)
          HLDOUTQ  OUTQ(&OUTQLIB/&OUTQ) /* Hold output queue of +
          job to ensure that output from WRKACTJOB +
          available for copying to physical file */
          WRKACTJOB OUTPUT(*PRINT) SBS(QCTL) /* Display jobs +
          running in QCTL to print to determine +
          whether or not performance monitor is +
          active. */
          CPYSPLF  FILE(QPDSPAJB) TOFILE(QALSND/CPYSPLF) +
          JOB(&NBR/&USERPRF/&JOBNAME) SPLNBR(*LAST) +
          /* Copy output from WRKACTJOB command to +
          physical file so that it can be read by +
          program. */
          READ:    RCVF      /* Read CPYSPLF physical file containing +
          WRKACTJOB output. */
          MONMSG   MSGID(CPF0864) EXEC(DO) /* End of file +
          reached and QPFRMON job is not active in +
          QCTL. Call CL program to generate an +
          alert via QALGENA and QALSND APIs */
          CALL     PGM(QALSND/QALSNDCLP)
          GOTO     CMDLBL(END)
          ENDDO
          IF       COND(&JOBNAM *EQ 'QPFRMON ') THEN(GOTO +
          CMDLBL(END)) /* QPFRMON job record found +
          in WRKACTJOB output. Performance Monitor +
          is active in QCTL. Go to end of program */
          /* */
          GOTO     CMDLBL(READ)
          END:      RLSOUTQ  OUTQ(&OUTQLIB/&OUTQ) /* Release output queue +
          of job */
          ENDPGM:  ENDPGM
```

Figure 254. Source for QPFRMONCHK Control Language Program

```

PGM      /* This program calls the RPG program +
          QALSND which in its turn, calls the API +
          QALGENA to generate an alert and +
          following the successful completion of +
          this, calls the API QALSND to send this +
          alert to OS/4-- alert processing */
DCL      VAR(&MSGDTA) TYPE(*CHAR) LEN(132) /* Declare +
          a character variable to contain maximum +
          possible length of first-level message +
          text */
DCL      VAR(&MSGDLN) TYPE(*DEC) LEN(5 0) /* Declare +
          a numeric variable to contain the length +
          of the first-level message text */
RTVMSG:  RTVMSG  MSGID(CPFOA02) MSGF(QSYS/QCPFMSG) +
          MSG(&MSGDTA) MSGLEN(&MSGDLN) /* Retrieve +
          first-level message text and length from +
          message in message file QSYS/QCPFMSG */
CALL:    CALL    PGM(QALSND/QALSND) PARM(' QCPFMSG +
          QSYS      ' 'CPFOA02' &MSGDTA) /* Call +
          RPG program to call QALGENA and QALSND +
          APIs */
END:     ENDPGM  /* End of program */

```

Figure 255. Source for QALSNDCLP Control Language Program

```

A      R CPYSPL
A      FILL01      3
A      JOBNAM      10
A      FILL02      3
A      USERID      10
A      FILL03      54

```

Figure 256. Source for CPYSPLF File to Receive CPYSPLF Output

```

A      R CPYSPL      PFILE(CPYSPLF)
A      K JOBNAM
A      S JOBNAM      COMP(EQ 'QPFRMON ')
A      O              ALL

```

Figure 257. Source for Logical File LCPYSPL over CPYSPLF

```

H*
I* Define data structure for required parameters for
I* QALGENA API
IQALGEN      DS
I* Receiver variable: Output - Character(256)
I              1 256 RECVAR
I* Receiver variable length: - Input - Binary(4)
I              B 257 2600RECVLN
I* Bytes returned: - Output - Binary(4)
I              B 261 2640BYTRET
I* Alert table/message file
I* and library: - Input - Character(20)
I              265 284 ALRTBL
I* Message ID: Input - Character(7)
I              285 291 MESSID
I* Message data: Input - Character(132)
I              292 423 MSGDTA
I* Message data length: - Input - Binary(4)
I              B 424 4270MSGDLN
I* Error code: - Input/Output - Character(16)
I              428 443 ERRCOD
I* Subfield of Error code - Input - Binary(4) Length which calling
I* application provides for the error code in bytes. Must be
I* 0, 8 or >8.
I              B 428 4310ERRCDA
I* Subfield of Error code - Output - Binary(4) Length of
I* exception data available to the API to return, in bytes. If
I* this is 0, no error was detected.
I              B 432 4350ERRCDB
I*
IQALSND      DS
I* Alert major vector - Input - Character(256)
I              1 256 ALRTMV
I* Alert major vector length - Input - Binary(4)
I              B 257 2600ALRMVL
I* Local or received indicator - Input - Character(1)
I              261 261 LOCRCV
I* Origin - Input - Character(10) Not included in alert.
I* Used only in substitution text for messages CPI7B62 and
I* CPI7B60. Could be used for name of program generating alert.
I              262 271 ORIGIN
C* Parameter list of parameters received by CL program QALSNDCLP
C      *ENTRY    PLIST
C* Alert table/message file (first ten chars) and library in
C* which it resides (second ten chars). Work field.
C      PARM      ALRTBW 20
C* Alert/message ID. Work field.
C      PARM      MESSIW 7
C* First level message text.
C      PARM      MSGDTW132
C* Move parameters received from QALSNDCLP into appropriate
C* fields in data structure
C      MOVE ALRTBW    ALRTBL
C      MOVE MESSIW    MESSID
C      MOVE MSGDTW    MSGDTA

```

Figure 258. Source for RPG Program QALSND - Panel 1 of 2

```

C* Initialize binary length fields prior to calling QALGENA
C* API to generate alert.
C          Z-ADD256      RECVLN
C          Z-ADD132      MSGDLN
C*
C* Initialize receiver variable with blanks. This variable
C* receives the generated alert in the format of an SNA major
C* vector
C          MOVE *BLANKS  RECVAR
C* Initialize receiver variable length binary field.
C          Z-ADDO        BYTRET
C* Initialize exception data bytes provided binary field
C          Z-ADDO        ERRCD
C* Initialize exception data bytes available binary field
C          Z-ADDO        ERRCD
C*
C* Call QALGENA API to generate alert and pass required parameters
C          CALL 'QALGENA'
C          PARM          RECVAR
C          PARM          RECVLN
C          PARM          BYTRET
C          PARM          ALRTBL
C          PARM          MESSID
C          PARM          MSGDTA
C          PARM          MSGDLN
C          PARM          ERRCD
C* QALGENA has successfully generated an alert from the message.
C* The API has filled the OUTPUT fields of the required
C* parameters, in response to the values contained in the
C* INPUT fields.
C*****
C* Prepare parameters prior to call to QALSND API to send the
C* generated alert to OS/400 alert processing.
C*
C* Move name of program generating locally generated alert.
C          MOVE 'QALSND' ORIGIN
C* Move "L" into Local/Received field to indicate local alert.
C          MOVE 'L'      LOCRCV
C* Call QALSND API to send alert to OS/400 alert processing
C          CALL 'QALSND'
C          PARM          RECVAR
C          PARM          BYTRET
C          PARM          LOCRCV
C          PARM          ORIGIN
C          PARM          ERRCD
C* End of program. Alert successfully sent to OS/400 alert
C* processing.
C          SETON          LR

```

Figure 259. Source for RPG Program QALSND - Panel 2 of 2

## G.2 Processing Alert Sent to Data Queue

This section contains the source code of the files and programs used in 5.5, "Processing an Alert Sent to a Data Queue" on page 194 to process an alert sent to a data queue by an action entry in an alert filter.

```

PGM
/* Declare the five compulsory parameters for the QRCVDTAQ API */
/*
      DCL      VAR(&QNAME) TYPE(*CHAR) LEN(10) +
                VALUE('PERFORM ') /* Name of data queue */
      DCL      VAR(&LIB) TYPE(*CHAR) LEN(10) +
                VALUE('QALSND') /* Data queue library */
      DCL      VAR(&FLDLN) TYPE(*DEC) LEN(5 0) VALUE(256) +
                /* Number of characters received from data +
                queue */
      DCL      VAR(&FIELD) TYPE(*CHAR) LEN(256) /* Data +
                received from data queue */
      DCL      VAR(&WAIT) TYPE(*DEC) LEN(5 0) VALUE(300) /* +
                Number of seconds to wait */
/* Call API to receive data from the data queue specified in the */
/* action entry within the alert filter */
LOOP:      CALL      PGM(QRCVDTAQ) PARM(&QNAME &LIB &FLDLN +
                &FIELD &WAIT)
/* If no entry is on the data queue, the field length parameter */
/* returned to this program will be zero */
      IF      (&FLDLN *NE 0) DO
      STRPFRMON INTERVAL(5) HOUR(8) MINUTE(0) /* Start +
                performance monitor automatically */
      SNDUSRMSG MSG('Attention! The Performance Monitor was +
                not started.') MSGTYPE(*INFO) TOMSGQ(QSYSOPR)
      CALL      PGM(QCLRDTAQ) PARM(PERFORM QALSND) /* Clear +
                data queue to prepare for next entry */
      GOTO      CMDLBL(LOOP) /* Return to QRCVDTAQ to check +
                for another entry */
      ENDDO      /* If no entry on data queue, performance +
                monitor is running so program will drop +
                through and end */
END:      ENDPGM

```

Figure 260. Source for RCVDTAQ Control Language Program





## Appendix H. AS/400 RUNCMD Program Listing

```
/*-----*/
/* OS/2 Communication Manager includes a function called */
/* Remote operation (ROPS). This function allows an external */
/* system like NetView or the AS/400 using a RUNCMD interface */
/* to send to the OS/2 system OS/2 non-interactive commands. */
/* */
/* LAN Network Manager product using the OS/2 CM/2 service point */
/* (SPAR) to receive via the same protocol LAN Network */
/* Management commands. */
/* See OS/2 CM manual and LNM manual for the commands supported. */
/* */
/* Before starting the CM/2, you have to define a link between */
/* the PS/2 CM/2 and the AS/400. On the AS/400, you have to */
/* define an APPC controller for the PS/2. */
/* */
/* After having started the CM/2, you have to start SPAR and */
/* ROPS on CM/2 and to vary on the AS/400 controller, and */
/* is needed the LAN program. */
/* When the link is active, you can start the AS/400 RUNCMD */
/* program. */
/* Destination NETID means PS/2 OS/2 CM/2 NETWORK ID. */
/* Destination CPNAME means PS/2 OS/2 CM/2 PU Name. */
/* Destination Application names are REMOTEOP for CM/2 remote */
/* operation support and LANMGR for the LAN Network Manager. */
/* */
/* The parameters for a REMOTEOP commands are: */
/* OP=XXXXXXX;RCO=NO;ZZZZZZZZZZZZZZZZ */
/* */
/* XXXXXXXX = a user name. */
/* RCO=YES means only command feedback. */
/* RCO=NO means response to the command. */
/* ZZZZZZZZZZZZ = OS/2 command. */
/* */
/* For the LAN Network Manager : */
/* YYYYYYYYYYYYYYYY where YYYYYYYY = LNM command. */
/* */
/* */
/* This is a source application that uses the Management Services */
/* Transport API. It does the following: */
/* 1. Prompts for data to be sent to X'23F0F1F4' */
/* 2. Sends a MS Transport request with reply to X'23F0F1F4' */
/* 3. Repeats steps 1-3 until QUIT is entered. */
/* */
/* Written by Fernand Biname ITS0-Raleigh */
/* Raleigh 10/06/93 Version 1.0 */
/*-----*/
/*-----*/
/* Includes */
/*-----*/
#include <xxcvt.h>
#include <stdio.h>
#include <string.h>
#include <stdlib.h>
#define NOERROR "NOERROR"
```

```

/*-----*/
/* Type definitions */
/*-----*/
typedef int HANDLE; /* typedef for handle */
typedef char NETID[8]; /* typedef for network ID */
typedef char CPNAME[8]; /* typedef for control point name */
typedef char MODENAME[8]; /* typedef for mode name */
typedef char SENSECODE[8]; /* typedef for SNA sense code (in
                           character format) */
typedef char LIBNAME[10]; /* typedef for library name */
typedef char QNAME[10]; /* typedef for data queue name */
typedef char MSGID[7]; /* typedef for message ID */
typedef char EXCPDATA[48]; /* typedef for exception data */
typedef char CATEGORY[8]; /* typedef for category */
typedef char APPLTYPE[10]; /* typedef for appl type */
typedef char REPLREG[10]; /* typedef for replace
                           registration */

typedef char COUNT[4];

typedef char DATARCVD[10]; /* typedef for data received */
typedef char REQTYPE[10]; /* typedef for request type */
typedef char POSTRPL[10]; /* typedef for post reply */
typedef char REQUESTID[53]; /* typedef for request ID */
typedef char SRBUFFER[600]; /* typedef for send/receive
                           buffer. This program limits
                           the amount of data to be sent
                           or received to 500 bytes. The
                           maximum size of a MS transport
                           buffer is 31739. */

typedef struct { /* Library-qualified data queue
                 name */
    QNAME data_queue_name; /* data queue name */
    LIBNAME library_name; /* library name */
} QUALQNAME;

typedef struct { /* Error code structure */
    int bytes_provided; /* number of bytes provided */
    int bytes_available; /* number of bytes available */
    MSGID exception_ID; /* exception ID */
    char reserved_area; /* reserved */
    EXCPDATA exception_data; /* exception data */
} ERRORCODE;

typedef struct { /* Notification record structure */
    char record_type[10]; /* Record type */
    char function[2]; /* Function */
    HANDLE handle; /* Handle */
    REQUESTID req_id; /* Request ID */
    char reserved[11]; /* Reserved area */
} NOTIFRCD;

typedef struct { /* Receiver variable structure */
    int bytes_provided; /* number of bytes provided */
    int bytes_available; /* number of bytes available */
}

```

```

        SRBUFFER received_data;          /* received data          */
    } RECEIVERVAR;

typedef struct {                          /* Qualified application name */
    NETID network_id;                     /* Network ID                 */
    CPNAME cp_name;                       /* Control point name         */
    char QUAPL1;                          /* Application name            */
    char QUAPL2[7];
} QUALAPPL;

typedef struct {                          /* application name          */
    char APL1;                            /* Application name            */
    char APL2[7];
} APPLNAME;

typedef struct {                          /* CP_MSU                     */
    short int CP_MSUL2;
    short int CP_MSUH2;
    char CP_MSUL3;
    char CP_MSUH3;
    char CP_MSUL4;
    char CP_MSUH4;
    char CP_MSUT1[8];
    char CP_MSUL5;
    char CP_MSUH5;
    char CP_BUFFER[500];
    } CP_MSU_BUFFER ;

typedef struct {                          /* CP_MSU                     */
    int REC_CP_MSUL1;
    int REC_CP_MSUH1;
    short int REC_CP_MSUL2;
    short int REC_CP_MSUH2;
    short int REC_CP_MSUL3;
    short int REC_CP_MSUH3;
    char REC_CP_BUFFER[33000];
    } REC_MSU_BUFFER ;

/*-----*/
/* External program declarations          */
/*-----*/
#pragma linkage(QNMSTRAP, OS)              /* Start application API      */
extern void QNMSTRAP (HANDLE *handle,      /* pointer to handle          */
                    APPLNAME *applname,   /* pointer to appl name      */
                    QUALQNAME *qualqname, /* pointer to data queue     */
                    name                  /* name                       */
                    ERRORCODE *errorcode); /* pointer to error code     */
                                           /* parameter                  */

#pragma linkage(QNMENDAP, OS)              /* End application API        */
extern void QNMENDAP (HANDLE *handle,      /* pointer to handle          */
                    ERRORCODE *errorcode); /* pointer to error code     */
                                           /* parameter                  */

#pragma linkage(QNMRCVDT, OS)              /* Receive data API          */
extern void QNMRCVDT (HANDLE *handle,      /* pointer to handle          */
                    REC_MSU_BUFFER *rec_msu_buffer,
                    int *rcvvarln,        /* pointer to receiver       */
                                           /* variable length            */
                    REQUESTID *reqid,     /* pointer to request ID*/

```

```

        QUALAPPL *qualappl,    /* pointer to remote
                                application name */
        DATARCVD *datarcvd,    /* pointer to type of data
                                received */
        int *waittim,          /* pointer to wait time */
        ERRORCODE *errorcode); /* pointer to error code
                                parameter */

#pragma linkage(QNMSNDRQ, OS)    /* Send request API */
extern void QNMSNDRQ (HANDLE *handle, /* pointer to handle */
                     QUALAPPL *qualappl, /* pointer to remote
                                application name */
                     REQUESTID *reqid, /* pointer to request ID */
                     CP_MSU_BUFFER *cp_msu_buffer,
                     int *sndbufln, /* pointer to send buffer length */
                     REQTYPE *reqtype, /* pointer to request type */
                     POSTRPL *postrpl, /* pointer to post reply */
                     int *waittim, /* pointer to wait time */
                     ERRORCODE *errorcode); /* pointer to error code
                                parameter */

#pragma linkage(QNMCHGMN, OS)    /* Change mode name API */
extern void QNMCHGMN (HANDLE *handle, /* pointer to handle */
                     MODENAME *modename, /* pointer to mode name */
                     ERRORCODE *errorcode); /* pointer to error code
                                parameter */

void check_error_code (char func_name[8]); /* Used to check error
                                           code */

void process_replies(void); /* Process replies received from
                             destination application */

/*-----*/
/* Global declarations */
/*-----*/
HANDLE appl_handle; /* Handle of application */
ERRORCODE error_code_struct = /* Error code parm */
    {sizeof(error_code_struct), /* Initialize bytes provided */
     0, /* initialize bytes available */
     NOERROR}; /* initialize error code */
char input_line[80]; /* Input data */
char input_appl[80]; /* Input data */
REQUESTID req_id; /* Returned request ID */
int wait_time = 60; /* Wait time = 60 seconds */
int ret_code = 0;

/*-----*/
/* Start of main. */
/*-----*/
int main ()
{
    QUALQNAME data_queue_parm = /* Data queue name to be used */
        {"*NONE", ""}; /* Initialize structure */
    NOTIFRCD notif_record; /* Area to contain notification
                           record */
    CATEGORY category = "*NONE"; /* SNA/MS function set group */
    APPLTYPE appl_type = "*FPAPP"; /* Application type */
    REPLREG replace_reg = "*YES"; /* Replace registration = *YES */
    int sys_result; /* Result of system function */

```

```

char end_msg[] = "ENDRMTAPPL";      /* If this data is received then
                                     the application will end */
COUNT count;
char incoming_data[] = "01";        /* Incoming data constant */
SRBUFFER send_buffer;               /* Send buffer */
CP_MSU_BUFFER cp_msu_buffer;
int data_length;                    /* Length of send data */
char input_char;                    /* Input character */
REQTYPE req_type = "*RQSRPY ";      /* Request type */
POSTRPL post_reply = "*NO ";        /* Don't post any received replies */
char cp_msu_t1[] = "REMOTEOP";
                                     */
MODENAME mode_name = "SNASVCMG";    /* Mode name = SNASVCMG */
                                     */
APPLNAME appl_name ;                /* Appl name to be used */
QUALAPPL qual_appl ;               /* Qualified application name */

int ctl_h_23;                       /* */
int ctl_h_31;                       /* */

int seq_number;

int CP_MSUH2_int;
int CP_MSUH3_int;
int CP_MSUH4_int;
int CP_MSUH5_int;

int CP_MSUL2_int;
int CP_MSUL3_int;
int CP_MSUL4_int;
int CP_MSUL5_int;

int x;
int digits = 3;
int fraction = 0;

ctl_h_23 = 0x23;                    /* */
/* APPLNAME appl_name = "#015 "; */
appl_name.APL1 = (char) ctl_h_23;
strncpy(appl_name.APL2, "015 ", 7 );

qual_appl.QUAPL1 = (char) ctl_h_23;

strncpy(qual_appl.network_id, "USIBMRA ", 8 );
strncpy(qual_appl.cp_name, "WTRFJB ", 8 );
strncpy(qual_appl.QUAPL2, "014 ", 7 );
/* {"USIBMRA ", "WTRFJB ", "#014 "}; */

CP_MSUH2_int = 0x8061;
CP_MSUH3_int = 0x06 ;
CP_MSUH4_int = 0x50;
CP_MSUH5_int = 0x31;
CP_MSUL3_int = 0x0C;
CP_MSUL4_int = 0x0A;

```

```

/*-----*/
/* Start of executable code */
/*-----*/
QNMSTRAP (&appl_handle,
          &appl_name,
          &data_queue_parm,
          &error_code_struct); /* Start application */
check_error_code("QNMSTRAP"); /* Check error code */
QNMCHGMN (&appl_handle,
          &mode_name,
          &error_code_struct); /* Change mode name */
check_error_code("QNMCHGMN"); /* Check error code */
seq_number = 0;
printf ("Enter Destination NETID\n");
gets(input_line);
data_length = strlen(input_line); /* Get length of message */
if (data_length == 0)
    strncpy(qual_appl.network_id, "USIBMRA ", 8 );
else
{
    strncpy(qual_appl.network_id, " ", 8 );
    strncpy(qual_appl.network_id, input_line, data_length);
}
printf ("Enter Destination CPNAME\n");
printf ("1 for RAYLNM\n");
printf ("2 for WTRFJB\n");
printf ("or the full name\n");
gets(input_line);
data_length = strlen(input_line); /* Get length of message */
if (data_length == 1)
{
    if (memcmp(input_line,
               "1",
               sizeof("1")) == 0)
        strncpy(qual_appl.cp_name, "RAYLNM ", 8 );
    else
        strncpy(qual_appl.cp_name, "WTRFJB ", 8 );
}
else
{
    strncpy(qual_appl.cp_name, " ", 8 );
    strncpy(qual_appl.cp_name, input_line, data_length);
}
printf ("Enter Destination Application\n");
printf ("1 for REMOTEOP\n");
printf ("2 for LANMGR\n");
printf ("or the full name\n");
gets(input_appl);
data_length = strlen(input_appl); /* Get length of message */
if (data_length == 1)
{
    if (memcmp(input_appl,
               "2",
               sizeof("2")) == 0)
        strncpy(cp_msu_buffer.CP_MSUT1, "LANMGR ", 8 );
    else
        strncpy(cp_msu_buffer.CP_MSUT1, "REMOTEOP", 8 );
}
else

```

```

    {
        strncpy(cp_msu_buffer.CP_MSUT1,"", 8 );
        strncpy(cp_msu_buffer.CP_MSUT1,input_appl, data_length);
    }
printf ("Enter message to send to remote application or "
        "QUIT to end\n");
gets(input_line);
while (memcmp(input_line,
               "QUIT",
               sizeof("QUIT")) != 0) /* While terminating string
                                     hasn't been entered */
{
    data_length = strlen(input_line); /* Get length of message */

    cp_msu_buffer.CP_MSUH2 = CP_MSUH2_int;
    cp_msu_buffer.CP_MSUH3 = (char) CP_MSUH3_int;
    cp_msu_buffer.CP_MSUH4 = (char) CP_MSUH4_int;
    cp_msu_buffer.CP_MSUH5 = (char) CP_MSUH5_int;
    cp_msu_buffer.CP_MSUL3 = (char) CP_MSUL3_int;
    cp_msu_buffer.CP_MSUL4 = (char) CP_MSUL4_int;

    CP_MSUL5_int = data_length + 2;
    CP_MSUL2_int = data_length + 18;
    cp_msu_buffer.CP_MSUL5 = (char) CP_MSUL5_int;
    cp_msu_buffer.CP_MSUL2 = CP_MSUL2_int;
    memcpy(cp_msu_buffer.CP_BUFFER,input_line,data_length);
/*  memcpy(send_buffer,(char) cp_msu_buffer.CP_MSUL1_int); */
    if (memcmp(cp_msu_buffer.CP_MSUT1,
               "LANMGR ",
               8) == 0)
    {
        strncpy(cp_msu_buffer.CP_BUFFER + data_length,
                " BINAME ",
                9);
        seq_number = seq_number + 1;
        QXXIT0Z(count,digits,fraction, seq_number);
        memcpy(cp_msu_buffer.CP_BUFFER + data_length + 9,
               count,
               3);
        CP_MSUL5_int = data_length + 14;
        CP_MSUL2_int = data_length + 30;
        cp_msu_buffer.CP_MSUL5 = (char) CP_MSUL5_int;
        cp_msu_buffer.CP_MSUL2 = CP_MSUL2_int;
    }
    QNMSNDRQ (&appl_handle,
               &qual_appl,
               &req_id,
               &cp_msu_buffer,
               &CP_MSUL2_int,
               &req_type,
               &post_reply,
               &wait_time,
               &error_code_struct); /* Send request to remote
                                     application */
    check_error_code("QNMSNDRQ"); /* Check error code */

    process_replies(); /* Process one or more received
                       replies */
}

```

```

    printf ("Enter message to send to remote application\n");
    printf ("Enter NEW to change initial parameters\n");
    printf ("QUIT to end\n");
    gets(input_line);
    data_length = strlen(input_line); /* Get length of message */
    if (memcmp(input_line,
                "NEW",
                sizeof("NEW")) == 0)
    {
        printf ("Enter Destination NETID\n");
        gets(input_line);
        data_length = strlen(input_line); /* Get length of message */
        if (data_length == 0)
            strncpy(qual_appl.network_id, "USIBMRA ", 8 );
        else
        {
            strncpy(qual_appl.network_id,"", 8 );
            strncpy(qual_appl.network_id,input_line, data_length);
        }
        printf ("Enter Destination CPNAME\n");
        printf ("1 for RAYLNM\n");
        printf ("2 for WTRFJB\n");
        printf ("or the full name\n");
        gets(input_line);
        data_length = strlen(input_line); /* Get length of message */
        if (data_length == 1)
        {
            if (memcmp(input_line,
                        "1",
                        sizeof("1")) == 0)
                strncpy(qual_appl.cp_name,"RAYLNM ", 8 );
            else
                strncpy(qual_appl.cp_name,"WTRFJB ", 8 );
        }
        else
        {
            strncpy(qual_appl.cp_name,"", 8 );
            strncpy(qual_appl.cp_name,input_line, data_length);
        }
        printf ("Enter Destination Application\n");
        printf ("1 for REMOTEOP\n");
        printf ("2 for LANMGR\n");
        printf ("or the full name\n");
        gets(input_appl);
        data_length = strlen(input_appl); /* Get length of message */
        if (data_length == 1)
        {
            if (memcmp(input_appl,
                        "2",
                        sizeof("2")) == 0)
                strncpy(cp_msu_buffer.CP_MSUT1,"LANMGR ", 8 );
            else
                strncpy(cp_msu_buffer.CP_MSUT1,"REMOTEOP", 8 );
        }
        else
        {
            strncpy(cp_msu_buffer.CP_MSUT1,"", 8 );
            strncpy(cp_msu_buffer.CP_MSUT1,input_appl, data_length);
        }
    }

```



```

printf ("Enter message to send to remote application or "
        "QUIT to end\n");
gets(input_line);
}
}
QNMENDAP (&appl_handle,
          &error_code_struct); /* End the application */

return 0;
}

/*-----*/
/* process_replies function */
/*-----*/
void process_replies ()
{
    REC_MSU_BUFFER rec_msu_buffer = /* Receiver variable */
        {sizeof(rec_msu_buffer)}; /* Initialize bytes provided */
    int rcv_var_len = sizeof(rec_msu_buffer); /* Length of receiver
        variable */
    DATARCVD data_rcvd = "*NODATA "; /* Type of data received */
    QUALAPPL qual_appl; /* Sender of reply */

    char *buffptr;
    char *endbuff;
    int movelength;
    int next;
    int number_line;
    char output[80];
    number_line = 0;

    printf ("Received reply(s):\n");
    strncpy(rec_msu_buffer.REC_CP_BUFFER,
            "\0",
            sizeof(rec_msu_buffer.REC_CP_BUFFER));
    /* Null out data buffer */

    QNMRCVDT (&appl_handle,
              &rec_msu_buffer,
              &rcv_var_len,
              &req_id,
              &qual_appl,
              &data_rcvd,
              &wait_time,
              &error_code_struct); /* Receive reply */
    check_error_code("QNMRCVDT"); /* Check error code */
    while (memcmp(data_rcvd,
                  "RPYCPL ",
                  sizeof(data_rcvd)) != 0) /* While final reply hasn't
        been received */
    {
        for (buffptr = ((char*)&rec_msu_buffer) + 16,
             endbuff = ((char*)&rec_msu_buffer) +
                rec_msu_buffer.REC_CP_MSUL1;
             buffptr < endbuff; buffptr += next)
        {
            next = *((char*)buffptr);
            movelength = next - 2;

```

```

        strncpy(output,
            "\0",
            sizeof(output));
                                /* Null out data buffer */
        strncpy(output, buffptr + 2, movelength);

        printf("%1.500s\n", output);
                                /* Print out reply */
        number_line += 1;
        if (number_line == 20)
        {
            printf("Press enter to continue\n");
            gets(input_line);
            number_line = 0;
        }
        rcv_var_len = sizeof(rec_msu_buffer); /* Length of receiver
                                                variable */
        strncpy(rec_msu_buffer.REC_CP_BUFFER,
            "\0",
            sizeof(rec_msu_buffer.REC_CP_BUFFER));
                                /* Null out data buffer */
        QNMRCVDT (&appl_handle,
            &rec_msu_buffer,
            &rcv_var_len,
            &req_id,
            &qual_appl,
            &data_rcvd,
            &wait_time,
            &error_code_struct); /* Receive reply */
        check_error_code("QNMRCVDT"); /* Check error code */
    }
    for (buffptr = ((char*)&rec_msu_buffer) + 16,
        endbuff = ((char*)&rec_msu_buffer) +
        rec_msu_buffer.REC_CP_MSUL1;
        buffptr < endbuff; buffptr += next)
    {
        next = *((char*)buffptr);
        movelength = next - 2;

        strncpy(output,
            "\0",
            sizeof(output));
                                /* Null out data buffer */
        strncpy(output, buffptr + 2, movelength);

        printf("%1.500s\n", output);
                                /* Print out reply */
        number_line += 1;
        if (number_line == 20)
        {
            printf("Press enter to continue\n");
            gets(input_line);
            number_line = 0;
        }
    }

```

```

    }
}

/*-----*/
/* check_error_code [ */
/*-----*/
void check_error_code (char func_name[8])
{
    char *sense_ptr = error_code_struct.exception_data + 36; /*
                                                                /* Pointer to sense code in
                                                                exception data */
    SENSECODE sense_code; /* SNA sense code */
    if (error_code_struct.bytes_available != 0) /* Error occurred? */
    {
        printf("\n\nError occurred calling %1.8s.\n", func_name);
        memcpy(sense_code,
               sense_ptr,
               sizeof(sense_code)); /* Copy sense code from
                                     exception data */
        printf("Error code is %1.7s, SNA sense code is %1.8s.\n",
               error_code_struct.exception_ID,
               sense_code);
        if (memcmp(func_name,
                   "QNMSTRAP",
                   sizeof(func_name)) != 0) /* Error didn't occur on
                                             start application? */
        {
            QNMENDAP (&appl_handle,
                      &error_code_struct); /* End the application */
        }
        exit(EXIT_FAILURE); /* Exit this program */
    }
}

```



---

## List of Abbreviations

<b><i>APPC</i></b>	Advanced Program-to-Program Communication	<b><i>OPC</i></b>	Operations, Planning & Control
<b><i>APPN</i></b>	Advanced Peer-to-Peer Networking	<b><i>OSI</i></b>	Open Systems Interconnection
<b><i>IBM</i></b>	International Business Machines Corporation	<b><i>RODM</i></b>	NetView Resource Object Data Manager
<b><i>ITSO</i></b>	International Technical Support Organization	<b><i>SMAO</i></b>	Systems Management Maintenance Offering
<b><i>LNМ</i></b>	LAN Network Manager	<b><i>SQL</i></b>	Structured Query Language
		<b><i>SQL/DS</i></b>	Structured Query Language/Data System



---

## Index

### Numerics

3174 Release 5 or later 216  
5494 Alert Support 75  
5494 Remote Control Unit 74

### A

abbreviations 303  
acronyms 303  
Advanced Peer-to-Peer Networking, see APPN  
AIX AS/400 Connection Program/6000 86  
AIX NetView Service Point Program 94  
alert  
    5494 Alert Support 75  
    5494 Remote Control Unit 74  
    Adding an Alert description 57  
    AIX AS/400 Connection Program/6000 86  
    AIX NetView Service Point Program 94  
    Alert Automation Applications 285  
    Alert code point 53, 201  
    alert content 21  
    Alert database 59  
    Alert Description 45  
    alert detail 22, 23, 46  
    Alert filter 40  
    Alert Flags 31  
    Alert Focal point 32  
    Alert focal point to request 39  
    Alert hold count 39  
    Alert logging status 59  
    Alert Recommended Actions 46  
    Alert Subvectors 29  
    alert table 45  
    alert tables 52, 54, 55, 57  
    Alertable message 41  
    AS/400 downstream information 73  
    Backup focal point 38  
    Create a user profile for Alert processing 58  
    Default focal point 38  
    definition 13  
    Display Alert in Hexadecimal 28  
    Display Processing Nodes 26  
    Display Product Identification 24  
    Filter Components 63  
    Generic Alert Code Points 201  
    Generic Alert default code points 202  
    Hierarchy of Control in a Network - Conceptual View 73  
    IBM 3174 Establishment Controller 105  
    Implementation and use of Alert filter 62  
    LAN Network Manager 120  
    LU 6.2 session for Alert transport 39  
    Message Alert attribute 48, 51  
    Network Attributes 36, 37

alert (*continued*)

    Network Attributes for Alert support 37  
    OS/2 Communications Manager/2 113  
    OS/400 LAN Network Manager 128  
    Primary focal point 37  
    Processing an Alert Sent to a Data Queue 194  
    Relationship Between Message Files and Alert Tables 52  
    Resource Hierarchy 29  
    routing data 15  
    RS/6000 Running AIX 85  
    RS/6000 Running AIX AS/400 Connection Program/6000 Version 2 85  
    Sending an Alert using OS/400 APIs 189  
    SNA Alert Format 202, 203  
    SNA Generic Alert Code Points 209  
    SNA Generic Alerts 201  
    Sphere of Control 32  
    SSCP-PU session for Alert transport 39  
    SystemView System Manager/400 136  
    TCP/IP example for RS/6000 90  
    transporting data 14  
    Working with logged Alerts 60  
    WRKALR command 21  
Alert Automation Applications 285  
    CPYSPLF File to Receive CPYSPLF Output 286  
    QALSNDCLP CL Program 285  
    QPFRMONMCHK CL Program 285  
    RCVDTAQ CL Program 288  
    RPG Program QALSND 286, 287  
    Source for Logical File LCPYSPL Over CPYSPLF 286  
Alert code point 53  
Alert database 59  
Alert Description 45  
Alert filter  
    Action entries 63  
    Action Entry 65, 71, 72  
    Alert filter 40  
    Conceptual Operation 64  
    Filter Components 63  
    Implementation and use of Alert filter 62  
    Message queue name 40  
    Network attribute 63  
    Processing an Alert Sent to a Data Queue 194  
    Selection entries 63  
    Selection Entry 65, 66, 71  
Alert Sent to a Data Queue 194  
alert table 45  
Alertable message 41  
AMONDSCH 269  
AMONECHB 269  
APIs for Alert 189

- APPN (Advanced Peer-to-Peer Networking) and Management Services 17
- AS/400
  - alert content 21
  - alert support implementation 21
  - AUTOMATION CENTER/400 177
  - AUTOMATION FACILITIES/400. 177
  - implementation of alert support 21
  - OMEGAMON/400 177
  - OMEGAMVIEW/400 177
- AS/400 as a focal point 135
- AS/400 as a Focal Point using RUNCMD 139
- AS/400 as a Focal Point using RUNCMD to an OS/2 139
- AS/400 as a Focal Point using RUNCMD to LAN Network Manager 148
- AS/400 as a Focal Point using RUNCMD to RS/6000 and NetView/6000 150
- AS/400 Command Tree 225
- AS/400 downstream information for management purpose 73
- AS/400 RUNCMD Program Listing 291
- AUTOMATED FACILITIES/400
  - overview 19
- Automation
  - Alert Automation Applications 285
  - AUTOMATION CENTER/400 177
  - AUTOMATION FACILITIES/400. 177
  - IBM AUTOMATED FACILITIES/400 219
  - IBM AUTOMATION CENTER/400 as a SystemView Product 219
  - IBM AUTOMATION CENTER/400 in a network 219
  - IBM AUTOMATION CENTER/400 in a Stand-Alone Environment 219
  - IBM OMEGAMON/400 219
  - IBM OMEGAVIEW/400 219
  - NetView Remote Operations Agent/400 223
  - NetView Remote Operations for AS/400 223
  - NetView Remote Operations for AS/400 Automation 185
  - NetView Remote Operations Manager MVS/ESA 223
  - NetView remote operations using RODM method 188
  - OMEGAMON/400 177
  - OMEGAVIEW/400 177
  - Processing an Alert Sent to a Data Queue 194
  - Sending an Alert using OS/400 APIs 189
- AUTOMATION CENTER/400 177
  - IBM AUTOMATED FACILITIES/400 19, 219
  - IBM AUTOMATION CENTER/400 as a SystemView Product 219
  - IBM AUTOMATION CENTER/400 in a network 219
  - IBM AUTOMATION CENTER/400 in a Stand-Alone Environment 219
  - IBM OMEGAMON/400 19, 219
  - IBM OMEGAVIEW/400 19, 219
  - overview 19

- AUTOMATION FACILITIES/400. 177

## C

- Change Management 136
- Code point 53
- configuring
  - Network Attributes for Alert support 37
- CPYSPLF File to Receive CPYSPLF Output 286
- Customizing NetView Remote Operations Manager 234

## D

- Data Queue for Alert 194
- Default code points 202

## E

- entry point 12

## F

- Filter Components 63
- FNADSPV command list 235
- FNADSPV sample 238
- FNAGVARS command list 235
- FNAGVARS sample 249
- FNAINIT sample 237
- FNASETV command list 235
- FNASETV sample 240
- focal point 12
  - Acquiring a Focal point 32
  - Alert Focal point 32
  - Alert focal point to request 39
  - AS/400 as a Focal Point using RUNCMD 139
  - AS/400 as a Focal Point using RUNCMD to LAN Network Manager 148
  - AS/400 as a Focal Point using RUNCMD to RS/6000 and NetView/6000 150
  - Backup focal point 38
  - Default focal point 38
  - LU 6.2 session for Alert transport 39
  - NetView as a Focal Point for AS/400 150
  - NetView Remote Operations for AS/400 Automation 185
  - NetView Remote Operations Manager MVS/ESA 151
  - Network Attributes 37
  - New focal point 34
  - Primary Focal point 32, 37
  - SSCP-PU session for Alert transport 39
- Focal Point using RUNCMD 139
- Focal Point using RUNCMD to an OS/2 139
- Focal Point using RUNCMD to LAN Network Manager 148
- Focal Point using RUNCMD to RS/6000 and NetView/6000 150



## G

Generic Alert Code Points 201

## H

Hierarchy of Control in a Network - Conceptual View 73

## I

IBM 3174 Establishment Controller 105  
IBM AUTOMATED FACILITIES/400 219  
IBM AUTOMATION CENTER/400 as a SystemView Product 219  
IBM AUTOMATION CENTER/400 in a network 219  
IBM AUTOMATION CENTER/400 in a Stand-Alone Environment 219  
IBM OMEGAMON/400 219  
IBM OMEGAVIEW/400 219  
IBM Service Level Reporter 255  
Implementation and use of Alert filter 62  
installing  
    AS/400 Command Tree 225  
    Customizing NetView Remote Operations Manager 234  
    Customizing the Command Tree/2 Interface 226  
    Hardware and Software Requirements. 225, 235  
    Installing NetView Remote Operations Agent/400 235  
    NetView Remote Operations Agent/400 152  
    NetView Remote Operations Manager MVS/ESA 225  
    Planning for NetView Remote Operation Agent/400 235  
    SMAO 253  
Installing NetView Remote Operations Agent/400 235

## L

LAN Network Manager 120, 135, 148  
LAN Network Manager OS/400 128

## M

Management Services 215  
    3174 Release 5 or later 216  
    5494 Remote Control Unit 74  
    AIX NetView Service Point Program 94  
    APPN networking 17  
    architecture and technology 17  
    IBM 3174 Establishment Controller 105  
    introduction 17, 215  
    LAN Network Manager 120  
    Management Services Transport 215  
    MS Transport implementations 216  
    NetView V2R2 216  
    Network Attributes for LU 6.2 39  
    Network Attributes for SSCP-PU session 39  
    OS/400 V2R2 216

Management Services (*continued*)

    Problem management 215  
    Remote operation 135  
    RS/6000 with SNA/Server or NetView Service Point 216  
    subarea networking 17

Management Services Transport 215

MS Transport implementations 216

## N

NetView  
    NetView remote operation 165  
    NetView Remote Operations Agent/400 223  
    NetView Remote Operations for AS/400 223  
    NetView Remote Operations for AS/400 Automation 185  
    NetView Remote Operations Manager MVS/ESA 223  
    NetView remote operations using RODM method 188  
    NetView to AS/400 Bridge PRPQ 275  
    Planning for NetView Remote Operation Agent/400 235  
NetView as a Focal Point for AS/400 150  
NetView Distribution Manager 150  
    HCF/DHCF 150  
NetView for OS/2 135  
NetView hardware monitor 150  
NetView remote operation Agent/400 planning 235  
NetView Remote Operations Agent/400 151, 223  
NetView Remote Operations for AS/400 151, 223  
    Customizing NetView Remote Operations Manager 234  
    Customizing the Command Tree/2 Interface 226  
    Features 223, 224  
    FNADSPV command list 235  
    FNADSPV sample 238  
    FNAGVARS command list 235  
    FNAGVARS sample 249  
    FNAINIT sample 237  
    FNASETV command list 235  
    FNASETV sample 240  
    Hardware and Software Requirements. 225, 235  
    Installation 225  
    Installation of the AS/400 command tree 225  
    Installing NetView Remote Operations Agent/400 235  
    Introduction 223  
    NetView Remote Operations Agent/400 223  
    NetView Remote Operations Manager MVS/ESA 223  
    OPSMGMT command list 234  
    overview 18  
    Planning 235  
    Samples 237  
NetView Remote Operations for AS/400 Automation 185

- NetView Remote Operations Manager MVS/ESA 151, 223, 225
- NetView remote operations using RODM method 188
- NetView to AS/400 Bridge PRPQ 275
- NetView V2R2 216
- NetView/6000 135
  - AS/400 as a Focal Point using RUNCMD to RS/6000 and NetView/6000 150
- Network Attributes for Alert 36

## O

- OMEGAMON/400 177
  - overview 19
- OMEGAMVIEW/400 177
- OMEGAVIEW/400
  - overview 19
- OPC/ESA Interface for SMAO 160
- OPERATE command 135
- Operations Management
  - AS/400 as a focal point 135
  - AS/400 as a Focal Point using RUNCMD 139
  - AS/400 as a Focal Point using RUNCMD to an OS/2 139
  - AS/400 as a Focal Point using RUNCMD to LAN Network Manager 148
  - AS/400 as a Focal Point using RUNCMD to RS/6000 and NetView/6000 150
  - AS/400 RUNCMD Program Listing 291
  - Change Management 136
    - description 9
  - NetView as a Focal Point for AS/400 150
  - NetView remote operation 165
  - NetView Remote Operations Agent/400 151, 223
  - NetView Remote Operations for AS/400 151, 223
  - NetView Remote Operations for AS/400
    - Automation 185
  - NetView Remote Operations Manager
    - MVS/ESA 151, 223
  - NetView remote operations using RODM
    - method 188
  - problem management 11, 136
  - Processing an Alert Sent to a Data Queue 194
  - Remote Monitoring 165
  - remote operation 12, 135
  - Sending an Alert using OS/400 APIs 189
  - SMAO 151
    - SMAO/400 Remote Operations 155
- OPSMGMT command list 234
- OS/2 Communications Manager/2 113
- OS/400 LAN Network Manager 128
- OS/400 V2R2 216

## P

- Planning for NetView Remote Operation
  - Agent/400 235
- Primary focal point 32

- Problem Management 136

## Q

- QALSND A RPG program 286
- QALSNDCLP CL Program 285
- QPFMONMCHK CL Program 285

## R

- RCVDTAQ CL Program 288
- relationship between message files and alert tables 52
- Remote Monitoring 165
  - AS/400 RUNCMD Program Listing 291
  - CLIST SBSCHK 165
  - NetView remote operation 165
  - NetView remote operation example 165
  - SMAO/400 Remote subsystem monitoring 168
- Remote operation
  - AS/400 as a focal point 135
  - AS/400 as a Focal Point using RUNCMD 139
  - AS/400 as a Focal Point using RUNCMD to an OS/2 139
  - AS/400 as a Focal Point using RUNCMD to LAN Network Manager 148
  - AS/400 as a Focal Point using RUNCMD to RS/6000 and NetView/6000 150
  - AS/400 RUNCMD Program Listing 291
  - Change Management 136
  - HCF/DHCF 150
  - Introduction 135
  - LAN Network Manager 135
  - NetView as a Focal Point for AS/400 150
  - NetView Distribution Manager 150
  - NetView for OS/2 135
  - NetView hardware monitor 150
  - NetView Remote Operations Agent/400 151, 223
  - NetView Remote Operations for AS/400 151, 223
  - NetView Remote Operations for AS/400
    - Automation 185
  - NetView Remote Operations Manager
    - MVS/ESA 151, 223
  - NetView remote operations using RODM
    - method 188
  - NetView/6000 135
  - NRF 150
  - OPERATE command 135
  - Problem Management 136
  - Processing an Alert Sent to a Data Queue 194
  - Remote operation 135
  - RS/6000 Service point 135
  - RUNCMD command 135, 139, 148, 150
  - Sending an Alert using OS/400 APIs 189
  - SMAO 151
    - SMAO/400 Remote Operations 155
  - SNA Primary LU Support 151
  - SPLS 151
  - SystemView System Manager/400 135

- RODM method 188
- RS/6000
  - AIX NetView Service Point Program 94
  - Alert support 85
  - RS/6000 with SNA/Server or NetView Service Point 216
  - TCP/IP example 90
- RS/6000 Running AIX 85
- RS/6000 Running AIX AS/400 Connection Program/6000 Version 2 85
- RS/6000 Running AIX NetView Service Point Program 94
- RS/6000 Service point 135
- RS/6000 with SNA/Server or NetView Service Point 216
- RUNCMD command 135
- RUNCMD Program Listing 291

## S

- Schedule 269
- SDF job monitoring for SMAO 162
- Sending an Alert using OS/400 APIs 189
- SMAO (Systems Management Automation Offering)
  - Automated Enterprise Job Scheduling and Tracking 255
  - Central Accounting of Distributed Resources 255
  - Enterprise reporting 255
  - functional description 254
  - functions 253
  - IBM Service Level Reporter 255
  - Operational environment 257
  - overview 18
  - Problem notification 254
  - remote subsystem monitoring 168
  - Reports 255
  - SMAO/400 Remote Operations 155
- SMAO/400 Remote Operations 155
  - AS/400 job tracker function 164
  - AS/400 Jobs 158
  - Command panel 156
  - Function Overview 156
  - JCL for AS/400 job 160
  - OPC/ESA Interface 160
  - SDF job monitoring 162
- SMAO/400 remote subsystem monitoring
  - add message in table entry 170
  - AS/400 message table 169
  - AS/400 setup 169
  - Function overview 169
  - Message server 171
  - Scenario 173
  - SMAO main menu 169
- SNA Alert Format 202
- SNA Generic Alert Code Points 209
- SNA Generic Alerts 201
- SNA Primary LU Support 151
- Sphere of Control 32
  - Adding a system 35
- Sphere of Control (*continued*)
  - Display Status 35
  - New focal point 34
  - Node status 32
  - Primary focal point 32
  - Removing a system 35
- Sphere of Control - Node status
  - Active 32, 33
  - Add pending 33
  - Inactive 32, 33
  - Never active 33
  - Rejected 33
  - Remove pending 33
  - Revoked 32, 33
- SPLS 151
- Systems Management Automation Offering (SMAO) 253
- Systems Management Automation Offering, see SMAO
- SystemView
  - benefits 7
  - IBM AUTOMATED FACILITIES/400 219
  - IBM AUTOMATION CENTER/400 as a SystemView Product 219
  - IBM AUTOMATION CENTER/400 in a network 219
  - IBM AUTOMATION CENTER/400 in a Stand-Alone Environment 219
  - IBM OMEGAMON/400 219
  - IBM OMEGAVIEW/400 219
  - introduction 6
  - NetView Remote Operations Agent/400 223
  - NetView Remote Operations for AS/400 223
  - NetView Remote Operations Manager MVS/ESA 223
  - structure 7
- SystemView System Manager/400 135
- SystemView System Manager/400 Problem and Change Management 136



**AS/400 Network Management Guide****Publication No. GG24-4154-00**

Your feedback is very important to help us maintain the quality of ITSO Bulletins. **Please fill out this questionnaire and return it using one of the following methods:**

- Mail it to the address on the back (postage paid in U.S. only)
- Give it to an IBM marketing representative for mailing
- Fax it to: Your International Access Code + 1 914 432 8246
- Send a note to REDBOOK@VNET.IBM.COM

**Please rate on a scale of 1 to 5 the subjects below.**

**(1 = very good, 2 = good, 3 = average, 4 = poor, 5 = very poor)**

<b>Overall Satisfaction</b>	_____	
Organization of the book	_____	Grammar/punctuation/spelling _____
Accuracy of the information	_____	Ease of reading and understanding _____
Relevance of the information	_____	Ease of finding information _____
Completeness of the information	_____	Level of technical detail _____
Value of illustrations	_____	Print quality _____

**Please answer the following questions:**

- a) If you are an employee of IBM or its subsidiaries:
- |  |                  |
|--|------------------|
| Do you provide billable services for 20% or more of your time? | Yes_____ No_____ |
| Are you in a Services Organization?                            | Yes_____ No_____ |
- b) Are you working in the USA? Yes\_\_\_\_\_ No\_\_\_\_\_
- c) Was the Bulletin published in time for your needs? Yes\_\_\_\_\_ No\_\_\_\_\_
- d) Did this Bulletin meet your needs? Yes\_\_\_\_\_ No\_\_\_\_\_
- If no, please explain:

\_\_\_\_\_

\_\_\_\_\_

What other topics would you like to see in this Bulletin?

\_\_\_\_\_

\_\_\_\_\_

What other Technical Bulletins would you like to see published?

\_\_\_\_\_

**Comments/Suggestions: ( THANK YOU FOR YOUR FEEDBACK! )**

\_\_\_\_\_  
Name

\_\_\_\_\_  
Address

\_\_\_\_\_  
Company or Organization

\_\_\_\_\_  
Phone No.



Fold and Tape

Please do not staple

Fold and Tape



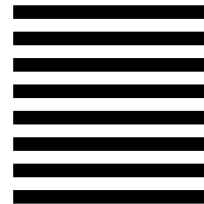
## BUSINESS REPLY MAIL

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

POSTAGE WILL BE PAID BY ADDRESSEE

IBM International Technical Support Organization  
Department 545, Building 657  
P.O. BOX 12195  
RESEARCH TRIANGLE PARK NC  
USA 27709-2195

NO POSTAGE  
NECESSARY  
IF MAILED IN THE  
UNITED STATES



Fold and Tape

Please do not staple

Fold and Tape





Printed in U.S.A.

GG24-4154-00

